JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH. IN ELECTRONICS AND INSTRUMENTATION ENGINEERING
EFFECTIVE FROM ACADEMIC YEAR 2019-20 ADMITTED BATCH

R19 COURSE STRUCTURE AND SYLLABUS

I YEAR I – SEMESTER

Course Code	Course Title	L	T	P	Credits
Professional Core - I	Transducers and Applications	3	0	0	3
Professional Core - II	Signal Conditioning Circuits	3	0	0	3
Professional Elective - I	1. Advanced Microcontrollers 2. Electronic System Design 3. Transform Techniques	3	0	0	3
Professional Elective - II	1. Digital Instrumentation 2. Advanced Digital Signal Processing 3. Neural Networks and Fuzzy Logic	3	0	0	3
Lab - I	Transducers and Applications Lab	0	0	3	2
Lab - II	Data Acquisition and simulation Lab	0	0	3	2
	Research Methodology & IPR	2	0	0	2
Audit - I	Audit Course - I	2	0	0	0
	Total	**16**	**0**	**6**	**18**

I YEAR II – SEMESTER

Course Code	Course Title	L	T	P	Credits
Professional Core - III	Process Instrumentation & Control	3	0	0	3
Professional Core - IV	Virtual Instrumentation	3	0	0	3
Professional Elective - III	1. Analytical Instrumentation 2. Image and Video Processing 3. Data Acquisition & PC based Instrument	3	0	0	3
Professional Elective - IV	1. Industrial Automation 2. Quality & Reliability of Electronic System 3. EMI/EMC	3	0	0	3
Lab - III	Process Instruments & Control Lab	0	0	3	2
Lab - IV	Virtual Instrumentation Lab	0	0	3	2
	Mini project with Seminar	0	0	4	2
Audit - II	Audit Course - II	2	0	0	0
	Total	**14**	**0**	**10**	**18**

III SEMESTER

Category	Course Title	L	T	P	Credits
Professional Elective - V	1. IoT and Its Applications 2. Pattern Recognition & Machine Learning 3. Medical Electronics	3	0	0	3
Open Elective	Open Elective	3	0	0	3
Dissertation	Dissertation Work Review - II	0	0	12	6
	Total	**6**	**0**	**12**	**12**

II YEAR II - SEMESTER

Course Code	Course Title	L	T	P	Credits
Dissertation	Dissertation Work Review - III	0	0	12	6
Dissertation	Dissertation Viva-Voce	0	0	28	14
	Total	**0**	**0**	**40**	**20**

***For Dissertation Work Review - I, Please refer 7.8 in R19 Academic Regulations.**

Audit Course I & II:

1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Stress Management by yoga
8. Personality Development Through Life Enlightenment Skills

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

TRANSDUCERS AND APPLICATIONS (PC – I)

Course Objectives:

- To understand Static and Dynamic Characteristics of Measuring Systems
- To learn the concepts of various measuring devices to measure physical parameters like displacement, temperature, pressure, flow.
- To learn the concepts of transducers for measuring acceleration, velocity, force, torque etc.

Course Outcomes: On successful completion of this course the student will be able to;

- Identify suitable sensors and transducers for real time applications.
- Translate theoretical concepts into working models.
- Design the experimental applications to engineering modules and practices.
- Design engineering solution to the Industry/Society needs and develop products.

UNIT-I

Introduction to Measurement Systems General concepts and terminology, measurement systems, sensor classification, static characteristics of measurement systems-accuracy, linearity, resolution, precision and sensitivity etc. estimation of errors. Dynamic characteristics of measurement systems. Zero order first-order and second-order measurement systems and response.

UNIT-II

Measuring Devices Displacement and Temperature Displacement Resistive Potentiometer, Resistive strain gauges inductive displacement transducer, Capacitive Displacement Transducers, Piezo Electric Transducers, Ultrasonic Methods. Temperature Thermal expansion methods, Thermo electric, radiation methods thermal and photon detectors-based thermometers.

Measuring Devices Pressure and Flow Pressure Methods of pressure measurement: Dead weight gauges and manometers, elastic transducers, high pressure measurement. Flow Anemometers, velocity sensors obstruction meters, averaging Pitot tubes, Rota meters, Electromagnetic, Vortex shedding, Ultrasonic Flow meters.

UNIT-III

Measuring Devices Velocity and Acceleration Seismic displacement, velocity and acceleration pickups (Accelerometers). Gyroscopic angular displacement and velocity sensors. Force and Torque: Methods of force measurement and characteristics, Bonded strain gauge, Variable Reluctance, Piezo Electric Transducer, Torque measuring on rotating shafts.

UNIT-IV

Measuring Devices Humidity, Density and Radiation Capacitive, Impedance and Piezoelectric Hygrometers Differential Pressure, U-tube and ultrasonic Densitometers, pH measurement- Ion Selective Type; Viscosity Measurement; Radiation Detectors - Radiation Thermometers and Optical Pyrometers.

UNIT-V

Digital Sensors Position encodes variable frequency sensors-quartz digital thermometer, SAW sensors, digital flow meters, sensors based on semiconductor junctions: thermometers based on semiconductor junctions, magneto diodes and magneto transistors, photodiodes and phototransistors, charge-coupled sensors.

TEXT BOOKS:

1. Measurement Systems, E. O. Doeblin, Mc-Graw Hill Publication
2. Transducers and Instrumentation, D.V.S. Murthy, PHI Publication
3. Sensors & Transducers, D. Patranbis, Wheeler Publishing

REFERENCES:

1. Instrument transducers, H.K. P Neubert, Oxford University Press.
2. Process Measurement and Analysis, B.G. Liptak, ISA Publication 4th edition
3. A Text Book of Mechanical Measurements and Instrumentation, A.K. Sawhney.
4. Mechanical Measurements, E. O. Doeblin, Mc-Graw Hill Publication.
5. Transducer Engineering, Ranganathan. S, Allied Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

SIGNAL CONDITIONING CIRCUITS (PC – II)

Course Objectives:

- To understand the working principle and design of various analog signal conditioning circuits used in industrial applications.
- To impart knowledge on the design of signal conditioning circuits
- To impart the knowledge of various measurement methods of physical parameters like velocity, acceleration, torque, pressure, flow, temperature etc. and their relevance to Industry.

Course Outcomes: On successful completion of this course the students should be able to;

- **Understand** principle of working of various signal conditioners used with Temperature, Displacement, optical and various miscellaneous other sensors.
- **Design** signal conditioning circuits for various transducers.
- **Understand** applications of various signal conditioners used in industry.
- Capable of selecting best suited signal conditioners for any given application.

UNIT-I

Signal Conditioning for Resistive Sensors: Measurement of Resistance, Voltage Dividers Wheatstone Bridge: Balance Measurements, Detection Measurements, Differential and Instrumentation Amplifiers, Interference.

Signal Conditioning for Self-Generating Sensors: Chopper and Low-Drift Amplifiers, Electrometer and Transimpedance Amplifiers, Charge Amplifiers, Noise in Amplifiers, Noise and Drift in Resistors.

UNIT-II

Temperature Sensors Interfacing: Thermo Switches, Thermocouples Interfacing – Thermo switches, Ambient Referenced Thermocouples, Isolated Thermocouple Measurement, Thermocouple to Frequency, Thermocouple to 4to20 m A Temperature Transmitter, Isolated Multiplexing of Thermocouples RTD"s Interfacing - Single Op Amp Interface, using a Signal Conditioner, Bridge configuration using 3wire RTD, Linearizing RTD Circuits, Current Transmitters for RTD Outputs, RTD Based Precision controller

UNIT-III

Semiconductor Temperature sensors Interfacing Thermistor Interfacing - Simple Interface Circuits, High-resolution Differential Thermometer, Current Transmitters, Thermistor to Frequency Conversion T to F Conversion using Diodes, Absolute Temperature to current Conversion, Temperature Control Circuits, Multiplexed Applications, Isolation, 4to20 m A Current Transmission

UNIT-IV

Pressure and Force Transducers Interfacing Pressure Transducer Interfacing - Strain Gauge Based Transducers, Potentiometer to Frequency Transducer, Interfacing High level Semiconductor Transducers, Isolated Pressure Transmitter, Pressure Control System Force Transducer Interfacing - Spring Driven Rheostat, Strain gauge & Signal Conditioner, High Resolution Load Cell Platform, Interface, Strain Gauge to Frequency Conversion, Isolators & Transmitters

UNIT-V

Flow meters and Level Transducers Interfacing Flow Meter Interfacing - Differential Pressure Flow meters, Frequency output Flowmeters, Anemometers, Hinged Vane, Flowmeter, Thermal Flow Meter,

Transmission & Readout level Transducers Interfacing - Float & Potentiometer, Optical Sensing & Thermal Sensing

TEXT BOOKS:

1. Raman Pallas Areny, John G. Webster, Sensors and Signal Conditioning, second edition, John Wiley and Sons (I,II UNITS)
2. Transducer Interfacing Handbook A Guide to Analog Signal Conditioning, Edited by Daniel H Sheingold Analog Devices Publications. (III, IV, V, VI UNITS)

REFERENCES:

1. Op Amp Applications Handbook, Walt Jung, Editor, Elsevier
2. Robert B. Northrop, Introduction to Instrumentation and measurement-second edition- Taylor &Francis group

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

ADVANCED MICROCONTROLLERS (PE - I)

Prerequisite: Microprocessors and Microcontrollers

Course Objectives

1. Explore the architecture and instruction set of ARM processor.
2. To provide a comprehensive understanding of various programs of ARM Processors.
3. Learn the programming on ARM Cortex M.

Course Outcomes: After completing this course the student will be able to:

1. To explore the selection criteria of ARM processors by understanding the functional level trade off issues.
2. Explore the ARM development towards the functional capabilities.
3. Expected to work with ASM level program using the instruction set.
4. Understand the architecture of ARM Cortex M and programming on it.

UNIT I

ARM Embedded Systems: RISC design philosophy, ARM design philosophy, Embedded system hardware, Embedded system software.

ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions Interrupts and Vector Table, Core Extensions, Architecture Revisions, ARM Processor Families.

Architecture of ARM Processors: Introduction to the architecture, Programmer's model- operation modes and states, registers, special registers, floating point registers, Behaviour of the application program status register(APSR)-Integer status flags, Q status flag, GE bits, Memory system-Memory system features, memory map, stack memory, memory protection unit (MPU), Exceptions and Interrupts-what are exceptions?, nested vectored interrupt controller(NVIC), vector table, Fault handling, System control block (SCB), Debug, Reset and reset sequence.

UNIT II

Introduction to the Arm Instruction Set: Data processing instructions, branch instructions, load-store instructions, software interrupt instructions, program status register instructions, loading constants, ARMv5E extensions, Conditional execution.

Introduction to the Thumb Instruction Set: Thumb Register Usage, ARM-Thumb Interworking, Other Branch Instructions, Data Processing Instructions, Single-Register Load-Store Instructions, Multiple-Register Load-Store Instructions, Stack Instructions, Software Interrupt Instruction.

UNIT III

Technical Details of ARM Cortex M Processors: General information about Cortex-M3 and cortex M4 processors-Processor type, processor architecture, instruction set, block diagram, memory system, interrupt and exception support, Features of the cortex-M3 and Cortex-M4 Processors-Performance, code density, low power, memory system, memory protection unit, interrupt handling, OS support and system level features, Cortex-M4 specific features, Ease of use, Debug support, Scalability, Compatibility.

UNIT -IV

Instruction SET of ARM Cortex M Background to the instruction set in ARM Cortex-M Processors, Comparison of the instruction set in ARM Cortex-M Processors, understanding the assembly

language syntax, Use of a suffix in instructions, Unified assembly Language (UAL), Instruction set, Cortex-M4-specific instructions, Barrel shifter, Accessing special instructions and special registers in Programming.

UNIT -V

Floating Point Operations About Floating-Point Data, Cortex-M4 Floating Point Unit (FPU)-overview, FP registers overview, CPACR register, Floating point register bank, FPSCR, FPU->FPCCR, FPU-> FPCAR, FPU->FPDSCR, FPU->MVFR0, FPU->MVFR1. ARM Cortex-M4 and DSP Applications: DSP on a microcontroller, Dot Product example, writing optimized DSP code for the Cortex M4-Biquad filter, Fast Fourier transform, FIR filter.

TEXTBOOKS:

1. ARM System Developer's Guide Designing and Optimizing System Software by Andrew N. SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier Publications, 2004.
2. The Definitive Guide to ARM Cortex-M3 and Cortex-M4 Processors by Joseph Yiu, Elsevier Publications, 3rd Ed.,

REFERENCES:

1. Arm System on Chip Architectures – Steve Furber, Edison Wesley, 2000.
2. ARM Architecture Reference Manual – David Seal, Edison Wesley, 2000.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

ELECTRONIC SYSTEM DESIGN (PE - I)

UNIT -I

Analog and Digital Circuit Design of Circuits: Analog and digital circuit design of circuits for biomedical applications using operational amplifiers, data acquisition, conversion, and interface to microcomputers. Patient safety, patient isolation circuits. Operating principles of various types of patient isolation circuitry. Most suitable isolation circuit for a given application. Test isolation circuits.

UNIT -II

Data Acquisition: Sample and Hold Conversion, Multi Channel acquisition, High speed sampling in ADC, Selection of drive amplifier for ADC performance, Gain setting and level shifting, ADC input protection, Multichannel channel applications for data acquisition systems, External protection of amplifiers, High speed ADC architectures.

UNIT -III

Interference and Noise Reduction Techniques: Types of noise-Thermal noise, shot noise, excess noise, Burst, Internal noise in OPAMPs, Noise issues in high speed applications, Causes of noise and interference encountered in medical equipment. Manifestation of noise or interference. Techniques for minimizing the impact of noise or interference when using various types of medical equipment.

UNIT -IV

Hardware Approach to Digital Signal Processing: Coherent and non-coherent sampling, Digital signal processing techniques, DSP hardware, ALU, Multipliers, accumulators, data address generators, serial ports, system interfacing ADC's and DAC's to DSPs. Interfacing IO ports to DSPs.

UNIT -V

Use of Telemetry in A Medical Environment: Available frequency bands and licensing requirements for RF telemetry environments. Typical telemetry methods used in medical applications. Common problems with telemetry installations. Battery management procedures. Types of batteries used in medical equipment. Typical shelf life of common batteries. Applications for common batteries. Techniques to improve life of batteries. Test equipment for correct function after battery replacement.

TEXT BOOKS:

1. Halit Eren, "Electronic portable instruments-Design and applications", CRC Press, 2004.
2. Robert B. Northrop, "Analysis and application of analog electronic circuits to biomedical instrumentation", CRC Press, 2004.

REFERENCE BOOKS:

1. Reinaldo J. Perez, "Design of medical electronic devices", Academic Press, 2002.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

TRANSFORM TECHNIQUES (PE - I)

Prerequisite: None

Course Objectives

1. To learn basics of two-dimensional transform.
2. Understand the various two-dimensional transform definition, properties and applications.
3. Understand the design of filter Bank structure.
4. To learn the fundamentals of wavelet transform and special wavelets.

Course Outcomes: On completion of this course student will be able to:

1. The student will learn basics of two-dimensional transforms.
2. Understand the definition, properties and applications of various two-dimensional transform.
3. Understand the basic concepts of wavelet transform.
4. Understand the special topics such as wavelet packets, Bi-orthogonal wavelets e.t.c.

UNIT -I

Fourier Analysis: Vector space, Hilbert spaces, Fourier basis, FT- Limitations of Fourier Analysis, Need for time-frequency analysis, DFT, 2D-DFT: Definition, Properties and Applications, IDFT, Hilbert Transform, STFT.

UNIT -II

Transforms: Walsh, Hadamard, Haar and Slant Transforms, DCT, DST, KLT– Definition, Properties and applications.

UNIT -III

Continuous Wavelet Transform (CWT): Short comings of STFT, Need for wavelets, Wavelet Basis- Concept of Scale and its relation with frequency, Continuous time wavelet Transform Equation- Series Expansion using Wavelets, CWT, Tiling of time scale plane for CWT, Important Wavelets: Haar, Mexican Hat, Meyer, Shannon, Daubechies.

UNIT -IV

Multi Rate Analysis and DWT: Need for Scaling function, Multi Resolution Analysis, Two-Channel Filter Banks, Perfect Reconstruction Condition, Relationship between Filter Banks and Wavelet Basis, DWT, Structure of DWT Filter Banks, Daubechies Wavelet Function, Applications of DWT.

UNIT -V

Special Topics: Wavelet Packet Transform, Multidimensional Wavelets, Bi-orthogonal basis- B-Splines, Lifting Scheme of Wavelet Generation, Multi Wavelets.

TEXT BOOKS

1. Wavelet Transforms-Introduction theory and applications -Raghuveer M. Rao and Ajit S. Bopardikar, Pearson Edu, Asia, New Delhi, 2003.
2. “Insight into Wavelets from Theory to practice “, Soman. K. P, Ramachandran. K.I, Prentice Hall India, First Edition, 2004.

REFERENCES:

1. "Fundamentals of Wavelets- Theory, Algorithms and Applications", Jaideva C Goswami, Andrew K Chan, John Wiley & Sons, Inc, Singapore, 1999.
2. "Wavelets and sub-band coding", Vetterli M. Kovacevic, PJI, 1995.
3. "Introduction to Wavelets and Wavelet Transforms", C. Sydney Burrus, PHI, First Edition, 1997.
4. "A Wavelet Tour of Signal Processing", Stephen G. Mallat, Academic Press, Second Edition, 2008.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

DIGITAL INSTRUMENTATION (PE - II)

UNIT -I

Data Acquisition Systems: Overview of A/D converter, Types and characteristics – Sampling, Errors, Objective, Building blocks of Automation systems, Counters, Modes of operation- Frequency, Period, Time interval measurements, Pre-scalar, Heterodyne converter for frequency measurement, Single and Multichannel Data Acquisition systems.

UNIT -II

Interfacing and Data Transmission: Data transmission systems, 8086 Microprocessor based system design, Peripheral Interfaces, Time Division Multiplexing (TDM), Digital Modulation–Pulse Modulation, Pulse Code Format – Interface systems and standards, Communications.

UNIT -III

Instrumentation Bus: Introduction, Modem standards, Basic requirements of Instrument, Bus standards, Bus communication, interrupt and data handshaking, Interoperability, Interchangeability for RS-232, USB, RS-422, RS-485.

UNIT -IV

Parallel Port Buses: Field bus, Mod bus, GPIB, IEEE-488, VME, VXI, Network buses– Ethernet, TCP/IP protocols; CAN bus- Basics, Message transfer, Fault confinement.

UNIT -V

Case Studies: PC based DAS, Data loggers; PC based industrial process measurements like flow, temperature, pressure and level development system, CRT interface and controller with monochrome and color video display.

TEXT BOOKS:

1. A.J. Bouwens, “Digital Instrumentation”, TATA McGraw-Hill Edition, 1998.
2. H S Kalsi, “Electronic Instrumentation”, 2nd Edition, Tata McGraw-Hill, 2006.

REFERENCE BOOKS:

1. N. Mathivanan, “Microprocessors, PC Hardware and Interfacing”, Prentice-Hall India, 2005.
2. Joseph J. Carr, “Elements of Electronic Instrumentation and Measurements”, 3rd Edition, Pearson Education, 2003.
3. Buchanan, “Computer Busses”, Arnold, London, 2000.
4. Jonathan W Valvano, “Embedded Microcomputer Systems”, Asia Pvt. Ltd., Brooks/Cole, Thomson, 2001.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

ADVANCED DIGITAL SIGNAL PROCESSING (PE – II)

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

1. To understand theory of different filters and algorithms
2. To understand theory of multirate DSP, solve numerical problems and write algorithms
3. To understand theory of prediction and solution of normal equations
4. To know applications of DSP at block level.

UNIT I

Overview of DSP, Characterization in time and frequency, FFT Algorithms, Digital filter design and structures: Basic FIR/IIR filter design &structures, design techniques of linear phase FIR filters,IIR filters by impulse invariance, bilinear transformation, FIR/IIR Cascaded lattice structures, parallel realization of IIR.

UNIT-II

Multi rate DSP, Decimators and Interpolators, Sampling rate conversion, multistage decimator & interpolator, poly phase filters, QMF, digital filter banks, Applications in subband coding.

UNIT-III

Linear prediction & optimum linear filters, stationary random process, forward-backward linear prediction filters, solution of normal equations, AR Lattice and ARMA Lattice-Ladder Filters, Wiener Filters for Filtering and Prediction.

UNIT-IV

Adaptive Filters, Applications, Gradient Adaptive Lattice, Minimum mean square criterion, LMS algorithm, Recursive Least Square algorithm

UNIT-V

Estimation of Spectra from Finite-Duration Observations of Signals. Nonparametric Methods for Power Spectrum Estimation, Parametric Methods for Power Spectrum Estimation, Minimum-Variance Spectral Estimation, Eigen analysis Algorithms for Spectrum Estimation.

TEXTBOOKS:

1. J. G. Proakis and D.G. Manolakis, “Digital signal processing: Principles, Algorithm and Applications”, 4th Edition, Prentice Hall, 2007.
2. N. J. Fliege, “Multirate Digital Signal Processing: Multirate Systems -Filter Banks – Wavelets”, 1st Edition, John Wiley and Sons Ltd, 1999.

REFERENCES:

1. Bruce W. Suter, “Multirate and Wavelet Signal Processing”,1st Edition, Academic Press, 1997.
2. M. H. Hayes, “Statistical Digital Signal Processing and Modeling”, John Wiley & Sons Inc., 2002.
3. S. Haykin, “Adaptive Filter Theory”, 4th Edition, Prentice Hall, 2001.
1. D. G. Manolakis, V. K. Ingle and S. M. Kogon, “Statistical and Adaptive Signal Processing”, McGraw Hill, 2000

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

NEURAL NETWORKS AND FUZZY LOGIC (PE – II)

Course Objectives: Student will be able to

1. To cater the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling realtime systems.
2. To expose the students to the concepts of feed forward Neural Networks and about feedback Neural Networks
3. To teach about the concepts of Fuzziness involved in various systems and comprehensive knowledgeof Fuzzy logic control and to design the Fuzzy control

Course Outcomes: On successful completion of this course, it is expected that students should be able to

1. Understand the concepts of feed forward neural networks.
2. Acquire adequate knowledge about feedback neural networks.
3. Acquire the concept of fuzziness involved in various systems.
4. Acquire knowledge about fuzzy set theory.

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 NeuronModel, 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 ofNeuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, NeuralDynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), LearningRules, 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 Back propagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, LearningDifficulties 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 BAMStability Theorem

Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, StabilityAnalysis, 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 VectorQuantization, Stability-Plasticity Dilemma, Feed forward competition, Feedback Competition, Instar, Outstar, ART1, ART2, Applications.

Classical and 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.

REFERENCES:

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 Haykin Pearson Education
4. Neural Engineering by C. Eliasmith and CH. Anderson, PHI
5. Neural Networks and Fuzzy Logic System by Bork Kosko, PHI Publications

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

TRANSDUCERS AND APPLICATIONS LAB (Lab – I)

Course Objectives

1. Know the various types of error in instruments
2. Obtain the knowledge about various types of Sensors & Transducers and their working principle
3. Understand the various types of transducers like Resistive, Capacitive and Inductive
4. Learn some of the miscellaneous transducers

Course outcomes

1. An ability to know the standards to measure and to compute the statistical error analysis
2. An ability to analyze and understand various sensors based on its classification and working principle.
3. An ability to identify the problem use the appropriate sensors with resistive, capacitive inductive or any other modern sensor technologies like fiber optic MEMS, nano, etc for multidisciplinary applications.

List of Experiments:

1. Characteristics of Strain gauge
2. Characteristics of load cell
3. Characteristics of thermistor
4. Characteristics of RTD
5. Characteristics of Thermocouple
6. Loading effect of Potentiometer
7. Characteristics of Synchros
8. Characteristics of LVDT
9. Characteristics of Piezo-electric transducer
10. Characteristics of Hall-effect transducer

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

DATA ACQUISITION AND SIMULATION LAB (Lab – II)

Course Objectives:

1. To acquire knowledge about design of filters used in signal conditioning.
2. To demonstrate methods of real time data acquisition.
3. To analyze real time data for various applications.

Course Outcomes: After successful completion of this course, the students should be able to

1. Analyze various filters for different applications.
2. Formulate methods of real time data acquisition.
3. Predict action to be taken based on data obtained.

List of Experiments:

1. Design and simulation of RLC filter circuits.
2. Acquisition and analysis of real time ECG signal.
3. Measurement and detection of strain relief using EMG signal.
4. Speed control of a DC motor using LabVIEW.
5. Tank level control using LABVIEW.
6. Data acquisition of a given sensor using NI DAQ card
7. ON/OFF Temperature control of a water bath using NI DAQ card
8. Development of simple database application and publishing it in the web.
9. Image processing using LabVIEW
10. Design of virtual oscilloscope
11. Data acquisition and storage using file handling tools.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

RESEARCH METHODOLOGY AND IPR

Prerequisite: None

Course Objectives:

- To understand the research problem
- To know the literature studies, plagiarism and ethics
- To get the knowledge about technical writing
- To analyze the nature of intellectual property rights and new developments
- To know the patent rights

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

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

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. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

TEXT 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”

REFERENCES:

1. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners”
2. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
3. Mayall, “Industrial Design”, McGraw Hill, 1992.
4. Niebel, “Product Design”, McGraw Hill, 1974.
5. Asimov, “Introduction to Design”, Prentice Hall, 1962.
6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “Intellectual Property in New Technological Age”, 2016.
7. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

PROCESS INSTRUMENTATION AND CONTROL (PC – III)

Course Objectives:

- To understand the basic characteristics of first order and higher order processes.
- To acquire knowledge about the characteristics of various controller modes and methods of tuning of controller.
- To acquire knowledge on the construction, characteristics and application of control valves.
- To study the UNIT operations and a case study of distillation column control

Course Outcomes: On successful completion of this course students will be able to:

- Determine the mathematical model for real-time first and higher order systems.
- Design various controller modes with appropriate tuning
- Implement advanced control schemes for various processes
- Ability to Analyze Multivariable Systems and Design Multi-variable and Multi-loop
- Control Schemes for various processes

UNIT- I:

Introduction: Need for process control, Design aspects of process control system, Process degree of freedom. Mathematical model of first order processes: level, pressure and thermal processes Second order process: Interacting and non-interacting processes, State space modelling Discrete time systems, analog to digital and digital to analog conversion, sampling of continuous time signal, conversion of discrete time to continuous time signal with zero and first order holds, z-transform.

UNIT- II

Basic Single Loop Control Actions: Characteristics and dynamics of Discrete Control Modes: ON-OFF, Multi Speed, Floating Controllers. Characteristics and dynamics of feedback control modes: Proportional, Integral and Derivative control modes P+I, P+D and P+I+D control modes

P-I-D Controller Tuning and Stability Analysis

Tuning of Controllers: Evaluation criteria IAE, ISE, ITAE and **¼ decay ratio** Tunings Process reaction curve method Ziegler Nichols method Damped oscillation method, Digital PID Algorithm. Dahlin's algorithm, deadbeat controller.

UNIT- III

MIMO Systems -Multiloop Control:

MIMO Systems: Multi loop Controllers: Feed-forward control ratio control- cascade control adaptive split-range control multivariable control Multi variable IMC- Model based Predictive Controller examples from distillation column and boiler systems.

UNIT- IV

Final Control Element: I/P converter pneumatic and electric actuators valve positioner control valves characteristics of control valves inherent and installed characteristics control valve sizing cavitation and flashing selection criteria.

UNIT- V

Industrial Applications:

Dynamics of Four tank system, CSTR, pH neutralization process Distillation column and Modern control practices in: Power plants, pharmaceuticals and petrochemicals industries.

TEXT BOOKS:

1. G. Stephanopoulos, Chemical Process Control, Prentice Hall of India, New Delhi, 1990.
2. Bela. Liptak, Process Control,
3. Curtis Johnson, Process Control Instrumentation Technology, Prentice Hall India.

REFERENCES:

1. B. Wayne Bequette, “Process Control: Modeling, Design, and Simulation”, Prentice Hall of India,2004.
2. Pollard A. Process Control, Heinemann educational books, London, 1971.
3. Eckman. D.P., Automatic Process Control, Wiley Eastern Ltd., New Delhi, 1993.
4. S. K. Singh, Process Control, PHI Publications, New Delhi 2010.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

VIRTUAL INSTRUMENTATION (PC – IV)

Course Objectives: Student will be able to

1. It provides new concepts towards measurement and automation.
2. It gives knowledge about how to control an external measuring device by interfacing a computer.
3. To become competent in data acquisition and instrument control.
4. It gives knowledge networking

Course Outcomes: On successful completion of this course, it is expected that students should be able to

1. Acquire knowledge on how virtual instrumentation can be applied for data acquisition and instrument control.
2. Identify salient traits of a virtual instrument and incorporate these traits in their projects.
3. Experiment, analyze and document in the laboratory prototype measurement
4. Acquire knowledge on developing different applications in Digital image processing control system, signalprocessing and in simulation systems using a computer, plug-in DAQ interfaces and bench level instruments

UNIT - I:

Virtual Instrumentation: Historical perspective, advantages, block diagram and architecture of a virtualinstrument, data-flow techniques, graphical programming in data flow, comparison with conventionalprogramming. Development of Virtual Instrument using GUI, Real-time systems, Embedded Controller, OPC,HMI / SCADA software, Active X programming.

UNIT - II:

VI Programming Techniques: VIs and sub-VIs, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, Publishing measurement data in the web.

UNIT - III:

VI Chassis Requirements: Common Instrument Interfaces: Current loop, RS 232C/ RS485, GPIB. VISA and IVI.

Application of Virtual Instrumentation: Instrument Control, Signal Measurement and generation: DataAcquisition

UNIT - IV:

Advanced LabVIEW Data Concepts: Advanced file I/O, Configuring INI files, Calling code from other languages, Fitting Square Pegs into round holes: Advanced.

Connectivity in Lab VIEW: Lab VIEW web server, E-mailing data from Lab VIEW, Remote Panels, Self-describing data, shared variables, talking to other programs and objects, talking to other computers, database, report generation.

UNIT - V:

Simulation of systems using VI, Development of Control system, Industrial communication, Image acquisition and processing, Motion control.

TEXT BOOKS:

1. Gary Johnson, LabVIEW Graphical Programming, 2nd edition, McGraw Hill, New York, 1997.
2. Lisa K. wells & Jeffrey Travis, LabVIEW for everyone, Prentice Hall, New Jersey, 1997.

REFERENCES:

1. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes, 2000.
2. Rick Bitter, LabVIEW advanced programming technique, 2nd Edition, CRC Press,2005
3. Jovitha Jerome, Virtual Instrumentation using LabVIEW, 1st Edition, PHI, 2001.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

ANALYTICAL INSTRUMENTATION (PE – III)

Course Objectives: Student will be able to

1. Understand whole array of modern analytical instrumentation with the goal of providing them with the tools to further apply them in industry.
2. Acquire “hands-on" approach with sample preparation, theory, application, method development, data analysis and interpretation being key elements.
3. Qualitative and quantitative analysis of chemical compounds.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

1. Observe basic lab safety rules while working in analytical chemistry laboratories
2. Appreciate basic analytical processes and sampling procedures
3. Appreciate the basic principles of spectroscopy
4. Perform simple analytical procedures on given samples using Ultraviolet or Infrared
5. Spectrophotometers and Interpret data derived from the above.

UNIT - I:

Electrochemical Instruments: Basic concepts of Analytical instrumentation, Electro chemical instruments- pH meter, Conductivity meter, Dissolved oxygen analyzers using Polarographic principle – sodium analyzer- silica analyzers– Polarographic Instruments.

UNIT - II:

Absorption Spectrophotometers-I: UV, VIS spectrophotometers – single beam and double beam instruments – instrumentation associated with the above spectrophotometers – sources and detectors, IR SPM– sources and detectors for IR spectrophotometers, FTIR, Raman Spectroscopy, Interpretation & Analysis.

Emission Spectrophotometers-II: Flame emission and atomic absorption spectrophotometer – Atomic emission spectrophotometer – sources for Flame Photometers and online calorific value measurements**.**

UNIT - III:

Gas and Liquid Chromatographs: Basic principle of gas chromatography, liquid chromatography, HPLC different types of columns, detectors, recorders and associated equipment, Salient features of liquid chromatography, Detectors used, applications of high pressure liquid chromatography, Interpretation and Analysis.

Principle of Nuclear Magnetic Resonance: Instrumentation associated with NMR spectrophotometer – Introduction to mass spectrophotometers, Principle and brief discussion on ELECTRON SPIN RESONANCE (ESR)

UNIT - IV:

Gas Analyzers-I: Flue gas analysis using thermal conductivity principle, Katharometer – oxygen analyzers using
paramagnetic principle, Zirconium oxide cells, Pollution Monitoring Instruments.

Gas Analyzers-II: Industrial analyzer circuits; CO monitors – Noxanalyzer – SoxAnalyzer - H2S analyser system

UNIT - V:

Nuclear Radiation Detectors: GM counter, Scintillation counter, Ionization chamber – Solid state detector, Gamma Spectrometry, Industrial application of radiation measurement,

Thermal Analyzers: Differential Scanning Calorimetry (DSC), Derivative Thermo Gravimetric Analyzers (DTGA)

TEXT BOOKS:

1. Analytical Instrumentation, R.S. Khandpur
2. Instrumental Method of Analysis Willard, Merrit, Dean, D.VanNostrand
3. Principles of Instrumental Analysis, Skoog D.M and West D.M, HeltSaunder publication

REFERENCES:

1. Process Measurement and Analysism B.G. Liptak, CRC Press
2. Instrument Technology, E.B. Jones, Butterworth Scientific Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

IMAGE AND VIDEO PROCESSING (PE – III)

Prerequisite: Digital Signal Processing

Course Objectives:

1. The student will be able to understand the quality improvement methods of Image.
2. To study the basic digital image and video filter operations.
3. Understand the fundamentals of Image Compression.
4. Understand the Representation of video, principles and methods of motion estimation.

Course Outcomes: On completion of this course student will be able to

1. Learn the image representation, and fundamental processing steps of an image.
2. Know the different enhancement techniques in both spatial and frequency domains.
3. Understand the importance of compression and different compression techniques.
4. Learn the representation, modeling and motion estimation of Video.

UNIT – I

Fundamentals of Image Processing and Image Transforms: Basic steps of Image Processing System Sampling and Quantization of an image, Basic relationship between pixels.

Image Segmentation: Segmentation concepts, Point, Line and Edge Detection, Thresholding, Region based segmentation.

UNIT – II

Image Enhancement: Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters.

Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering.

UNIT – III

Image Compression: Image compression fundamentals - Coding Redundancy, Spatial and Temporal redundancy, Compression models: Lossy & Lossless, Huffman coding, Bit plane coding, Transform coding, Predictive coding, Wavelet coding, Lossy Predictive coding, JPEG Standards.

UNIT - IV

Basic Steps of Video Processing: Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

UNIT – V

2-D Motion Estimation: Optical flow, General Methodologies, Pixel Based Motion Estimation, Block-Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding.

TEXT BOOKS:

1. Digital Image Processing – Gonzaleze and Woods, 4rd Ed., Pearson, 2018.
2. Digital Video Processing – M. Tekalp, Prentice Hall International

REFERENCE BOOKS:

1. Video Processing and Communication – Yao Wang, Joem Ostermann and Ya–quin Zhang. 1st Ed., PH Int.
2. Digital Image Processing – S. Jayaraman, S. Esakkirajan, T. Veera Kumar –TMH, 2009

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

DATA ACQUISITION SYSTEM & PC BASED INSTRUMENT (PE – III)

Course Objectives: Student will be able to

1. Identify the selection of type of data acquisition system.
2. Understand the principles of A/D , D/A Converters, Error Analysis, Display Systems
3. Recognize these principles written in form of mathematical equations
4. Apply these equations to analyze problems by making good assumptions and learn systematic engineering method to design a good Data acquisition system

Course Outcomes: On successful completion of this course, it is expected that students should be able to

1. Apply fundamental knowledge of mathematics to modeling and analysis of A/D & D/A's, error analysison data acquisition systems.
2. Conduct case studies indifferent data acquisition systems and interpreting data from model studies toprototype cases, as well as documenting them in engineering reports.
3. Understand the errors/problems by an improper design analysis in data acquisition system.
4. Interface the analog and digital acquisition systems with PC, Analyze and display the output.

UNIT - I:

Data Loggers and Data Acquisition Systems: Data acquisition systems-configurations components, analog multiplexes and sample and hold circuits-specifications and design considerations.

DACs: specifications – characteristics, types of DACs (serial, parallel, direct and indirect). Hybrid and monolithic DACs.

ADCs: specifications – characteristics, types of ADCs (serial, parallel, direct and indirect). Hybrid and monolithic ADCs, sigma – delta ADCs', Hybrid DAS – Schematic diagram – configurations – specifications

UNIT - II:

Error Budget of DACs and ADCs: Error sources, error reduction and noise reduction techniques in DAS. Error budget analysis of DAS.Case study of a DAC and an ADC. 31

Data Acquisition Hardware and Software: Specifications of Hardware-IO analog signal range, gain for analog input and resolution in ADC converter, resolute\ion in DAC and counter chips, sampling frequency and maximum update rates, triggering capacity. Digital lines and ports, data acquisition VIs.

UNIT - III

Distributed AND Stand-Alone Data Loggers: Introduction, methods of operation-programming and logging data using PCMCIA cards, standard alone operation-direct and remote connection to the host PC, stand alone logger/controller hardware interface – RS232C, RS485 standard, communication bottlenecks and system performance, using Ethernet to connect data loggers.

UNIT - IV:

IEEE 488 Standard: Introduction, characteristics, physical connection configurations, device types, bus structure, GPIB hand shake, device communication, IEEE 488.2, standard commands for programmable instruments.

Display Systems: LCD Flat panel displays, Digital storage CROs, Plasma displays, Projection systems.

UNIT - V:

Analyzers – Spectrum Analyzers – guidelines, various triggering techniques, different types of spectrum analyzers, Recorders. Display devices and Display systems, Logic Analyzers – State and time referenced data capture. Scalar and Vector Network analyzers.

TEXT BOOKS:

1. Users Handbook of D/A & A/D Converters, E.R. HNATEK
2. Electronic Analog/Digital converters, H.Schmid
3. Data Converters, G.B. Clayton
4. Electronic Measurements, Oliver and Cage (ISE), Mc. Graw Hill

REFERENCES:

1. Electronic Instrumentation (ISTE Learning Material) (Ch:7) H.S. Kalsi, Learning Material Center, Indian
2. Society of Technical Education, New Mehrauli Road, New Delhi – 110 016
3. Electronic Instrumentation & Measurements, David A. BELL
4. Hand book of Biomedical Instrumentation, Khandpur R.S., Tata Mc. Graw Hill, 1996.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING
INDUSTRIAL AUTOMATION (PE – IV)

Course objectives: After learning the course the students should be able to:

- Understand various automation components and systems
- Draw block diagram of industrial automation and control system
- Explain architecture of industrial automation system
- Measure industrial parameters like temperature, pressure, force, displacement, speed, flow, level, humidity and pH.
- Explain fundamentals of process control
- List basic devices used in automated systems
- Use programmable logic controllers for industrial automation
- Draw block diagram of supervisory control and data acquisition (SCADA).
- Integrate SCADA with PLC systems
- Use Internet of Things for industrial automation
- Know use of robot for industrial applications

UNIT - I

Introduction: Automation overview, Requirement of automation systems, Architecture of Industrial Automation system, Introduction of PLC and supervisory control and data acquisition (SCADA). Industrial bus systems: modbus & profibus

UNIT - II

Automation components: Sensors for temperature, pressure, force, displacement, speed, flow, level, humidity and pH measurement. Actuators, process control valves, power electronics devices DIAC, TRIAC, power MOSFET and IGBT. Introduction of DC and AC servo drives for motion control

UNIT - III

Computer aided measurement and control systems: Role of computers in measurement and control, Elements of computer aided measurement and control, man-machine interface, computer aided process control hardware, process related interfaces, Communication and networking, Industrial communication systems, Data transfer techniques, Computer aided process control software, Computer based data acquisition system, Internet of things (IoT) for plant automation

UNIT - IV

Programmable logic controllers: Programmable controllers, Programmable logic controllers, Analog digital input and output modules, PLC programming, Ladder diagram, Sequential flow chart, PLC Communication and networking, PLC selection, PLC Installation, Advantage of using PLC for Industrial automation, Application of PLC to process control industries.

UNIT - V

Distributed Control System: Overview of DCS, DCS software configuration, DCS communication, DCS Supervisory Computer Tasks, DCS integration with PLC and Computers, Features of DCS, Advantages of DCS.

TEXT BOOKS:

1. Industrial Instrumentation and Control By. S.K. Singh The McGraw Hill Companies
2. Process Control Instrumentation Technology By. C.D. Johnson, PHI
3. Industrial control handbook, Parr, Newnem
4. Programmable logic controller, Dunning, Delmar

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

QUALITY & RELIABILITY OF ELECTRONIC SYSTEM (PE – IV)

UNIT – I

Elements of Probability Theory, Probability Distributions: Random variables, density and distribution functions, Mathematical expectation, Binominal distribution, Poisson distribution, Normal distribution, Exponential distribution, Weibull distribution. Reliability: Definition of Reliability, Significance of the terms appearing in the definition, Component reliability, Hazard rate, Derivation of the reliability functions in terms of the hazard rate, Hazard models.

UNIT – II

Failures: Causes of failures, Types of failures (early failures, chance failures and wear-out failures), Modes of failure, Bath tub curve, Effect of preventive maintenance. Measures of Reliability: Mean Time to Failure (MTTF) and Mean Time between Failures (MTBF).

UNIT – III

Reliability Logic Diagrams (reliability block diagrams): Classification of engineering systems Series, Parallel, Series-Parallel, Parallel-Series and non-series-parallel configurations (mainly for Electronic system configurations), Expressions for the reliability of the basic (Electronic Systems) configurations.

UNIT – IV

Reliability Evaluation of Non-Series-Parallel Configurations (Mainly for Electronic Systems Configurations): Minimal tie-set, Minimal cut-set and decomposition methods, Deduction of the minimal cut sets from the minimal path sets. More than Two Components Electronics Systems Reliability Evaluation: Series systems, Parallel systems with two and more than two components, Network reduction techniques, Minimal cutest / failure mode approach.

UNIT – V

Discrete Markov Chains: General modelling concepts, Stochastic transitional probability matrix, Aime dependent probability evaluation and limiting state probability evaluation, absorbing states (mainly for Electronic systems). Continuous Markov Processes: Modelling concepts, State space diagrams, Stochastic Transitional Probability Matrix, Evaluating limiting state Probabilities, Reliability evaluation of repairable systems (mainly for Electronic systems).

TEXT BOOKS:

1. Roy Billinton and Ronald N Allan, “Reliability Evaluation of Engineering Systems”, Plenum Press.
2. Elsayed A. Elsayed, “Reliability Engineering”, Prentice Hall Publications.

REFERENCE BOOKS:

1. Alessandro Birolini, “Reliability Engineering: Theory and Practice”, Springer Publications.
2. E. Balaguruswamy, “Reliability Engineering”, TMH Publications

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

EMI/EMC (PE – IV)

UNIT – I

Introduction, Natural and Nuclear Sources of EMI / EMC: Electromagnetic environment, History, Concepts, Practical experiences and concerns, frequency spectrum conservations, An overview of EMI / EMC, Natural and Nuclear sources of EMI.

UNIT – II

EMI from Apparatus, Circuits and Open Area Test Sites: Electromagnetic emissions, Noise from relays and switches, Non-linearity in circuits, passive intermodulation, Cross talk in transmission lines, Transients in power supply lines, Electromagnetic interference (EMI), Open area test sites and measurements.

UNIT – III

Radiated and Conducted Interference Measurements and ESD: Anechoic chamber, TEM cell, GH TEM Cell, Characterization of conduction currents / voltages, Conducted EM noise on power lines, Conducted EMI from equipment, Immunity to conducted EMI detectors and measurements, ESD, Electrical fast transients / bursts, Electrical surges.

UNIT – IV

Grounding, Shielding, Bonding, and EMI filters: Principles and types of grounding, Shielding, and bonding, Characterization of filters, Power lines filter design.

UNIT – V

Cables, Connectors, Components and EMC Standards: EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, optoisolators, National / International EMC standards.

TEXT BOOKS:

1. Dr. V.P. Kodali, IEEE Publication, “Engineering Electromagnetic Compatibility”, Printed in India by S. Chand & Co. Ltd., New Delhi, 2000.
2. IIT – Delhi, “Electromagnetic Interference and Compatibility IMPACT series”, Modules 1 – 9.

REFERENCE BOOKS:

1. C.R. Pal., “Introduction to Electromagnetic Compatibility”, Ny John Wiley, 1992.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

PROCESS CONTROL & INSTRUMENTATION LAB (Lab – III)

Course Objectives:

- To identify and obtain process parameters of various processes in the prototype model.
- To understand the working of actuators, converters, controllers and control valves.
- To acquire the working knowledge of different controller types, modes of control actions, tuning of controllers and control schemes.
- To learn systematic engineering methodologies to solve practical process control problems.

Course Outcomes: After completion of the course the student can:

- Do mathematical modeling of different process to analyze its time response.
- Apply the control system knowledge to monitor and control industrial parameters like flow, level, pressure, temperature, pH problems.
- Identify optimal values for PID controller and realize Electronic, Pneumatic and Hydraulic Control actions for different applications.
- Learn to apply software tools typically used by process control professionals.

Process Control Laboratory
List of Experiments: (Minimum of 12 experiments should be conducted)

1. Realization of PID control actions and time response analysis with electronic controllers for First and Second Order Systems Using Process Controller Simulator.
2. Effect of ON-OFF, P, PI, PD and PID controller on Liquid Level Process Dynamics.
3. Temperature control process with PID Control Action.
4. Servo and Regulator operation for Set point tracking and Disturbance Rejection for DC Servo Motor.
5. Realization of control actions with Pneumatic and Hydraulic Actuation.
6. Optimum Controller settings with Process reaction curve tuning method.
7. Optimum Controller settings with continuous and damped oscillation tuning method
8. Effect of ON-OFF, P, PI, PD and PID controller on Flow Process Dynamics.
9. Experimental analysis of Control valve characteristics (Different types).
10. Realization of Feed forward control System for Flow-Level Process Station.
11. Multi loop control systems for Flow-Level Process Station using Ratio Control.
12. Multi loop control systems for Flow-Level Process Station using Cascade Control.
13. Mathematical Modeling and Time Response Analysis of Interacting and non-interacting system.
14. Split range control for liquid level process dynamics.
15. Neutralization of waste water using PID controller for pH Control System.

Instrumentation Laboratory
List of Experiments: (Minimum 12 experiments to be conducted)

1. Measurement of Load using Strain Gauge bridge
2. Measurement of Temperature using Thermistor, RTD and Thermocouple
3. Measurement of Displacement using LVDT.
4. Pressure measurement through Bourdon Tube
5. Measurement of Flow
6. Measurement of RPM using opto-coupler and comparing it with stroboscope
7. Measurement of precision, Angular Velocity and RPM of a rotating Disk

8. Measurement of Velocity, Acceleration and Vibration using Piezo-electric transducer
9. Measurement of Humidity
10. Measurement of Density
11. Measurement of Viscosity of Edible Oil using Redwood Viscometer
12. Measurement of Viscosity of Crude Oil using Saybolt Viscometer
13. Characteristics of pH sensors
14. Radiation Measurement and optical Pyrometers
15. Characteristics of Opto-Electronic Transducers (Photo Transistor, Photo Diode and LDR)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

VIRTUAL INSTRUMENTATION LAB (Lab – IV)

Course Objectives: Student will be able to

1. It provides new concepts using Data acquisition card
2. It gives knowledge about how to control an external measuring device by Interfacing a computer.
3. It gives knowledge to develop the image processing applications
4. Gives knowledge to develop the control system and signal simulation applications
5. Gives knowledge on DSP Application

Course Outcomes: On successful completion of this course, it is expected that students should be able to:

1. Design and Implement Data acquisition and control sequences using the Lab VIEW software
2. development tool
3. Perform experiments on electrical circuits to determine their frequency response and characteristics of
4. componentsetc (using NI Elvis)
5. Perform the image processing techniques on images using Vision Assistant module
6. Develop the control system and signal simulation applications using CDSM and DSP toolkit

List of experiments

1. Design of Decimal Counter Using Lab VIEW
2. Design of A function generator using Lab VIEW
3. Design of Filters Using NIELVIS.
4. Signal processing with speed 33 (speech recording and analysis)
5. Image Processing techniques with Vision Assistant
6. Image Processing application with vision assistant.
7. Image corrupted with salt and pepper noise ,apply average local 3 X 3 filter, local average 5 X 5,local average
8. 7 X 7 and median filter observe the response using Vision Assistant

Control design simulation using LabVIEW

1. Building and Configuring Simulations (Control Design and Simulation Module)
2. Modularizing the Simulation Diagram (Control Design and Simulation Module)
3. Trimming and Linearizing Nonlinear Models
4. Executing Simulations in Real Time
5. Optimizing Design Parameters
6. Simulation Model Converter

Networking usingLabVIEW

1. Creating a TCP Client
2. Creating a TCP Server
3. Binding Front Panel Controls to Shared Variables
4. Binding Front Panel Controls to Shared Variables in Other Projects
5. Binding Shared Variables to an Existing Source
6. Changing the Default Ports for TCP-Based NI-PSP
7. Configuring Firewalls and Network Address Translating Routers for Shared Variables

Calling Code Written in Text-Based Programming Languages

1. Building a Shared Library to Call from LabVIEW
2. Building a Function Prototype
3. Completing the .c File
4. Setting Input and Output Terminals for the CIN
5. Wiring Inputs and Outputs to the CIN
6. Creating a .c File
7. Compiling the CIN Source Code
8. Loading the CIN Object Code

Managing Performance and Memory

1. Profiling VI Execution Time and Memory Usage
2. Extending Virtual Memory Usage for 32-bit Windows

Signal Processing Using LabVIEW

1. Characteristics of an Ideal Filter
2. FIR Filters
3. IIR Filters
4. Comparing FIR and IIR Filters
5. Nonlinear Filters
6. Selecting a Digital Filter Design
7. FFT Analysis using LabVIEW
8. Design of digital filter using LabVIEW

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- II YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

IOT AND ITS APPLICATIONS (PE - V)

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

1. Understand the concept of IOT and M2M
2. Study IOT architecture and applications in various fields
3. Study the security and privacy issues in IOT.

UNIT-I

IoT & Web Technology The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.

UNIT-II

M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

UNIT-III

IoT Architecture -State of the Art – Introduction, State of the art, Architecture Reference Model-Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture-Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

UNIT-IV

IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.

UNIT-V

Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues,

TEXTBOOKS

1. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.
2. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013.
3. Cuno Pfister, “Getting Started with the Internet of Things”, O Reilly Media, 2011.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- II YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

PATTERN RECOGNITION AND MACHINE LEARNING (PE – V)

Prerequisite: Statistics and Linear Algebra

Course Objectives

1. The student will be able to understand the mathematical formulation of patterns.
2. To study the various linear models.
3. Understand the basic classifiers.
4. Can able to distinguish different models.

Course Outcomes: On completion of this course student will be able to

1. Learn the basics of pattern classes and functionality.
2. Construct the various linear models.
3. Understand the importance kernel methods.
4. Learn the Markov and Mixed models.

UNIT-I

Introduction to Pattern recognition: Mathematical Formulation and Basic Functional Equation, Reduction of Dimensionality, Experiments in Pattern Classification, Backward Procedure for Both Feature Ordering- and Pattern Classification, Suboptimal Sequential Pattern Recognition, Nonparametric Design of Sequential Pattern Classifiers, Analysis of Optimal Performance and a Multiclass Generalization

UNIT-II

Linear Models : Linear Basis Function Models -Maximum likelihood and least squares, Geometry of least squares , Sequential learning, Regularized least squares, Multiple outputs , The Bias-Variance Decomposition, Bayesian Linear Regression -Parameter distribution, Predictive, Equivalent, Bayesian Model Comparison, Probabilistic Generative Models-Continuous inputs, Maximum likelihood solution, Discrete features, Exponential family, Probabilistic Discriminative Models -Fixed basis functions, Logistic regression, Iterative reweighted least squares, Multiclass logistic regression, Probit regression, Canonical link functions

UNIT-III

Kernel Methods: Constructing Kernels, Radial Basis Function Networks - Nadaraya-Watson model, Gaussian Processes -Linear regression revisited, Gaussian processes for regression, Learning the hyper parameters, Automatic relevance determination, Gaussian processes for classification, Laplace approximation, Connection to neural networks, Sparse Kernel Machines- Maximum Margin Classifiers, Overlapping class distributions, Relation to logistic regression, Multiclass SVMs, SVMs for regression, Computational learning theory, Relevance Vector Machines- RVM for regression, Analysis of sparsity, RVM for classification

UNIT-IV

Graphical Models: Bayesian Networks, Example: Polynomial regression, Generative models, Discrete variables, Linear-Gaussian models, Conditional Independence- Three example graphs, D-separation, Markov Random Fields -Conditional independence properties, Factorization properties, Illustration: Image de-noising, Relation to directed graphs, Inference in Graphical Models- Inference

on a chain, Trees, Factor graphs, The sum-product algorithm, The max-sum algorithm, Exact inference in general graphs, Loopy belief propagation, Learning the graph structure.

UNIT-V

Mixture Models and EM algorithm: K-means Clustering-Image segmentation and compression, Mixtures of Gaussians-Maximum likelihood, EM for Gaussian mixtures, An Alternative View of EM-Gaussian mixtures revisited, Relation to K-means, Mixtures of Bernoulli distributions, EM for Bayesian linear regression, The EM Algorithm in General, Combining Models- Tree-based Models, Conditional Mixture Models- Mixtures of linear regression models, Mixtures of logistic models, Mixtures of experts.

TEXT BOOKS:

1. Sequential methods in Pattern Recognition and Machine Learning-K.S.Fu, Academic Press, volume no.52.
2. Pattern Recognition and Machine Learning- C. Bishop-Springer,2006.

REFERENCES:

1. Pattern Classification- Richard o. Duda, Peter E. hart, David G. Stork, John Wiley& Sons, 2nd Ed., 2001.
2. The elements of Statistical Learning- Trevor Hastie, Robert Tibshirani, Jerome H. Friedman, Springer, 2nd Ed., 2009.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- II YEAR- I SEMESTER
ELECTRONICS AND INSTRUMENTATION ENGINEERING

MEDICAL ELECTRONICS (PE – V)

Course Objectives:

1. To gain knowledge about the various physiological parameters both electrical and non-electrical and the methods of recording and also the method of transmitting these parameters_
2. To study about the various assist devices used in the hospitals_
3. To gain knowledge about equipment used for physical medicine and the various recently developed diagnostic and therapeutic techniques.

Course Outcomes: Upon completion of the course, students will be able to:

1. Discuss the application of electronics in diagnostic and therapeutic area.
2. Measure biochemical and various physiological information.
3. Describe the working of units which will help to restore normal functioning.

UNIT - I

Electro-Physiology and Bio-Potential Recording: The origin of Bio-potentials; biopotential electrodes, biological amplifiers, ECG, EEG, EMG. PCG: lead systems and recording methods, typical waveforms **and** signal characteristics.

UNIT - II

Bio-Chemical and Non-Electrical Parameter Measurement: pH, P02: PCO2, colorimeter, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure_ temperature, pulse, Blood Cell Counters

UNIT - III

Assist Devices: Cardiac pacemakers; DC Defibrillator, Dialyser, Heart lung machine

UNIT - IV

Physical Medicine and Biotelemetry: Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy Telemetry principles: frequency selection, biotelemetry, radiopill, electrical safety

UNIT - V

Recent Trends in Medical Instrumentation: Thermograph. endoscopy unit, Laser in medicine, cryogenic application, Introduction to telemedicine

TEXTBOOKS:

1. Leslie Cromwell, "Biomedical Instrumentation and Measurement", Prentice Hall of India, New Delhi, 2007.
2. John G. Webster; Medical Instrumentation Application and Design-, 3rd Edition, Wiley India Edition, 2007.

REFERENCES:

1. Khandpur. R.S., "Handbook of Biomedical Instrumentation", TATA Mc Craw-Hill; New Delhi, 2003.
2. Joseph J_Carr and John M_Brown: Introduction to Biomedical Equipment Technology", John Wiley and Sons, New York: 2004.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (EIE)

ENGLISH FOR RESEARCH PAPER WRITING (Audit Course - I & II)

Prerequisite: None

Course objectives: Students will be able to:

- Understand that how to improve your writing skills and level of readability
- Learn about what to write in each section
- Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

UNIT-I:
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT-II:
Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

UNIT-III:
Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-IV:
key skills are needed when writing a Title, key skills are needed when writing 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 Conclusions. useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

TEXT BOOKS/ REFERENCES:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (EIE)

DISASTER MANAGEMENT (Audit Course - I & II)

Prerequisite: None

Course Objectives: Students will be able to

- 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

UNIT-I:
Introduction:
Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.
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-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 and Famines, 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 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-IV:
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.

UNIT-V:
Disaster Mitigation:
Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

TEXT BOOKS/ REFERENCES:

1. R. Nishith, Singh AK, “Disaster Management in India: Perspectives, issues and strategies “’New Royal book Company.
2. Sahni, Pardeep Et. Al. (Eds.),” Disaster Mitigation Experiences and Reflections”, Prentice Hall of India, New Delhi.
3. Goel S. L., Disaster Administration and Management Text and Case Studies”, Deep &Deep Publication Pvt. Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (EIE)

SANSKRIT FOR TECHNICAL KNOWLEDGE (Audit Course - I & II)

Prerequisite: None

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: Students will be able to

- Understanding basic Sanskrit language
- Ancient Sanskrit literature about science & technology can be understood
- Being a logical language will help to develop logic in students

UNIT-I:
Alphabets in Sanskrit,

UNIT-II:
Past/Present/Future Tense, Simple Sentences

UNIT-III:
Order, Introduction of roots,

UNIT-IV:
Technical information about Sanskrit Literature

UNIT-V:
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

TEXT BOOKS/ REFERENCES:

1. "Abhyaspustakam" – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (EIE)

VALUE EDUCATION (Audit Course - I & II)

Prerequisite: None

Course Objectives: Students will be able to

- Understand value of education and self- development
- Imbibe good values in students
- Let the should know about the importance of character

Course outcomes: Students will be able to

- Knowledge of self-development
- Learn the importance of Human values
- Developing the overall personality

UNIT-I:
Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements

UNIT-II:
Importance of cultivation of values. 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 and Kindness.

UNIT-IV:
Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

UNIT-V:
Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation, Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

TEXT BOOKS/ REFERENCES:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (EIE)

CONSTITUTION OF INDIA (Audit Course - I & II)

Prerequisite: None

Course Objectives: Students will be able to:

- 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.

Course Outcomes: Students will be able to:

- 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 in India.
- 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 Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

UNIT-I:
History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working), **Philosophy of the Indian Constitution:** Preamble**,** Salient Features.

UNIT-II:
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-III:
Organs of Governance: Parliament**,** Composition**,** Qualifications and Disqualifications**,** Powers and Functions**,** Executive**,** President**,** Governor**,** Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualification, Powers and Functions.

UNIT-IV:
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.

UNIT-V:
Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

TEXT BOOKS/ REFERENCES:

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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (EIE)

PEDAGOGY STUDIES (Audit Course - I & II)

Prerequisite: None

Course Objectives: Students will be able to:

- 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.

Course Outcomes: Students will be able to understand:

- What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
- 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 pedagogical practices, Methodology for the indepth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the scho 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 class sizes

UNIT-V:

Research gaps and future directions: Research design**,** Contexts**,** Pedagogy**,** Teacher education**,** Curriculum and assessment**,** Dissemination and research impact.

TEXT BOOKS/ REFERENCES:

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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (EIE)

STRESS MANAGEMENT BY YOGA (Audit Course - I & II)

Prerequisite: None

Course Objectives:

- To achieve overall health of body and mind
- To overcome stress

Course Outcomes: Students will be able to:

- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

UNIT-I:
Definitions of Eight parts of yog. (Ashtanga)

UNIT-II:
Yam and Niyam.

UNIT-III:
Do`s and Don't's in life.
i) Ahinsa, satya, astheya, bramhacharya and aparigraha
ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT-IV:
Asan and Pranayam

UNIT-V:
i) Various yog poses and their benefits for mind & body
ii) Regularization of breathing techniques and its effects-Types of pranayam

TEXT BOOKS/ REFERENCES:

1. 'Yogic Asanas for Group Tarining-Part-I": Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (EIE)

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS
(Audit Course - I & II)

Prerequisite: None

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

Course Outcomes: Students will be able to

- Study of Shrimad-Bhagwad-Geeta will 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
- Study of Neetishatakam will help in developing versatile personality of students

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)

UNIT-II:

Neetisatakam-Holistic development of personality

- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

UNIT-III:

Approach to day to day work and duties.

- Shrimad Bhagwad Geeta: 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.

UNIT-IV:

Statements of basic knowledge.

- Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta:

UNIT-V:

- Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

TEXT BOOKS/ REFERENCES:

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