SARDAR PATEL UNIVERSITY
VALLABH VIDYANAGAR

SYLLABUS EFFECTIVE FROM: 2018-19

Syllabus for M.Sc. (Electronics)

(પીજી બોર્ડ તા. ૦૩/૦૫/૨૦૧૭)

Semester III

PS03CELE21: PRINCIPLES OF CONTROL SYSTEMS

TOTAL 100 MARKS (EXTERNAL-70, INTERNAL 30)
University Examination -3 Hours Duration

OUTLINE OF THE COURSE

This course introduces students the theory and practice of control systems, design of feedback systems and their applications in control systems.

UNIT-1

Definition, Classification and Characteristics of Control Systems, Open and closed loop Systems, Transfer Function: Single I/P, Single O/P systems, Multivariable system, Impulse Response, Block Diagram Representation, Signal Flow graph, Modeling of Systems. Control Action & Controllers, ON/OFF, Proportional, Integral, Derivative and PID Controllers

UNIT-2

Time Domain Analysis, Standard test Signals, Transient response design and Steady state error design, Analysis of Type 0,1,and 2 Systems, Time Response of higher order Systems, Frequency Domain Analysis, Conceptual Approach to Frequency Response, Relation between Transfer Function and Frequency Response, Co-relation between Time and Frequency Response Specifications.

UNIT-3

Response analysis of control system and stability criterion, Concept of Root Locus, Angle and Magnitude Condition, Construction Of Root Locus, Inverse Root Locus, Addition of Poles and Zeros on Root Locus, Stability of Control Systems, Routh-Hurwitz Criterion, Bode Plots and Stability Analysis of Systems

UNIT- 4

Polar Plots, Stability on Polar Plots, Nyquist Analysis, Stability from Nyquist Plot, Constant gain and Phase Loci, M and N Circles, Nichols Chart. Compensation of Control Systems, Types of Compensation, Phase-Lead, Phase-Lag, Phase-Lag-Lead Compensation, Feedback Compensation.

OUTCOME OF THIS COURSE

Knowledge of this course enables the students to understand and design many control loops found in industries.

BOOKS:

1. **Principles of Control Systems**
   S.C.Goyal and V.A.Bakshi Technical Publications, Pune (INDIA)
2. **Feedback Control Systems**
   S.D.Bhide, S.Satyanarayan & N.A. Jalgaonkar, Technova Publications, Pune (INDIA)
3. **Control Engineering: Theory and Practice**
   M.N.Bandyopadhyay
   Prentice Hall of India Private Limited, New Delhi (INDIA)
4. **Automatic Control Systems**
   Benjamin C. Kuo, Prentice Hall of India Pvt. Ltd., New Delhi (INDIA)
5. **Modern Control Engineering**
   Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., New Delhi (INDIA)
6. **Control Systems Engineering**
   IJ.Nagrath & M. Gopal, Wiley Eastern, New Delhi (INDIA)

PS03CELE22: DIGITAL AND MICROWAVE COMMUNICATION SYSTEMS
TOTAL 100 MARKS (EXTERNAL - 70, INTERNAL-30)
University Examination -3 Hours Duration

Outline:
The motivation is provide right path for the study of electronic communication systems as its stands today in the area of Digital, Microwave, Satellite8086
and Mobile Communication.

UNIT-1
Digital Communication- Information capacity, Frequency Shift Keying, (FSK), Phase Shift Keying (PSK), Binary Phase Shift Keying (BPSK),Quaternary Phase Shift Keying (QPSK), Quadrature Amplitude Modulation (QPSK), Differential Phase Shift Keying (DPSK), Application of Digital Modulation-PCM, Delta Modulation, Data Communication- Circuits, Codes, Error Control, Data Communication Hardware- Line Control Unit, UART.

UNIT-2
Multiplexing- Time- Division Multiplexing, T1 Digital Carrier System, Codecs, Combo chip, Line Encoding, Frame Synchronization, Frequency- Division Multiplexing- Composite Base Band Signal, Formation of Group, Super Group, Master Group.

UNIT-3
Microwave Communication- Simplified Microwave System, Microwave transmitter and receiver, Microwave repeaters, Diversity- frequency, space and polarization, Microwave System Gain, Free Space Path Loss, Fade Margin, Receiver Threshold, Noise Figure.

UNIT-4
Satellite Communication- History of orbital satellites, geostationary satellites, Orbital Patterns, Look angles, Orbital spacing and frequency allocation, Satellite system, link models, Satellite system parameters Cellular Communication- The cellular concept and its implementation, Cellular carriers and frequencies- channel allocation and frequency reuse multiple access technologies for cellular system, Mobile call termination, hand off.

Outcome:
Upon completion of the course, the student will be able learn about generation and detection of various digital modulation and detection methods. They will also gain the understating on Mobile and satellite communications techniques.

BOOKS:

1. **Advanced Electronic Communication System**
   Wayne Tomasi, Prentice Hall International
2. **Electronic Communication**
   Dennis Roddy & John Coolen, Prentice Hall India
3. **Electronic Communication System**
   George Kennedy, Mcgraw Hill Book Co.

PS03CELE23: COMPUTER HARDWARE & NETWORKING
TOTAL 100 MARKS (EXTERNAL - 70, INTERNAL-30)
University Examination -3 Hours Duration

Outline:
This course covers the fundamentals of computer emphasizing on the introduction hardware components, basic of Networking.

UNIT-1
Microprocessor types & Specifications, Motherboard & BUS, PC Components features and system design, Network Elements, LAN & WAN, Host-Workstation and Server, Peer-to-peer and Client Server Architecture. Physical Topologies- BUS-Star-Ring-Mesh-Wireless,

UNIT-2
Backbone and Segments, Selecting the right Topology, Physical Media- Coaxial Cable-Twisted Pair Cable- Fiber Optic Cable, Common Network Connectivity Devices-Network Interface Adapter – Hub – Switch- Router, Ethernet Frame Structure IEEE 802.3, Wireless Network, WLAN, WPAN, IEEE 802.11 Frame Structure, Wireless Antenna, Wireless Network Connectivity Devices, WiMAX, GAN, The OSI Reference Model

UNIT-3
Networking Protocols – TCP/IP – IPX/SPX – NetBEUI, TCP/IP Fundamentals, The Transmission Control Protocol, The Internet Protocol, Understanding IP Addressing, Name Resolution Methods, Configuring TCP/IP on Windows, TCP/IP Utilities, IPV4, IPV6- The New Internet Generation – Characteristics- Packet Header- Addressing-Transition from IPV4 to IPV6.

UNIT-4
Networking with Windows Operating System, Basic Software requirements, Network Connection, NIC Setting, Installing the Network Adapter and Protocols, File and Printer Sharing, Browsing the Network, Mapping the Network Drives. Windows 200X Operating System, Architecture of Windows 200X, Workgroups, Domains and Active Directory, Installing Windows 200X, Installing & Configuring DNS and Active Directory, Administering and Securing Active Directory, Managing User Groups, Sharing – Securing and Accessing Files & Folders.

Outcome:
After completing the course the students will be able to:
Have knowledge of in practice Develop computer system configuration Conduct diagnostics - testing and inspection
Have Knowledge of hardware components and latest development in the field
Carry out installation of operating system and applications Have Basic knowledge of Networking and system connectivity

BOOKS:

1. **Upgrading and Repairing PCs – 14th Edition** Scott Mueller, Pearson Education Asia
2. **Troubleshooting, Maintaining & Repairing PCs**, **5th Edition** Stephen J. Bigelow, Tata McGrew Hill Publishing Company Limited, New Delhi
3. **Computer Networks Protocols, Standards and Interfaces** Uyless Black, Prentice Hall of India Pvt. Ltd., New Delhi
4. **Computer Networks** Andrew S. Tanenbaum, Prentice Hall of India Pvt. Ltd., New Delhi
5. **Networking + Study Guide** David Groth, Todd Lammle, William Tedder, BPB Publications.
6. **Installing, Configuring & Administering Windows 200X Professional Windows 200X Server, Windows 200X Networking Infrastructure Windows 2000 Directory Services** Alan R. Carter, IDG Books India (P) Ltd.

PS03EELE21: THIN FILM TECHNOLOGY
TOTAL 100 MARKS (EXTERNAL - 70, INTERNAL-30)
University Examination -3 Hours Duration

Outline:
This course covers Theory and operating Principle of Vacuum system with different types of Vacuum Pumps and Gauges. Also it covers thin film electronic devices.

UNIT-1
Physical Vapor Deposition Methods – Direct, Flash, Electron Beam, Molecular Beam Epitaxy (MBE), Pulse Laser deposition Technique. Sputtering Yield and Influenced Factors D.C Sputtering, R.F Sputtering and Magnetron sputtering method-Chemical Vapor Deposition (CVD) Method- Metal Organic Vapor Deposition (MOCVD) method.

UNIT-2
Vacuum Pumps- Rotary pump-Diffusion pump- Turbo Molecular pump and Cryo- pump –Ion getter pump- Vacuum Gauges – Pirani gauge- Penning gauge. Substrate and Masks.

UNIT-3
Characterization techniques-X-Ray Diffraction, Electron Diffraction, Transmission and Scanning Electron Microscopy –Electron Probe Micro Analyzer (EPMA) and Electron Spectroscopy of Chemical Analysis (ESCA).

UNIT-4
Thin Film Resistor- Materials – Design and Applications. Thin Film Capacitors Materials, Design and Applications – Transparent Conducting Oxide Thin Films and their applications. Thin Film Device- Diode-Transistor-Photoconductor. Thick Film Technology.

Outcome:
This course gives importance to Vacuum system and its application of Thin Film Technology -motivates students to explore new horizons.

BOOKS

1. **Thin Film Technology and Applications**.K.L.Chopra and L.K.Malhotra, Tata Mc-Graw Hill, N.Delhi, (India)
2. **Active and Passive Thin Film devices**J.J.Coutts., Acadamic Press,NY (USA)
3. **Hand Book of Thin Film Technology**Leon I.Maissel and Reinhard Glang, Mc-Graw Hill Book.,NY (USA)
4. **The Materials Science of Thin Films** Milton Ohring, Academic press, NY(USA)
5. **Vacuum Science and Engineering** C.M.Vanatta, Mc-Graw Hill.,NY (USA)
6. **Thin Film Phenomena** K.L.Chopra Mc-Graw Hill.,NY (USA)
7. **Thin Film Hybrids** Malcolm R.Haskard, Prentice- Hall International (USA)
8. **Handbook of Thick Film Hybrid Microelectronics** Charles A Harper, Mc-Graw Hill Book Co.,NY (USA)
9. **Thin Film processes** Johan. L.Vossen and Warner Kern, Acadamic Press,NY(USA)

PS03EELE22: DIGITAL SIGNAL PROCESSING
TOTAL 100 MARKS (EXTERNAL-70, INTERNAL 30)
University Examination -3 Hours Duration

Outline:
This course is designed to provide students with a comprehensive treatment of the important issues in design, implementation and applications of digital signal processing concepts and algorithms.

UNIT-1
Introduction, Classification of Signals, Singularity Functions, Classification of Systems, Transformation of Discrete Time Signals, Representations of Systems, Trigonometric Fourier Series, Complex Fourier Series, Parseval's Identity for Fourier Series, Power Spectrum of a Periodic Function.

UNIT-2
Fourier Transform of Some Important Signals, Fourier Transform of Power and Energy Signals, Discrete-Time Fourier Transform (DTFT), Fast Fourier Transform (FFT), The Z-Transform, Properties of the Z-Transform, Inversion of the Z-Transform, The one-sided Z-Transform.

UNIT-3
Analysis of Linear Time-Invariant Systems in the Z-Domain, Finite Impulse Response (FIR) Filters; Magnitude Response and Phase Response of Digital Filters, Frequency Response of Linear Phase FIR Filters, Design Techniques for FIR Filters, Infinite Impulse Response(IIR), Design Techniques of IIR Filters.

UNIT-4
Realization of Digital Linear Systems, Block diagram and Signal flow graph, Basic Structures for IIR Systems, Basic Structures for FIR Systems, Applications of Digital Signal Processing; Voice Processing, Application of Radar, Image Processing, Introduction to DSP Software.

Outcome:
To introduce basic concepts of signal and systems
To introduce discrete Fourier transform and its applications.
To teach the design of infinite impulse response filters for filtering undesired signals

BOOKS:

1. **Signals and Systems**
   Simon Haykins and Barry Vankeen John Wiley & Sons, N.Y. (U.S.A)
2. **Signals and Systems : Continuous and Discrete**
   Rodger E. Ziemer, William A. Tranter and D. Ronald Fannin Max Well Macmillan Int. (U.S.A)
3. **Digital Signal Processing**
   Alan. V. Oppenheim and Ronald. W. Schafer Prentice Hall of India, New Delhi (INDIA)
4. **Theory and Applications of Digital Signal Processing**
   Lawrence R. Rabiner and Bernard Gold
   Prentice Hall of India, New Delhi (INDIA)
5. **Introduction to Digital Signal Processing**
   Johnny R. Johnson
   Prentice Hall of India, New Delhi (INDIA)
6. **Digital Signal Processing**
   John G. Proakis and Dimitris G. Manolakis Prentice Hall of India, New Delhi (INDIA)

PS03EELE23: ARM Programming and Embedded Communication Protocols
TOTAL 100 MARKS (EXTERNAL-70, INTERNAL 30)
University Examination -3 Hours Duration

Objectives:
1. To understand the basics of embedded system
2. To understand the architecture, assembly language and interfacing of different 8-bit microcontrollers
3. To learn embedded C programming
4. To learn software techniques to embed codes in to the systems
5. To learn communication standards and protocols ARM Programming:

Unit 1: •
ARM instruction set , Thumb instruction set • ARM memory interface: Cycle Types, Address Timing, Data Transfer Size, Instruction Fetch, Memory Management, Locked Operations, Stretching Access Times, The ARM Data Bus, The External Data Bus.

Unit 2: •
ARM Debug Interface: Debug Systems, Debug Interface Signals, Scan Chains and JTAG Interface, Reset, Pull-up Resistors, Instruction Register, Public Instructions, Test Data Registers, ARM7TDMI Core Clocks, Determining the Core and System State, The PC's Behavior During Debug, Priorities / Exceptions, Scan Interface Timing, Debug Timing. Embedded Communication Protocols:

Unit 3: •
Inter-Integrated Circuit (I2C) BUS: I2C bus specification, general characteristics, bus signals, Address mechanism, Extensions to the standard-mode I2C-bus specification, Applications. • System Management Bus (SMBus): Introduction, General characteristics, Physical Layer, data link layer, Network layer, differences between SMBus and i2c, Device addressing.

Unit 4: •
Controller Area Network (CAN): Specifications, basic concepts, Frame types, bus signals, Error handling, Addressing. • Serial peripheral interface (SPI): Introduction, Specifications, master slave configuration, applications.

Outcome:
Upon Completion of the course students will have basic concepts of ARM Architecture, interfacing and programming along with study and implementation of various communication protocols.

Books:
1. Real-Time Embedded Multithreading : Using ThreadX® and ARM®, Edward L. Lamie, CMPbooks.
2. ARM System Developer's Guide : Designing and Optimizing System Software (The Morgan Kaufmann Series in Computer Architecture and Design), Andrew Sloss, Dominic Symes, Chris Wright.
3. ARM Architecture Reference Manual (2nd Edition), David Seal. Addison-Wesley.
4. ARM System-on-Chip Architecture (2nd Edition), Steve Furber, Addison-Wesley