JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech.ICE-I Sem	L	T/P/D	C
	4	-/-/-	4

(A70439) EMBEDDED SYSTEMS

Objective: To learn the method of designing a real time system.

UNIT I :

8051 Family Architecture: 8051 Microcontroller Architecture, Microcontroller 8051 Pins, 8051 Ports, Internal and External Memory, Counter and Timers, Serial Communication in 8051, Interrupts, Interrupts in 8051, External Interrupts.

UNIT - II

Introduction to Real – Time Operating Systems : Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in RTOS Environment.

UNIT - III

Basic Design Using a Real-Time Operating System : Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/ Locators for Embedded

Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

UNIT – IV

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

UNIT V:

Introduction to the ARM Instruction Set: Data Processing Instructions, Branch Instructions, Load-Store Instructions, Software Interrupt Instruction, 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 and Multiple- Register Load-Store Instructions, Stack Instructions, Software Interrupt Instruction.

TEXT BOOKS:

1. Microcontrollers Architecture, Programming, Interfacing and System Design by Raj Kamal, 2e, Pearson.
2. ARM System Developer's Guide Design & Optimizing System Software by Sloss, Elsevier.

REFERENCES :

1. The 8051 Microcontroller & Embedded Systems using Assembly & C, by Kennet J Ayala and Dhananjay V. Gadre., Cengage Learning.
2. Embedded / Real Time Systems: Concepts, Design & Programming (Black Book) 2005 edition,by – KVKK Prasad.
3. Introduction to Embedded Systems – by Shibu K.V, MGH.

Outcomes:

Upon completion of this course, the student will be able to

- Understand the basics of an embedded system.
- Design, implement and test an embedded system.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech.ICE-I Sem

L	T/P/D	C
4	-/-/-	4

(A71006) COMPUTER AIDED DESIGN OF CONTROL SYSTEMS

Course Objective: To make student understand the concepts of controller designs and use soft tools for doing the same.

UNIT-I:

Controllability and Observability Introduction and mathematical back ground, system models, Generation of system matrices-Least order, Decoupling zeros, mode of the system transformation – Mcmillian form – Reduction to least order

Concepts of controllability and observability, Controllability and observability - Decomposition of state space and Duality.

UNIT- II:

Stability Analysis of Siso Systems and Compensator Designs: System Specification, Stability- Decoupling zeros, Nyquist Diagram Inverse Nyquist diagram.

Design of phase lead compensators from inverse Nyquist diagram- Design of phase lag compensators from inverse Nyquist diagram.Design using Root loci method of design, Comparison with inverse Nyquist diagram techniques – Sensitivity Design criteria , step response – frequency response – pole location – Selection of criteria. Irrational transfer functions, Non minimum phase response, the circle criteria – Connection with the describing function.

UNIT- III:

Multivariable Systems: Notation, Gain space, stability, frequency response criteria for stability, diagonal dominance, Ostrowski's theorem, Achieving dominance, Sensitivity, Direct Nyquist array, design procedure- Multi variable circle criterion.

UNIT- IV:

Matlab Programming: Introduction, variables, expressions, Control statements, Logical & Relational operators, Function files, Script files, Input-Output format, Working with Workspace

UNIT- V:

Design of Controllers Using Matlab: Introduction to Control system Tool Box, Time and Frequency domain analysis of Control Systems using MATLAB, Stability analysis using MATLAB, Controllability and Observability testing using MATLAB, Design of static Feed back Controllers.

TEXT BOOKS:

1. Computer Aided Design of Control Systems – by Resenbrock(Academic Press)
2. Multi variable Control Theory by Y.S. Apte.

REFERENCES:

1. MATLAB Control System Tool Box.
2. Simulation Tools for Electrical Engineers – by N. Yadaiah and G. Tulasi Ram Das, Pearson Education.

Course Outcome: The student shall be able to design his lumped control systems and test its performance.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech.ICE-I Sem

L	T/P/D	C
4	-/-/-	4

(A71004) ANALYTICAL INSTRUMENTATION

Course Objective : To introduce spectroscopic methods, Chemical Instrumental Analysis, Electro-analytical methods to numerous applications ranging across healthcare, environmental and pharmaceutical industries.

UNIT–I:

PH and Conductivity & Dissolved Component Analyser: Conductivity meters – pH meters – Dissolved oxygen, hydrogen analyzers – Sodium analyzer – Silica analyzer and sampling systems.

Gas Analysers: Thermal conductivity types – CO monitor – NOX analyzer – H 2 S analyzer system and sampling – Industrial analyzer circuits, Theory and problems on Beer – Lamberts Law.

UNIT – II:

Chromatography – I: Gas chromatography – Liquid chromatography – their principles and applications.

Chromatography – II: oxygen analyzer – paramagnetic type – detectors and sampling systems.

UNIT – III:

Spectrophotometers – I: UV, VIS Spectrophotometers – Single beam and double beam instruments – Instrumentation associated with the above Spectrophotometers – Sources and detectors – Sources and detectors for IR Spectrophotometers.

UNIT – IV:

Spectrophotometers – II: FT IR Spectrometer – Flame emission and atomic absorption Spectrophotometer – Atomic emission Spectrophotometer - sources for Flame Photometers and online calorific value measurements.

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.)

Special Analytical Instruments: Nuclear radiation detectors – Ionization chamber – GM Counter – Proportional Counter – Solid state detectors ND PMT.

TEXT BOOK:

1. Handbook of Analytical Instruments – by Khandpur. TMH
2. Analytical Instrumentation by Bela G. Liptak, CRC Press -1994

REFERENCES:

1. Instrumental Methods of Analysis – by Willard H.H., Merrit L.L., Dean J.A.. and Seattle F.L., CBS Publishing and Distributors, 6/e, 1995.
2. Instrument Technology – by Jones B.E., Butterworth Scientific Publ., London, 1987.
3. Mechanical and Industrial Measurements – by Jain R.K., Khanna Publishing, New Delhi, 2/e, 1992.
4. Principles of Instrumental Analysis – by Skoog D.A. and West D.M., Holt Sounder Publication, Philadelphia, 1985.
5. Instrumental Analysis – by Mann C.K., Vickerks T.J. & Gullick W.H., Harper and Row Publishers, New York, 1974.

Course Outcome :

The student is expected to acquire the knowledge is instruments used in Pharma and chemical Industries

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech.ICE-I Sem

L	T/P/D	C
4	-/-/-	4

(A70435) DIGITAL CONTROL SYSTEMS

Objective:

This course gives fundamentals digital control systems, z-transforms, state space representation of the control systems, concepts of controllability and observabilty, estimation of stability in different domains, design of discrete time control systems, compensators, state feedback controllers, state observers through various transformations.

UNIT – I:

Introduction : Introduction, Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

Z – TRANSFORMS: Introduction, Linear difference equations, pulse response, Z – transforms, Theorems of Z – Transforms, the inverse Z – transforms, Modified Z- Transforms. Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane.

UNIT – II:

State Space Analysis: State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and its Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations. Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

UNIT –III:

Stability Analysis: Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane.

Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

UNIT-IV:

Design of Discrete Time Control System : Transient and steady – State response Analysis – Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers.

UNIT – V:

State Feedback Controllers & Observers: Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula.

State Observers – Full order and Reduced order observers.

TEXT BOOK:

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition.

REFERENCE BOOKS:

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.Digital Control and State Variable Methods by M.Gopal, TMH .
2. Digital Control Systems V. I. George, C. P. Kurian, Cengage Learning.
3. Digital Control Engineering Analysis and Design M. Sami Fadali Antonio Visioli, AP Academic Press.

Outcome:

After going through this course the student gets a thorough knowledge on, basics of digital control systems, z-transforms, mapping between S-plane and Z-plane, state-space analysis, concept of controllability and observabilty, derivation of pulse-transfer function, stability analysis in S-domain and Z-domains, stability through jury-stability test, stability through bilinear transformation and R-H criteria, design of discrete-time control systems, design of lag, lead, lead-lag compensators, design of PID controllers and design of state feedback controllers and observers, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech.ICE-I Sem	L	T/P/D	C
	4	-/-/-	4

(A70505) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Learning Objectives:

- To understand object oriented programming concepts, and apply them in problem solving.
- To learn the basics of java Console and GUI based programming.

UNIT -I:

Object Oriented Thinking and Java Basics: Need for OOP Paradigm, Summary of OOP Concepts, Coping with Complexity, Abstraction Mechanisms, A Way of Viewing World – Agents, Responsibility, Messages, Methods, History of Java, Java Buzzwords, Data Types, Variables, Scope and Life Time of Variables, Arrays, Operators, Expressions, Control Statements, Type Conversion and Casting, Simple Java Program, Concepts of Classes, Objects, Constructors, Methods, Access Control, This Keyword, Garbage Collection, Overloading Methods and Constructors, Method Binding, Inheritance, Overriding and Exceptions, Parameter Passing, Recursion, Nested and Inner Classes, Exploring String Class.

UNIT -II:

Inheritance, Packages and Interfaces: Hierarchical Abstractions, Base Class Object, Subclass, Subtype, Substitutability, Forms of Inheritance-Specialization, Specification, Construction, Extension, Limitation, Combination, Benefits of Inheritance, Costs of Inheritance. Member Access Rules, Super Uses, Using Final with Inheritance, Polymorphism- Method Overriding, Abstract Classes, The Object Class.

Defining, Creating and Accessing a Package, Understanding Classpath, Importing Packages, Differences between Classes and Interfaces, Defining an Interface, Implementing Interface, Applying Interfaces, Variables in Interface and Extending Interfaces, Exploring Java.IO.

UNIT -III:

Exception Handling and Multithreading: Concepts of Exception Handling, Benefits of Exception Handling, Termination or Resumptive Models, Exception Hierarchy, Usage of Try, Catch, Throw, Throws and Finally, Built in Exceptions, Creating Own Exception Sub Classes.

String Handling, Exploring Differences between Multi-Threading and Multitasking, Thread Life Cycle, Creating Threads, Thread Priorities, Synchronizing Threads, Interthread Communication, Thread Groups, Daemon Threads.

Enumerations, Autoboxing, Annotations, Generics.

UNIT -IV:

Event Handling: Events, Event Sources, Event Classes, Event Listeners, Delegation Event Model, Handling Mouse and Keyboard Events, Adapter Classes.

The AWT Class Hierarchy, User Interface Components- Labels, Button, Canvas, Scrollbars, Text Components, Check Box, Check Box Groups, Choices, Lists Panels – Scrollpane, Dialogs, Menubar, Graphics, Layout Manager – Layout Manager Types – Border, Grid, Flow, Card and Grid Bag.

UNIT -V:

Applets: Concepts Applets, Differences between Applets and Applications, Life Cycle of an Applet, Types of Applets, Creating Applets, Passing Parameters to Applets.

Swing: Introduction, Limitations of AWT, MVC Architecture, Components, Containers, Exploring Swing- Japplet, Jframe and Jcomponent, Icons and Labels, Text Fields, Buttons – The Jbutton Class, Check Boxes, Radio Buttons, Combo Boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS:

1. Java the Complete Reference, 7th Editon, Herbert Schildt, TMH.
2. Understanding OOP with Java Updated Edition, T. Budd, Pearson Education.

REFERENCE BOOKS:

1. An Introduction to Programming and OO Design using Java, J.Nino and F.A. Hosch, John wiley & Sons.
2. An Introduction to OOP, Third Edition, T. Budd, Pearson Education.
3. Introduction to Java Programming, Y. Daniel Liang, Pearson Education.
4. An Introduction to Java Programming and Object Oriented Application Development, R.A. Johnson- Thomson.
5. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, Eighth Edition, Pearson Education.
6. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, eighth Edition, Pearson Education

Expected Outcome:

The student is expected to have

- Understanding of OOP concepts and basics of java programming (Console and GUI based)
- The skills to apply OOP and Java programming in problem solving
- Should have the ability to extend his knowledge of Java programming further on his/her own.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech.ICE-I Sem

L	T/P/D	C
4	-/-/-	4

(A70445) OPTO ELECTRONICS & LASER INSTRUMENTATION

(Elective-I)

Course Objective: To make the students under stand the application of Opto Electronics and Lasers in the quantifying .

UNIT – I

Optical Fibers and Their Properties

Introduction to optical fiber - fiber characteristics - principles of light propagation through a fiber - Different types of fibers and their properties - Losses in the optical fiber - Dispersion - advantages and disadvantages of optical fibers.

UNIT – II

Laser Fundamentals

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

UNIT – III

Opto-Electronic Components

Optical sources: LED, LD - Optical detectors: PIN, APD - Electro-optic, Magneto optic and Acousto-optic Modulators.

UNIT – IV

Industrial Applications of Optical Fibers

Interferometer method of measurement of length – Moire fringes – Measurement of pressure, Temperature, Current, Voltage, Liquid level and strain - fiber optic Gyroscope – Polarization maintaining fibers – Applications.

UNIT–V

Laser instrumentation

Industrial applications of lasers – Lasers for measurement of distance, length, velocity, acceleration, current, voltage and atmospheric effect - Bio-medical applications - Holography: Principle, Methods, Holographic Interferometers and applications.

TEXT BOOKS

1. 'Optical Fiber Communication – Principles and Practice, J.M. Senior, Prentice Hall of India, 1985.
2. 'Introduction to Opto Electronics, J. Wilson and J.F.B. Hawkes,

Prentice Hall of India, 2001.

REFERENCES

1. Understanding Fiber Optics, 4th or 5th edition; Jeff Hecht; Prentice Hall publishers.
2. 'Optical Fibre Communication and Sensors', M. Arumugam, Anuradha Agencies, 2002.
3. 'Optical Fibre Communication', G. Keiser, 'McGraw Hill, 1995.
4. Lasers: Theory and Applications – by Thyagarajan K. and Ghatak A.K., Plenum Press.
5. Monte Ross, 'Laser Applications', McGraw Hill, 1968.

Course Outcome:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech.ICE-I Sem

L	T/P/D	C
4	-/-/-	4

(A71116) TELEMETRY AND TELECONTROL

(Elective-I)

Objective: To make students understand the application of telemetry techniques to Instrumentation.

UNIT – I

Telemetry Principles: Introduction, Functional blocks of Telemetry system, Methods of Telemetry – Non Electrical, Electrical, Pneumatic, Frequency.

Symbols and Codes: Bits and Symbols, Time function pulses, Line and Channel Coding, Modulation Codes, Inter symbol Interference.

UNIT – II

Frequency& Time Division Multiplexed Systems: FDM, IRIG Standard, FM and PM Circuits, Receiving end, PLL.

TDM-PAM, PAM /PM and TDM – PCM Systems, PCM reception, Differential PCM Introduction, QAM, Protocols.

UNIT – III

Satellite Telemetry: General considerations, TT&C Service, Digital Transmission systems, TT&C Subsystems, Telemetry and Communications.

Modern Telemetry: Zigbee, Ethernet.

UNIT – IV

Optical Telemetry: Optical fibers Cable – Sources and detectors – Transmitter and Receiving Circuits, Coherent Optical Fiber Communication System.

UNIT – V

Telecontrol Methods: Analog and Digital techniques in Telecontrol, Telecontrol apparatus – Remote adjustment, Guidance and regulation – Telecontrol using information theory –Example of a Telecontrol System.

TEXT BOOKS

1. Telemetry Principles – D. Patranabis, TMH.
2. Telecontrol Methods and Applications of Telemetry and Remote Control – by Swoboda G., Reinhold Publishing Corp., London, 1991.

REFERENCES

1. Handbook of Telemetry and Remote Control – by Gruenberg L.,

McGraw Hill, New York, 1987.

2. Telemetry Engineering – by Young R.E., Little Books Ltd., London, 1988.

3. Data Communication and Teleprocessing System – by Housley T., PH Intl.,Englewood Cliffs, New Jersey, 1987.

Outcome: Upon completion of this course students will appreciate the application of different telemetry systems and control to any process.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech.ICE-I Sem	L	T/P/D	C
	4	-/-/-	4

(A70342) INSTRUMENTATION AND CONTROL IN MANUFACTURING SYSTEMS

(Elective – II)

Course objective: To make students understand the application of INSTRUMENTATION AND CONTROL system in manufacturing plant.

UNIT- I

Introduction to manufacturing operations and automation : Manufacturing industries and products, manufacturing operations, product/production relationships, production concepts, and mathematical models, costs of manufacturing operations, Components of a manufacturing systems, classifications of manufacturing systems, overview of the classification scheme, manufacturing progress functions (learning curves).

Introduction to automation & Industrial control Systems : Basic elements of aim automated system, advanced automation functions, levels of automation, process industries, verse discrete manufacturing industries, continuous verses discrete control, computer process control, forms of computer process control.

UNIT – II

Numerical Control and Discrete Control Using PLC's, fundamental of NC technology, computer numerical, DNC, applications of numerical control, descrete process control, ladder logic diagrams, programmable logic controllers, personal computers using soft logic.

UNIT –III

Industrial Robotics and Flexibile manufacturing Systems : Robot anatomic and related attributes, robot control systems, end effectors, sensers in robotics, industrial robot applications, robot programming, Engineering analysis of industrial robots.

Flexibile manufacturing Systems : What is an FMS ?, FMS Components, FMS applications, and benefits, FMS planning and implementation issues, fundamentals of automated assembly systems, design for auto0mated assembly, quantitative analysis of assembly systems.

UNIT –IV :

Quality assurance and statistical process control : Quality defined, traditional and modern quality control, taguchi methods in quality engineering, ISO 9000, process variability, and process capability, and control charts, other SPC tools, implementing statistical process control.

Quality inspection technologies : Inspection metrology, contact verses non contact inspection techniques, conventional measuring and gauging techniques and coordinate measuring machines, surface measurement, machine vision, other optical inspection techniques, non-contact non-optical inspection technologies.

UNIT –V :

Process and Production Planning : Process planning, computer- aided process planning (CAP), concurrent engineering and design for manufacturing, aggregate production planning and the master production scheduled, material requirements planning (MRP), capacity planning, shop floor control, inventory control.

TEXT BOOK :

1. Mikell P.Grover, Automation, Production Systems and Computer Prentice Hall of India Pvt.Ltd. 1995.

REFERENCES:

1. A.Troitsky Principles of Automation and Automated Production Mir Publ., 1976.
2. C.Ray Astaihe, Robots and Manufacturing automation, John Wile and Sons, New York.

Course Outcome:

Upon completion of this subject the student shall appreciate and understand the concept INSTRUMENTATION AND CONTROL application to manufacturing industries.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech.ICE-I Sem	L	T/P/D	C
	4	-/-/-	4

(A70515) COMPUTER NETWORKS

(Elective-II)

Objectives:

- To introduce the fundamental various types of computer networks.
- To demonstrate the TCP/IP and OSI models with merits and demerits.
- To explore the various layers of OSI Model.
- To introduce UDP and TCP Models.

UNIT-I

Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.

Physical Layer: Guided transmission media, wireless transmission media.

Data Link Layer – design issues, CRC Codes, Elementary Data link Layer protocols, sliding window protocol

UNIT-II

Multiple Access Protocols –ALOHA, CSMA, Collision free protocols, Ethernet- Physical Layer, Ethernet Mac Sub layer, data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters , hubs, bridges , switches, routers and gateways.

UNIT-III

Network Layer: Network Layer Design issues, store and forward packet switching connection less and connection oriented networks-routing algorithms-optimality principle, shortest path, flooding, Distance Vector Routing, Count to Infinity Problem, Hierarchical Routing, Congestion control algorithms, admission control.

UNIT-IV

Internetworking: Tunneling, Internetwork Routing, Packet fragmentation, IPv4, Ipv6 Protocol, IP addresses, CIDR, IMCP, ARP, RARP, DHCP.

Transport Layer: Services provided to the upper layers elements of transport protocol-addressing connection establishment, connection release, Connection Release, Crash Recovery.

UNIT-V

The Internet Transport Protocols UDP-RPC, Real Time Transport Protocols,

The Internet Transport Protocols- Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling, The TCP Sliding Window, The TCP Congestion Control, The future of TCP.

Application Layer-Introduction ,providing services, Applications layer paradigms, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS, SSH

TEXT BOOKS:

1. Data Communications and Networking – Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks — Andrew S.Tanenbaum, 4th Edition, Pearson Education.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A.Shay, Cengage Learning.
3. Introduction to Computer Networks and Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press.
4. Computer Networks, L.L.Peterson and B.S.Davie, 4th edition, ELSEVIER.
5. Computer Networking: A Top-Down Approach Featuring the Internet, James F.Kurose,K.W.Ross,3rd Edition, Pearson Education.

Outcomes:

- Students should be understand and explore the basics of Computer Networks and Various Protocols. He/She will be in a position to understand the World Wide Web concepts.
- Students will be in a position to administrate a network and flow of information further he/she can understand easily the concepts of network security, Mobile and ad hoc networks.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech.ICE-I Sem

L	T/P/D	C
4	-/-/-	4

(A71112) MEDICAL INSTRUMENTATION
(Elective-II)

Objectives: To understand

- the genesis of biopotentials
- different types electrodes and bioamplifiers
- Electrical Safety

UNIT-I

Origin of Biopotentials : Cell Structure, Electrical activity – Resting State, Active State, Action Potential.

Nernst Equation: Derivations and its significance. Refractory Period, Characteristics of Stimulus.Strength-Duration relationship.Electrical equivalent circuit of Axon. Membrane time and space constants, Membrane conductance, Nerve conduction.

Propagation of impulses in unmyelinated and myelinated nerve fiber, Electrical properties of synaptic junctions - EPSP and IPSP, Electroneurogram (ENG), Electromyogram (EMG), Electrocardiogram (ECG), Electroretinogram (ERG), Electroencephalogram (EEG), Electrooculogram (EOG).

UNIT-II

Bio Potential Electrodes : The Electrode – Electrolyte Interface, Polarization, Polari able and Nonpolarizable Electrodes, Electrode Behavior and circuit Models, The Electrode – skin Interface and Motion Artifact, Body-surface Recording Electrodes, Internal Electrodes, Electrode Arrays, Microelectrodes and its equivalent circuit, Electrodes for Electric stimulation of Tissue.

UNIT-III

Bio Amplifiers : General considerations for signal Conditioners, Pre-Amplifiers, Differential amplifier, Instrumentation Amplifier, Carrier amplifier, Chopper amplifier, Isolation amplifier, Sources of Noise in Low – Level Measurements.

UNIT-IV

Basic Recording Systems: Writing Systems, Direct Writing Recorders, Thermal & Ink Systems the Ink Jet Recorder, Potentiometric Recorder, Digital Recorders, Thermal Array Recorder, Video Printers, Electrostatic Recorder, Medical oscilloscope, LCD Display.

UNIT-V

Electrical Safety : Physiological effects of Electricity, Important Susceptibility

parameters, Distribution of Electric Power, Macro shock hazards, Micro Shock hazards, Electrical - Safety codes and Standards, Basic Approaches to protection against shock, Protection : Power distribution, Protection : Equipment Design, Electrical Safety Analyzers, Testing the Electrical System. Test of Electric Appliances.

TEXT BOOK:

1. John G. Webster. Medical Instrumentation.- Application and Design. John Wiley and Sons. Inc., New York, Third edition 2013.

REFERENCE:

1. R.S. Khandpur. Hand Book of Biomedical Instrumentation, McGraw Hill, 2nd Edition, 2003.
2. L. A Geddes, Principles of Applied Biomedical Instrumentation, John Willy & Sons, 1989.
3. Joseph .J. Carr, John M. Brown, Introduction to Biomedical Equipment Technology, Pearson-2001.

Outcomes:

- Know the basic levels of neuronal organization.
- Differentiate the electrodes used to acquire biopotentials and list the problems associated with acquisition.
- Recognize physiological parameters.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech. ICE-I Sem

L	T/P/D	C
-	-/3/-	2

(A71084) ANALYTICAL INSTRUMENTATION LAB

1. Gas analyzers.
2. Gas and liquid chromatography.
3. Spectrometer: UV and VIS spectrometer.
4. Spectrometer: IR and FT IR Spectrometer.
5. Flame photometer.
6. Measurement of calorific value.
7. Mass spectrometer.
8. pH Meter
9. Conductivity Meter
10. Bomb Calorimeter
11. GM Counter
12. Measurement of Gas Pollutents- Co, No, So
13. NMR Spectrometer.
14. Water Purity Measurement
15. Turbidity Measurement

(To perform any Twelve experiments)

Equipment:

Gas/ Liquid chromatographer, Gas Analyzer, UV & VIS spectrometer, IR spectrophotometer, Absorption spectrophotometer, Flame photometer, Bomb calorimeter.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech. ICE-I Sem	L	T/P/D	C
	-	-/3/-	2

(A70496) EMBEDDED CONTROL SYSTEMS LAB

(Minimum **TEN** experiments should be performed)

1. Determination of the control characteristics of A.C servomotor.
2. Transfer function of armature controlled D.C servomotor with inertia and viscous
3. Control characteristic of a magnetic amplifier with and without feedback.
4. D.C Motor speed control with regenerative and degenerative feedback and with tach generator in the feedback path.
5. D.C position control system – Output control with variation of control loop gain
6. System identification for the frequency response of a filter (based pass + band elimination filter)
7. Shaft angle encoder, decoder, output characteristics.
8. Amplitude modulation of low frequency, Signal and recovery after demodulation (effect of modulating frequency on the signal to noise ratio).
9. Robot manipulator motion control using feed pendent.
10. Pick and plan assignment of robot manipulator with microcontroller.
11. 4-1 line multiplexer with digital logic gates.
12. Elementary fast programming on a robot manipulator (describing a trajectory, which is predefined).