EC 6201 INTELLIGENT INSTRUMENTATION 3 Credits

Module – 1:

Technological trends in making transducers, Silicon sensors, Intelligent sensors and Bio-sensors. Measurement of Pressure, Level, Flow and Temperature using silicon sensors. Bio-sensors application and its type

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.
3. "Sensors and Transducers", 2/e by D. Patranabis

Module-2:

Non-contact type sensing: Radiation Sensors, X Ray and Nuclear radiation sensors, Fibre optic sensors for Temperature, Liquid level, Fluid flow measurement,

Electro-analytical sensors: Electrochemical cell, Standard Hydrogen Electrode (SHE), Smart sensors

Text Books:

1. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.
2. "Sensors and Transducers", 2/e by D. Patranabis

Module – 3:

Instrumentation systems, Types of Instrumentation systems, Data acquisition system and its uses in intelligent Instrumentation system, Detailed study of each block involved in making of DAS, Signal Conditioners: as DA, IA, Signal Converters (ADC & DAC), Sample and hold, Designing of Pressure, Temperature measuring instrumentation system using DAS, Data logger

Text Books:

1. "Process Control Instrumentation Technology" 6/e, by Curtis D Johnson, Pearson Ed.
2. "Electrical and Electronics Measurement and Instrumentation" by A. K. Swahney.
3. "Electronics instrumentation" by H. S. Kalsi [TMH]

Module – 4:

Automation system, Concepts of Control Schemes, Types of Controllers, Components involved in implementation of Automation system; Converter (I to P) and Actuators: Pneumatic cylinder, Relay, Solenoid (Final Control Element), Computer Supervisory Control System (SCADA), Direct Digital Control's Structure and Software

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.

Module – 5:

Introduction of Programmable logic controller, Principles of operation, Architecture of Programmable controllers, Programming the Programmable controller

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.

Module – 6:

Introduction about Distribution Digital Control, Functional requirements of process control system, System architecture, Distributed Control systems, Configuration, Some popular Distributed Control Systems, Industrial control applications like cement plant, thermal power plant.

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.

Module –7:

Introduction about Intelligent controllers, Model based controllers, Predictive control, Artificial Intelligent Based Systems, Experts Controller, Fuzzy Logic System and Controller, Artificial Neural Networks, Neuro-Fuzzy Controller system.

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Instrumentation ", by Kirk and Rimboi.

EC 6203 FIBER OPTIC COMMUNICATION SYSTEM 3 Credits

Module –1:

Introduction: Generations of optical communication, Advantages, Basic elements of an optical fiber transmission link

Text Book:

"Optical Fiber Communications" G.Keiser, 3/e, McGraw Hill

Module – 2:

Optical Fiber: Classification of Fibers, Fiber material and fabrication methods, Ray optics representation & wave optics representation for Step index and Graded index fibers, Phase & Group Velocity, Mode propagation, Goos-Hanchen shift, Power flow in step index fibers.

Text Book:

"Optical Fiber Communications" G.Keiser,3/e, McGraw Hill

Module –3 :

Signal attenuation and distortion in optical fibers, Dispersion effects in optical fibers.

Text Book:

"Optical Fiber Communications" G.Keiser, 3/e, McGraw Hill

Module - 4:

Optical Sources: Structure and materials of LED and LD sources, Operating characteristics and modulation capabilities of the LED and LD sources

Source to Fiber Power launching and coupling, Lensing scheme for coupling improvement, Fiber to fiber coupling and alignment methods, Splicing techniques, Fiber Connectors.

Text Book:

"Optical Fiber Communications" G.Keiser,3/e,McGraw Hill

Module – 5:

Principle of PIN photodiode and Avalanche photodiode, Noise in photodetectors, Detector response time, Photodiode materials, Optical receiver configuration and performance, Pre-amplifier design for optical receiver, analog and digital receiver.Point to point transmission links, Wavelength division multiplexing, optical data buses, Link power and rise time budget, Optical Amplifiers.

Text Book

"Optical Fiber Communications" G. Keiser, 3/e, McGraw Hill

Module – 6:

Fiber optics in LAN, MAN, SAN, WAN, FDDI architecture, SONET/ SDH architecture, SONET/ SDH network elements

Text Book:

"Optical Networking and WDM", Walter Goralski, Tata McGraw-Hill

Module - 7:

Potential application and future prospects optical fibers, multimode intensity sensors and signal mode interferometric sensors

Text Book:

"Fundamentals of Fiber optics in telecommunication and sensor systems", B.P.Pal, New age International (P) Ltd. Publishers, 2001.

Ref. Books:

1. "Optical Fiber Communication",J. M. Senior, PHI,2nd Ed.
2. "Introduction to Fiber Optics", Ghatak &Thyagarajan, Cambridge University press.
3. "Optical Communications", J.H.Franz &V.K.Jain Narosa Publishing House.
4. "Fiber Optics Communication", Harold Kolimbiris, Pearson Education.

EC 6205 COMPUTER NETWORKING 3 Credits

MODULE- I

Local Area Networks: Background, Topologies and Transmission Media, LAN standards IEEE 802 reference Model, Logical Link Control, Medium Access Control, IEEE 802.3 Medium Access Control, Ethernet, Fast Ethernet, Gigabit Ethernet, Token Ring and FDDI, Medium Access Control, IEEE 802.5 Transmission Medium Options.

Text Books:

1. "Data and Computer Communication", 8/e. by William Stallings.
2. "Data Communication and Networking", 4/e. by Behrouz A. Forouzan.

MODULE- II

Connecting devices and Backbone Networks: Bridges, Functions of a Bridge, Bridge Protocol Architecture, Fixed routing, Spanning tree approach, Connecting devices like Repeaters, Hubs, Bridges ,Two-layer switches, Routers and Three layer switches, Backbone Networks, Bus Backbone, Star Backbone, Connecting remote LANs, Wireless LANs, Applications, Architecture, IEEE 802.11, Architecture and Services, Medium Access Control, Physical layer.

Text Books:

1. "Data and Computer Communication", 8/e.by William Stallings.
2. "Data Communication and Networking" , 4/e. by Behrouz A. Forouzan.

MODULE- III

Internetworking: Principles of Internetworking, Requirements, Architectural approaches, Connectionless Internetworking, Addressing, Routing techniques, Static versus Dynamic Routing, Internet Protocol (IP), Internet Control Message Protocol (ICMP), IPV6 Structure, Header, Address and Header Formats, ICMPV6.

Text Books:

1. "Data and Computer Communication", 8/e. by William Stallings.
2. "Data Communication and Networking", 4/e. by Behrouz A. Forouzan.

MODULE- IV

Internet work Operations: Unicast and Multicast routing, Autonomous Systems, Unicast routing protocol OSPF, Internet Group Management Protocol (IGMP), Border Gateway Protocol, Integrated Service Architecture, ISA Approach, Components, Services, Queuing Discipline, Resource Reservation Protocol (RSVP), Differentiated Services (DS).

Text Books:

1. "Data and Computer Communication",8/e. by William Stallings.
2. "Data Communication and Networking", 4/e. by Behrouz A. Forouzan.

MODULE- V

Transport Protocols: Connection Oriented Transport Protocol Mechanisms, Reliable Sequencing networks services, Unreliable network services, TCP Services, TCP Header Format, TCP Mechanisms, TCP Implementation policy options, TCP Congestion Control, Retransmission Timer Management, Window Management, Quality of Service, User Datagram Protocol (UDP).

Text Books:

1. "Data and Computer Communication", 8/e. by William Stallings.
2. "Data Communication and Networking", 4/e. by Behrouz A. Forouzan.

MODULE- VI

Network Security: Passive and Active Attacks, Symmetric Encryption, Encryption Algorithms, Key Distribution, Traffic Padding, Message Authentication, Hash function, Secure Hash function, Public-key Encryption, Digital Signature, RSA Public Key Encryption algorithm, Key Management, Secure Socket layer and Transport layer Security, SSL Architecture, SSL Record Protocol, Change Cipher Spec Protocol, Alert Protocol, Handshake Protocol, IP level security IPSEC, Application layer security PGP, Firewall, Virtual Private Networks.

Text Books:

1. "Data and Computer Communication", 8/e. by William Stallings.
2. "Data Communication and Networking", 4/e. by Behrouz A. Forouzan.

MODULE- VII

Distributed Applications: Electronic Mail, Simple Mail Transfer Protocol (SMTP), Multipurpose Internal Mail Extension (MIME), Client Server Model, Socket Interface, Simple Network Management Protocol (SNMP) SNMP V2 and SNMP V3, Hypertext Transfer Protocol (HTTP) Overview Message Entities, World Wide Web (WWW), HTML, Common Gateway Interface (CGI), Voice over IP (VOIP).

Text Books:

1. "Data and Computer Communication", 8/e. by William Stallings.
2. "Data Communication and Networking", 4/e. by Behrouz A. Forouzan.

EE 6201 CONTROL THEORY 3 Credits

MODULE – I

Introduction:, Examples of control systems and applications, Basic components of control systems, Open loop and closed loop control systems, Effect of feedback on overall gain, Stability and external disturbances, Classification of control system : Linear and nonlinear continuous and digital, Time invariant and time varying, Minimum phase and non-minimum phase systems etc. Linearization of nonlinear systems using Taylors series.

MODULE – II

Block Diagrams and Signal Flow Graph: Block diagrams of control systems, Block diagram reduction, Signal Flow Graph (SFG)- Basic properties of SFG, SFG algebra, Gain formula to SGP, Application of gain formula to block diagrams.

MODULE – III

Time Response of Control Systems: Transient and steady state response, Time response specifications, Typical test signals, Steady state error, and error constant, Stability- Absolute, relative and conditional stability, Dominant poles of transfer function.

Root Locus Methods: Root locus concept, Properties and construction of root locus, Determination of relative stability from root locus, Root sensitivity to parameter variation, Root contours, Systems with transportation lag and effect of adding poles or zeros.

MODULE – IV

Bode Analysis and Introduction to Design: Frequency response specifications, Correlation between time and frequency domain Bode plot, Determination of stability using Bode plot, Introduction to compensation design using Bode plot.

MODULE – V

Other Frequency Domain Tools: Nyquist stability criterion, Theory of Magnitude phase plot, Constant M, constant N circle and Nichols chart.

MODULE – VI

Control System Components and Basic Control Actions: Sensors and encoders in control system, Potentiometer, Tachometers, incremental encoders, Synchros, Operational Amplifiers, Basic control actions: on-off control, P, PI, PD and PID.

MODULE – VIII

Concepts of State, State Variables: Development of state-space models. State and state equations, State equations from transfer function Transfer function from state equations, State transition matrix, Solution of State equation, Transfer Matrix, State variables and linear discrete time systems, Controllable and observable State models**,** Asymptotic state observers. Control system design via pole placement.

Text Books:

1. I. J. Nagrath & Gopal, "Control Systems Engineering", 4th Edition New Age International Publication.
2. K. Ogata, "Modern Control Engineering", 3rd Edition, Pearon Education.

Reference Books:

1. Norman Nise, "Control System Engineering, 4th Edition, Wiley.
2. Graham C. Goodwin, "Control System Design", PHI.
3. B. C. Kuo, "Automatic Control System", 7th Edition, PHI.