JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH IN ELECTRONICS & INSTRUMENTATION
EFFECTIVE FROM ACADEMIC YEAR 2017- 18 ADMITTED BATCH

COURSE STRUCTURE AND SYLLABUS

I Semester

Category	Course Title	Int. marks	Ext. marks	L	T	P	C
PC-1	Smart Industrial Instrumentation	25	75	4	0	0	4
PC-2	Analysis and Design of Signal Conditioning Circuits	25	75	4	0	0	4
PC-3	Analytical Instrumentation	25	75	4	0	0	4
PE-1	Transform Techniques Real Time Embedded Systems Electronic System Design	25	75	**3**	0	0	3
PE-2	Digital Instrumentation Linear and Nonlinear Systems Embedded System Design	25	75	**3**	0	0	3
OE-1	***Open Elective – I**	25	75	3	0	0	3
Laboratory I	Advanced Instrumentation Laboratory-I	25	75	0	0	3	2
Seminar I	Seminar	100	0	0	0	3	2
Total		**275**	**525**	**21**	**0**	**6**	**25**

II Semester

Category	Course Title	Int. marks	Ext. marks	L	T	P	C
PC-4	Industrial Automation	25	75	4	0	0	4
PC-5	Sensors and Actuators	25	75	4	0	0	4
PC-6	Advanced Process Control Instrumentation	25	75	4	0	0	4
PE-3	Advanced Instrumentation Systems Quality and Reliability Engineering Instrumentation Practices in Industries	25	75	**3**	0	0	3
PE4	MEMS and Applications Robotic Design and Control Advanced Image Processing	25	75	**3**	0	0	3
OE-2	***Open Elective – II**	25	75	3	0	0	3
Laboratory II	Advanced Instrumentation Laboratory-II	25	75	0	0	3	2
Seminar II	Seminar	100	0	0	0	3	2
Total		**275**	**525**	**21**	**0**	**6**	**25**

III Semester

Course Title	Int. marks	Ext. marks	L	T	P	C
Technical Paper Writing	100	0	0	3	0	2
Comprehensive Viva-Voce	0	100	0	0	0	4
Project work Review II	100	0	0	0	22	8
Total	**200**	**100**	0	**3**	22	**14**

IV Semester

Course Title	Int. marks	Ext. marks	L	T	P	C
Project work Review III	100	0	0	0	24	8
Project Evaluation (Viva-Voce)	0	100	0	0	0	16
Total	**100**	**100**	**0**	**0**	**24**	**24**

***Open Elective subjects must be chosen from the list of open electives offered by OTHER departments.**

 # For Project review I, please refer 7.10 in R17 Academic Regulations.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
ELECTRONICS & INSTRUMENTATION

SMART INDUSTRIAL INSTRUMENTATION (PC-1)

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.

Metrology: Measurement of length, Plainness, Area, Diameter, Roughness, Angle, Comparators, Gauge blocks, Optical Methods for length and distance measurements.

UNIT -II

Measuring Devices-I: Displacement: Resistive Potentiometer, Resistive strain gauges, Inductive displacement transducer, Capacitive Displacement Transducers, Piezo Electric Transducers, Ultrasonic Methods.

Temperature: Thermal expansion methods, Fundamentals-Radiation Detectors, Radiation Thermometers, Optical Pyrometers,

Force Measurement: Force measurement, Different methods, Gyroscopic Force Measurement, Vibrating wire Force transducer

UNIT -III

Measuring Devices-II: 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.

Viscosity: Units of Viscosity, Specific gravity scales used in Petroleum Industries, Different Methods of measuring consistency and Viscosity, Two float viscorator, Industrial consistency meter.

UNIT -IV

Measuring Devices-III: 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 -V

Measuring Devices-IV: Humidity, Density and Sound Measurement: Capacitive Impedance and Piezoelectric Hygrometers, Differential Pressure, U-tube and ultrasonic Densitometers, pH measurement- Ion Selective Type, Sound-Level Meters, Microphones, Particle Instruments and Clean-Room

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. E.O. Doeblin, “Measurement Systems”, McGraw Hill Publication.
2. D.V.S. Murthy, “Transducers and Instrumentation”, PHI Publication.
3. D. Patranbis, “Sensors & Transducers”, Wheeler Publishing.

REFERENCE BOOKS:

1. Patranabis D, “Principles of Industrial Instrumentation”, TMH, Edition, 1997
2. H.K.P Neubert, “Instrument transducers”, Oxford University Press.
3. B.G. Liptak, “Process Measurement and Analysis”, ISA Publication 4thEdition.
4. Jon S. Wilson, “Sensor Technology Handbook”, Elsevier Publications.
5. A.K. Sawhney, “A Course in Mechanical Measurements and Instrumentation”, 2005, Dhanpat Rai

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
ELECTRONICS & INSTRUMENTATION

ANALYSIS AND DESIGN OF SIGNAL CONDITIONING CIRCUITS (PC-2)

UNIT -I

Design of Signal Conditioning Circuits: Design of V/I Converter and I/V Converter, Analog and Digital filter design and Adaptive filter design, Signal conditioning circuit for pH measurement, Air-purge Level Measurement, Signal conditioning circuit for Temperature measurement- Thermocouple, RTD and Thermistor, Cold Junction Compensation and Linearization – Software and Hardware approaches.

UNIT -II

Signal Conditioning for Resistive Sensors: Measurement of resistance, Voltage dividers, Wheatstone bridge, Balance and deflection measurements, Sensor bridge calibration and compensation instrumentation amplifiers.

UNIT -III

Signal Conditioning for Reactance Variation Sensors: Problems and alternatives, AC bridges, Carrier amplifiers- Application to the LVDT, Variable oscillators, Resolver-to-digital and digital-to-resolver converters.

UNIT -IV

Signal Conditioning for Self-Generating Sensors: Chopper and low-drift amplifiers, Offset and drifts, Amplifiers- Electrometer amplifiers, Charge amplifiers, Noise in amplifiers.

UNIT -V

Design of Transmitters, Alarm & Annunciation Circuits: Study of 2wire and 4 wire transmitters– Design of RTD based Temperature Transmitter, Thermocouple based Temperature Transmitter, Capacitance based level Transmitter and Smart Flow Transmitters, Alarm and Annunciation circuits using Analog and Digital circuits.

TEXT BOOKS:

1. Ramon PallásAreny, John G. Webster," Sensors and Signal Conditioning", 2nd Edition, John Wileyand Sons, 2000.
2. D.Patranabis, "Sensors and Transducers", TMH 2003.

REFERENCE BOOKS:

1. Jon Wilson, "Sensor Technology Handbook", Newne 2004.
2. E.O. Doeblin, "Measurement System: Applications and Design", McGraw Hill Publications.
3. Hermann K P Neubert, "Instrument Transducers: An Introduction to Their Performance and Design", Oxford Publishers, 2nd Edition.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
ELECTRONICS & INSTRUMENTATION

ANALYTICAL INSTRUMENTATION (PC-3)

UNIT -I

Electrochemical Instruments: Basic concepts of Analytical instrumentation, Electro chemical instruments- pH meter, Conductivity meter, Dissolved oxygen analyzers using Polarographic principle, Sodium analyser, 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.

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.

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: CO monitors – Noxanalyzer – H_2S analyzer system – Industrial analyzer circuits .

UNIT -V

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

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

TEXT BOOKS:

1. R.S. Khandpur, “Analytical Instrumentation”, McGraw-Hill
2. Willard, Merrit, Dean, Settle, “Instrumental Methods of Analysis”, 2004, 7th Edition, CBS Publishers.
3. Skoog D.M and West D.M, “Principles of Instrumental Analysis”, HeltSaunder Publication.

REFERENCE BOOKS:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
ELECTRONICS & INSTRUMENTATION

TRANSFORM TECHNIQUES (PE-1)

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

REFERENCE BOOKS:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
ELECTRONICS & INSTRUMENTATION

REAL TIME EMBEDDED SYSTEMS (PE-1)

UNIT -I

Introduction: Embedded systems overview, Design challenge, Processor technology, IC technology, Design Technology, Trade-offs, Single purpose processors, RT level combinational logic, Sequential logic (RT level),Custom single purpose processor design (RT level), Optimizing custom single purpose processors.

General Purpose Processors: Basic architecture, operation, Pipelining, Programmer's view, Development environment, Application Specific Instruction Set Processors (ASIPs) – Micro Controllers and Digital Signal Processors, Design example, Model programs, Validation & Testing.

UNIT -II

State Machine and Concurrent Process Models: Introduction, Models Vs. Languages, Finite State Machines with Data path (FSMD) model, Using state machines, Program State Machine (PSM) model, Concurrent process model, Concurrent processes, Communication among processes, Synchronization among processes, Implementation, Data flow model, Real-time systems.

Communication Interface: Need for communication interfaces, RS232 / UART, RS422 / RS485, USB, Infrared, IEEE 1394 Firewire, Ethernet, IEEE 802.11, Blue tooth.

UNIT -III

Introduction to RTOS: Architecture of the Kernel, Tasks and Task scheduler, Interrupt service routines, Semaphores, Mutex, Mailboxes, Message Queues, Event Registers, Pipes, Signals.

Basic Design using RTOS: Principles, Semaphores and Queues, Hard real time scheduling considerations, Saving memory and power, An example RTOS like µC – OS (Open Source), Embedded S/W Development tools. Comparative study of RTOs Vx works & µCOS –Case studies.

UNIT -IV

Real Time Operating Systems: Timers, Memory Management, Priority inversion problem, Embedded operating systems Embedded Linux, Real-time operating systems, RT Linux, Handheld operating systems, Windows CE.

UNIT -V

Design Technology: Introduction, Automation, Synthesis, Parallel evolution of compilation and synthesis, Logic Synthesis, RT synthesis, Behavioral Synthesis, Systems Synthesis and Hardware/ Software Co-Design, Verification, Hardware/Software co-simulation, Reuse of intellectual property codes.

TEXT BOOKS:

1. Frank Vahid, Tony D. Givargis," Embedded System Design – A Unified Hardware/Software Introduction", John Wiley, 2002.
2. KVKK Prasad, "Embedded / Real Time Systems", Dreamtech Press, 2005.

REFERENCE BOOKS:

1. Jonathan W. Valvano, Brooks/Cole, "Embedded Microcomputer Systems ", Thompson Learning.
2. David E. Simon, "An Embedded Software Primer", Pearson Education.
3. Rajkamal, "Introduction to Embedded Systems", TMH, 2002.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
ELECTRONICS & INSTRUMENTATION

ELECTRONIC SYSTEM DESIGN (PE-1)

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 & INSTRUMENTATION

DIGITAL INSTRUMENTATION (PE-2)

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 & INSTRUMENTATION

LINEAR AND NONLINEAR SYSTEMS (PE-2)

UNIT - I

Linear Systems:

Mathematical Descriptions of Systems: Linear Algebra Review, Representations and Properties, Differential and difference equations, State-variable equations, Input-output representations (impulse response, transition matrix, transfer function), Time-variant & time-invariant, Linear feedback, Signal graph concepts, Stability.

UNIT - II

Feedback Controllers and Observers: Linear Dynamical Equations, Stability, Controllability and Observability, Minimal Realizations, State Feedback Controller Design, Pole Assignment using Ackkermans formula, State observers- Full order and reduced order observers.

UNIT - III

Non-Linear Systems: Nonlinear systems, Types of nonlinearities- Saturation, Dead zone, Backlash and Jump phenomina, Linearization of nonlinear systems, Singular points and its types- Describing function of different types of nonlinear elements.

Nonlinear Models and Nonlinear phenomena: Second-Order Systems , Qualitative behavior of linear systems, multiple equlibria, qualitative behavior near, equilibrium points, limit cycles, Numerical construction of Phase portraits, Existence of periodic orbits.

UNIT - IV

Lyapunov Stability and Input–Output Stability:

Lyapunov Stability: Autonomous Systems, The Invariance Principle, Linear Systems and Linearization, Comparison Functions, Non-autonomous Systems, Linear Time-Varying Systems and Linearization, Converse Theorems, Boundedness and Ultimate Boundedness, Input-to-State Stability.

Input–Output Stability: *L* Stability, *L* Stability of State Models, *L* 2 Gain, Feedback Systems: The Small-Gain Theorem.

UNIT - V

Frequency Domain Analysis of Feedback Systems: Absolute Stability, Circle Criterion, Popov Criterion, the Describing Function Method, Stability of Perturbed Systems.

TEXT BOOKS:

1. W. J. Rugh," Linear System Theory", 2nd Ed., Prentice-Hall, 1996.
2. C.T. Chen, "Linear System Theory and Design", 3rd Edition, Oxford.
3. H.K. Khailil, "Nonlinear System", 3rd Edition. Prentice Hall, 2002.
4. M. Gopal, "Modern Control System Theory", New Age International, 1984.

REFERENCE BOOKS:

1. R. D. Strum, D. E. Kirk, "Contemporary Linear Systems Using MATLAB", Brooks/Cole 2000.
2. S. S. Sastry," Nonlinear systems - Analysis and Control", Springer-Verlag, 1999.
3. Ogata. K, "Modern Control Engineering", Prince Hall, 1997.
4. Donald E. Kirk, "Optimal Control Theory- An Introduction", PH Network Series, First Edition.
5. M. Vidyasagar, "Nonlinear Systems Analysis", 2nd Ed, Prentice Hall, 1993.
6. J. J. Slotine, W. P. Li, "Applied Nonlinear Control", Prentice Hall, 1991.

7. Isidori, “Nonlinear Control Systems”, 3rd Edition, Springer, 1995.
8. M. Krstic, Kanellakopoulos, and Kokotovic, “Nonlinear and Adaptive Control Design”, Wiley, 1995.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
ELECTRONICS & INSTRUMENTATION

EMBEDDED SYSTEM DESIGN (PE-2)

UNIT -I

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

UNIT -II

Typical Embedded System: Core of the Embedded System- General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory- ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface- Onboard and External Communication Interfaces.

UNIT -III

Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT -IV

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

UNIT -V

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

TEXT BOOKS:

1. Shibu K.V, “Introduction to Embedded Systems”, Mc Graw Hill.

REFERENCE BOOKS:

1. Raj Kamal, “Embedded Systems”, TMH.
2. Frank Vahid, Tony Givargis, “Embedded System Design”, John Wiley.
3. Lyla, “Embedded Systems”, Pearson, 2013
4. David E. Simon, “An Embedded Software Prime”, Pearson Education.
5. Daniel D. Gajski, Samar Abdi, Andreas Gerstlauer, Gunar Schirner, “Embedded System Design: Modeling Synthesis and Verification”, Springer.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
ELECTRONICS & INSTRUMENTATION

ADVANCED INSTRUMENTATION LAB - I

Note: Minimum of 12 experiments should be conducted.

1. Measurement of strain using strain gauge
2. LVDT – characteristics
3. Piezoelectric transducers
4. Accelerometers
5. Stroboscope – measurement of RPM & Gyroscope – measurement of Torque
6. Measurement of Density and Viscosity of Fluid
7. Flow measurement of liquid using Ultrasonic Doppler effect
8. PID pressure controller
9. Multi loop control systems – Ratio control
10. Multi loop control systems – Cascade Control
11. pH meter
12. Flame Photometer
13. Chromatography
14. UV-VIS Spectrophotometer
15. FTIR Spectrophotometer