

Program: B.Sc Electronics and Communication System

Course title: **Core : Circuit and Network Analysis**

Subject Code: 13UEC1C01

Year: I

Semester: I

Credits: 4

Hrs/Week: 4

Unit – I: Passive Components

Resistors: Introduction - Classification of Resistors - Fixed Resistors - Variable Resistors - Colour coding of Resistors.

Inductors: Types of Inductors - Inductance of a coil - Energy stored in an Inductor.

Capacitors: Factors affecting Capacitance - Types of Capacitors.

Unit - II

DC resistive circuits: Voltage notation-Voltage reference point-Resistance in Series & Parallel -Voltage division rule- Current division rule-Capacitor in series and parallel - Filters using RC circuits: Low pass – High pass – Band pass filters.

Unit – III

AC Circuit: RMS value- Average value-Phasor diagram- AC through R,L&C circuit – AC through RL and RC series circuit-Power factor-Series and Parallel Resonance in **RLC circuit** - Graphical representation of resonance - Q-Factor of a series and parallel resonance circuit.

Unit - IV

Ohm's Law - Kirchoff's Laws - **Star-Delta and Delta-Star Conversion**- Mesh analysis-Super mesh analysis- Nodal analysis-Super node analysis. Simple problems in DC circuits.

Unit - V

Network Theorems: Superposition Theorem - Thevenin Theorem - Norton Theorem - Thevenin to Norton Conversion - Millman Theorem - Maximum Power Transfer Theorem - Problems.

Books for Study:

1. R.S.Sedha – “A Text Book of Applied Electronics” – S.Chand & Company Ltd., Reprint, 2010, (Unit I and II).
2. Ravish. R.Singh - “Basic Electrical and Electronics Engineering’

Program: B.Sc Electronics and Communication System

Course title: **Core : Semiconductor Devices**

Subject Code: 13UEC2C02

Year: I

Semester: II

Credits: 4

Hrs/Week: 4

Unit-I

Diode: Construction and Characteristics. Application: Clipping and clamping circuit. Diode breakdown: Zener and Avalanche breakdown. Special diode: Zener diode – Zener diode as a voltage regulator - Varicap - PIN and Tunnel diode.

Unit-II

Transistor: Construction and operation-Amplifying action-CB, CE and CC configuration-Load line analysis-Operating point-Cut off and Saturation point. Transistor Biasing: Self bias-feed back bias and voltage divider bias - Transistor as a switch.

Unit-III

Field Effect transistor: JFET construction-Working and Characteristics.FET biasing: Self bias and Voltage divider bias.FET as an amplifier: CS and CD in small signal model. MOSFET: Construction, Operation and Characteristics-Types of MOSFET - Introduction to CMOS.

Unit-IV

Power Electronics: Introduction - SCR – DIAC - TRIAC – UJT – PUT - SBS – SUS –Construction-Operation and Characteristics-Applications.

Unit-V

Optoelectronic Devices: Types of optical sources-Classifications of optoelectronic devices-LED – LCD - Photo diode - photo transistor – Light activated SCR - Solar cell – LDR – Applications.

Book for study

1. V.K.Metha “Principles of Electronics”, S.Chand & Company Ltd., Ram Nagar, New Delhi-110055, Reprints 1999, (**Unit I to IV**).
2. S.Salivahanan “Electronic devices and circuits”, N.Suresh Kumar, A.Vallavaraj,

Program: B.Sc Electronics and Communication System

Course title: **Core : Digital Electronics**

Subject Code: 13UEC3C04

Year: II

Semester: III

Credits: 4

Hrs/Week: 4

Unit-I

Number system: Binary-Decimal-Octal and Hexadecimal numbers. Codes: ASCII-Excess-3-BCD and Gray code. Basic logic gates: NOT, OR, AND, NAND and NOR-Universal logic gates: NOR and NAND. Boolean algebra: Boolean operation-Logic expression-Rules and Laws - DeMorgan's theorems - Simplification of Boolean expression - Karnaugh Map.

Unit-II

Arithmetic Circuits: Binary addition, Subtraction, Multiplication and Division- Adders-Parallel Adders-. Data-Processing Circuits: Decoder-Encoder-BCD to Binary conversion-Binary to Gray and Gray to Binary conversion-Multiplexer and Demultiplexer-Parity generator and checker-Comparator.

Unit-III

Flip-Flops: RS and Gated Flip-Flop-D and E triggered Flip-Flop-JK and MS Flip-Flop. Shift Register: Serial In-Serial Out, Serial In-Parallel out types shift registers. Counters: Asynchronous and synchronous counter-Decoding gates-Decade counter - Up-Down counter-Digital clock.

Unit-IV

D/A and A/D Conversion: Variable and Resistor network-Binary ladders-D/A Accuracy and Resolution. A/D conversion: Simultaneous and counter method-Continuous and Dual-Slope conversion method-A/D Accuracy and Resolution.

Unit-V

Memories: Basic terms and ideas-Magnetic memory-Optical memory-Memory addressing-ROMs, PROMs and EPROMs-RAM-Sequential programmable logic devices-Flash memories.

Books for study

1. Thomas L.Floyd, "Digital Fundamentals", Universal Book Stall, New Delhi-100002. Second edition. (Unit-I-III).
2. Donald P.Leach, "Digital Principles and Applications", Albert Paul Malvino and Goutam Saha, TMH Publishing Company, New Delhi, Sixth edition, (Unit IV-V)

Program: B.Sc Electronics and Communication System

Course title: **Core : Antenna and Wave Propagation**

Subject Code: 16UEC4C06

Year: II

Semester: IV

Credits: 4

Hrs/Week: 4

UNIT I: MICROWAVES

Introduction – Maxwell’s Equation – Ampere’s law – Faraday’s law – Gauss law – Wave Equation – TEM/TE/TM & HE wave equations – Waveguides: Rectangular waveguides – Circular waveguides.

UNIT II: RADIO WAVE PROPAGATION

Fundamentals of Electromagnetic Waves– Effect of Environment. Propagation of Waves: Ground waves- Sky wave propagation-Space waves- Tropospheric Scatter Propagation- Exterritorial Communications.

UNIT III: ANTENNAS

Basic considerations –Electromagnetic radiation- Wire radiator in space: Current and Voltage Distribution-Resonant antennas, Radiation Patterns and Length calculation- Nonresonant antenna. Terms and Conditions: Antenna gain and effective Radiated Power-Antenna Resistance-Bandwidth, Beam width and Polarization. Types of antenna: Yagi-Uda antenna- Rhombic antenna-Horn antenna-Lens antenna.

UNIT IV: MICROWAVE TUBES

Microwave Triodes-Multi cavity klystron – Reflex klystron - Magnetron – Traveling wave tube – Backward wave Oscillators – Fundamentals, Operation and Applications.

UNIT V: RADAR SYSTEMS

Radar fundamentals –Radar range equation – Pulsed Radar system: Basic pulsed radar system-Antenna scanning & tracking - Display methods – Moving Target Indicator. Other Radar System: CW Radar –FM Radar-Applications.

Books for study:

1. N.Kulkarni – ‘Microwave and Radar Engineering’, Umesh Publications, Second Edition. (Unit I).
2. George Kennedy ‘Electronic Communication Systems’ TMH Publishing Company Limited, Third Edition.1998.(Unit-II to V)

Book for Reference

3. Dennis Roddy and John Coolen, ‘Electronic Communications’ Pearson, Fourth Edition, 2011.
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Program: B.Sc Electronics and Communication System

Course title: **Core : Electronic Circuits**

Subject Code: 16UEC4C07

Year: II

Semester: IV

Credits: 4

Hrs/Week: 4

Unit - I: Power Supplies

Introduction – Linear mode power supply - Rectifiers: Half and Full Wave Rectifiers - Ripple Factor - Rectification Efficiency - Transformer Utilization Factor - Filters: Inductor Filter - Capacitor Filters - LC Filter - Pi Filter – Introduction to Voltage Regulator.

Unit - II: Amplifiers

Introduction – Classification - Single stage amplifiers: CE, CC and CB amplifiers - Small signal Analysis - FET Amplifiers: CS and CD amplifiers - Multi Stage Amplifier - Coupling Methods - Frequency Response of RC Coupled Amplifier - Transformer Coupled Amplifier - Direct coupled Amplifier - Tuned Amplifier .

Unit - III: Power Amplifiers

Amplifier classification based on biasing condition - Class A large signal amplifier - Transformer coupled class A Audio power amplifier - Efficiency of class A amplifier - Class B amplifier - Efficiency of class B amplifier - Class B Push pull amplifier – Cross over distortion - Class C Amplifier - Introduction to class D and class S amplifiers

Unit - IV: Feedback Amplifiers

Introduction - Basic concept of Feedback – Advantages of Negative Feedback: Gain, stability, Increased Bandwidth, Decreased Distortion, Decreased Noise. Type of Feedback Connections: Voltage series feedback – Voltage shunt feedback – Current series feedback-Current shunt feedback -Comparison of feedback connection

Unit - V: Oscillators and Waveform Generators

Introduction - Classification of Oscillators – Nature of sinusoidal oscillation - oscillator circuit - Frequency of oscillatory circuit - The Barkhausen criterion. Tuned Circuit Oscillator: Tuned base oscillator - Hartley Oscillator - Colpitts Oscillator - RC Oscillator : Phase Shift oscillator - Wien Bridge Oscillator - Crystal Oscillator . Multivibrators – Schmitt trigger (Transistor only).

Books for Study:

1. S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, “Electronic Devices and Circuits”, TMH Publishing Company Ltd., Seventh Reprint 2001.(Unit-I)
2. R. S. Sedha, “A test book of Applied Electronics”, S Chand and Company Ltd., 2nd Edition, 2001(Unit-IV and V)

Books for Reference:

1. V.K. Mehta, “Principles of Electronics”, S Chand and Company Ltd., 2nd Edition, 2001.

Program: B.Sc Electronics and Communication System

Course title: **Core : Modern Instrumentation**

Subject Code: 13UEC5C09

Year: III

Semester: V

Credits: 4

Hrs/Week: 4

Unit-I Qualities of Measurement

Introduction - Performance Characteristics - Static Characteristics - Errors In Measurement – Types of Static Error – Sources of Error – Dynamic Characteristics- - Statistical Analysis- Standard – Electrical standards – Atomic frequency and time standards.

Unit-II Bridges

Introduction- Wheatstone Bridge- Kelvin's Bridge- Capacitance Comparison Bridge- **Wien's Bridge- Schering Bridge** - Inductance Comparison Bridge - Maxwell's Bridge - Hay's Bridge.

Unit-III Signal Analysis Instruments

Oscilloscope: Basic principle – CRT features - Block Diagram - Vertical Amplifier - Horizontal Deflection System – CRT connections – Dual trace oscilloscope – Probes for CRO – Applications of oscilloscope – Introduction to Digital Storage Oscilloscope - Basic Wave Analyzer - Frequency Selective Wave Analyzer - **Heterodyne Wave Analyzer**- Harmonic Distortion Analyzer - Spectrum Analyzer.

Unit-IV Transducer

Introduction - Electrical Transducer – Selection of transducer –Active & Passive transducers - Resistive transducer: Strain gauges – Resistance thermometer – Thermistor - Inductive transducer: LVDT - Capacitive Transducer – Piezoelectric transducer – Photo electric transducer - Photovoltaic cell.

Unit-V Data Acquisition Systems

Introduction - Objective of a DAS-Signal conditioning of the input-Single channel DAS-Multi channel DAS-Computer Biased DAS - Data Loggers-Sensor based Computer Data Systems-Digital Transducer.

Book for Study:

1. Electronics Instrumentation - H.S. Kalsi, Third Edition, TMH Publishing Company Limited, 2010.

Books for Reference:

1. Electronic Instrumentation & Measurement Techniques - W.D.Cooper & A.D. Helfrick
2. Instrumentation Devices & Systems - C S Rangan, G.R. Sharma, V.S.V.Mani

Course title: **Core : Linear IC's and Its Applications** Subject Code: 13UEC5C10 Year: III
Semester: V Credits: 4 Hrs/Week: 4

Unit - I: Operational Amplifiers

Introduction – Block diagram of Operational Amplifiers – Ideal Op-amp – Parameters – Inverting Amplifier – Non-Inverting Amplifier – Voltage follower - Differential Amplifier – CMRR – AC and DC characteristics.

Unit - II: Op-Amp Applications

Scale changer – Summing Amplifier – Subtractor – Instrumentation amplifier – Voltage to current converter – Current to voltage converter – Log and Antilog amplifier – Multiplier and Divider - Differentiator - Integrator — Electronic analog computation.

Unit - III: Comparators and Waveform Generators

Introduction – Comparator – Applications – Schmitt trigger – Square wave generator – Monostable multivibrator – Triangular wave generator – Wien bridge oscillator – Function generator.

Unit - IV: Voltage Regulator

Introduction – Series regulator - IC voltage regulators – Fixed voltage series regulator - IC 723 General purpose regulator - Current limit protection - Current Fold back – Current boosting –Switching regulator.

Unit - V: Timer and Phase-Locked Loops

Introduction - Description of Functional diagram of 555 – Monostable operation – Astable operation – Applications – Schmitt trigger – PLL: Introduction – Basic principles – Phase detector – Comparator – VCO – Low pass filter - PLL Applications.

Books for Study:

1. D.Roy Choudhury, Shail B. Jain, “ Linear Integrated Circuits”, New Age International Publishers, Third Edition 2007.

Book for Reference:

1. Ramakant A Gayakwad, “Op-Amps and Linear Integrated Circuits”, PHI, 4th edition 2004.
 2. Botkar K.R, “Integrated Circuits”, Khanna Publishers, 9th Edition 2000.
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Program: B.Sc Electronics and Communication System

Course title: **Core : Optical Fiber Communication**

Subject Code: 16UEC6C12

Year: III

Semester: VI

Credits: 4

Hrs/Week: 4

Unit-I

Introduction - Propagation of light waves in optical fiber-Acceptance angle and Acceptance cone - Numerical Aperture-Classification of Optical fiber-Other latest developed fiber.

Unit-II

Fiber fabrication: Classification of fabrication techniques-External and Internal CVD-Axial vapor deposition-Multi element glasses- Phasil system-Comparison of various methods. Fiber drawing and coating - Cable construction – Strength member - Cable testing - Cable selection criteria - Fiber losses.

Unit-III

Light sources: LED and Laser-Basic construction and Operation. Detector: Classification and Characteristics of Detectors. Couplers: Types and working of couplers. Splicing: Types -Steps involved in splicing - Losses in splicing and Connectors.

Unit-IV

Communication Systems: Introduction- Transmitter for fiber optic communications-High performance Transmitter circuits- Laser Transmitter-Transmitter design- Fiber optic receiver- High performance receiver-Design of fiber optic receiver- Repeaters-Fiber based modems: Transreceiver.

Unit-V

Measurements: Introduction- Numerical Aperture- Fiber attenuation- Scattering loss- Dispersion loss- Refractive Index- Cut-off wavelength- Bending loss- Mode field diameter.

Book for study

1. Subir Kumar Sarkar, “Optical fibers and fiber optic communication system”, S.Chand & Company Ltd, 1997.

Book for reference

1. *Gerd Keiser “ Optical Fiber Communications” 3rd edition Aug 20, 2013.*
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Program: B.Sc Electronics and Communication System

Course title: **Core : PC Hardware Fundamentals**

Subject Code: 13UEC6C13

Year: III

Semester: VI

Credits: 4

Hrs/Week: 4

Unit - I

Evolution of PC – Specifications – PC System – I/O ports – Mother Board – BIOS-Bus Stand – SMPS – PC Memory Organization – Memory Package.

Unit - II

Magnetic Storage Fundamentals – Diskette Basics – Data Recoding Formats – Disk Organization in Dos – Floppy Disk Drive – Floppy Disk – Controller – Installation and Configuration – Hard Disk Drive Sub-Assemblies – Hard Disk Controller – Interface Types.

Unit - III

I/O Devices: Key Board – Mouse – Scanner – Digitizer – Digital Camera – Video Basics – VGAMonitors – Display Controller – Display Adaptors.

Unit - IV

CD-Rom Disk & Drive – Sound Blaster – Video on the PC – Dot Matrix Printer – Plotter – Printer controller – Laser printer – Inkjet Printer.

Unit - V

Computer Installation & Maintenance – Room Preparation Power supply – PC Installation – Post – Troubleshooting of Mother Board, Keyboard, Floppy/Hard Disk Devices & Printers – Diagnostic Software's – Data Security.

Book for Study:

1. D. Balasubramanian – Computer Installation and Service – Tata McGraw Hill.

Book for Reference:

1. Peter Norton – Inside the PC – Prentice Hall of India.
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ELECTIVES

Course title: **Elective-I: 8085 Microprocessor and Interfacing**

Subject Code: 16UEC4EL1

Credits: 5

Year: II

Semester: IV

Hrs/Week: 5

UNIT – I Microprocessor Fundamentals

Introduction – Block diagram – Evolution – CPU – Memory: Cache memory – Memory Hierarchy – Primary & Data Memory – Buses: Architecture – Types – Applications.

UNIT – II Microprocessor Architecture

Introduction – **Intel 8085 Architecture**: ALU – Timing and control unit – Registers – Data and address bus – Pin Configuration – Instruction word size - Instruction cycle: Fetch operation – Execute operation – Machine cycle and state – Instruction and data flow – Timing diagram: Timing diagram for OP code fetch cycle – Memory read – I/O read – Memory write – I/O write.

UNIT – III **Instruction Set**

Introduction - Instruction and Data formats - Addressing modes - Intel 8085 instructions – Data transfer group – Arithmetic group – Logical group – Branch group – Stack, I/O and machine Control group.

UNIT – IV **Programming**

Introduction - Assembly language – High level languages – Stack - subroutines – Delay subroutines - Debugging of problems - simple examples – 8 bit Addition and Subtraction of binary and Decimal numbers – Complements – Shift masking – Finding Maximum and Minimum in an array – Arranging a series of numbers – Multiplication, Division –Block Data transfer.

UNIT – V **Interfacing Devices**

Address space partitioning – memory and I/O interfacing – Data transfer schemes – 8255 Programmable peripheral interface – 8257 Programmable DMA controller – 8259 Programmable Interrupt controller – 8251 Programmable communication interface – 8253 Programmable interval timer – 8279 Programmable keyboard/Display interface.

Book for Study:

2. B.Ram, “Fundamentals of Microprocessor and Microcontrollers”, Dhanpat Rai Publications, Fifth Reprint, 2008.

Books for Reference:

2. Ramesh S.Gaonkar, “Microprocessor Architecture, Programming and Applications with the 8085” Penram International publishing (P) Ltd, Fifth Edition, 1995.
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Course title: **Elective-I: PCB Design and Fabrication**

Subject Code: 16UEC4EL1

Credits: 5

Year: II

Semester: IV

Hrs/Week: 5

Unit - I

Types of PCB –Single, Double, Multi-layer PCB’S-Flexible PCB-Contact between sides of PCB’S (clinched wires, rivets, placed through holes, via-holes, no plated holes) - PCB sizes-Layout approaches-Procedures-Documentation-Layout check. Resistance of printed conductors- Capacitance between printed conductors-Inductance of printed conductors-Spacing of conductors- Width of signal, supply and ground lines-Component placing, mounting and package density.

Unit - II

General consideration-Basic methods-Ink drawing-Black taping- Two layer, three layer artwork -Red/Blue taping - Diazo films- Cut & Strip Method-General artwork rules-Artwork check and inspection..Film master preparation - Emulsion parameters - Dimensional stability of film masters - Temperature and humidity.

Unit - III

Camera Tubes - Dark room considerations - Film processing photo-resists - Coating of Wet filmresists – Processing - Dry film resists. Etching methods and machines – Etching - Ferric chloride.

Unit - IV

Copper Clad Laminates – Manufacture - Properties Electrical, Physical, Bond - Types of Laminates - Resins – Classification. Reflections - TTL, CMOS & ECL IC’s - Matching with additional elements - Cross talks - Ground and supply line noise - Electromagnetic interference.

Unit - V

Solders and soldering techniques: Introduction - Principles of solder connections - Solder alloys - Soldering fluxes - Soldering techniques - Solder mask - Reflow soldering practice - Testing and quality control - Safety, Health and MEDICAL aspects IN soldering practice. Component assembly techniques: Preparation and mounting of components - Organization of non - Automatic PCB assembly - Lead cutting and soldering - PCB cleaning after soldering.

Books for Study:

1. Walter.C.Boshart - Printed Circuit Boards - Design and Technology - Tata McGraw Hill.

Course title: **Elective-I: Domestic Electric and Electronics Appliances**

Subject Code: 16UEC4EL1

Credits: 5

Year: II

Semester: IV

Hrs/Week: 5

Unit – I Indicating System

DC bell – AC bell – Buzzer – Two tone chime- Design and construction of bell circuits – Bell circuits with indicating system – Fire alarm system: Block diagram – Detectors – Manipulating circuit using SCR – Water level indicator: Block diagram – Level detectors.

Unit – II Electric Wiring

Introduction to power distribution system Symbols for electrical installations – Electrical accessories: Switches – Wires – Cables – Holders – Electrical lighting circuits – Protection circuits: Fuse – Fuse rating – Earthing system – Magnetic circuit breakers.

Unit – III Audio System

Tape Recorder: Mechanism – Block diagram of circuits – Maintenance Procedures – Public addressing system: Functional components – Block diagram – Typical PAS installation planning: Public meeting – Auditorium – Debating chamber – Foot ball stadium.

Unit – IV Video System

VCP & VCR Block diagram – Mechanism – Video Disk system – Closed circuit television: Block diagram – Camera installation procedure – Television set - Introduction to cable TV – MP3 Player – CD & DVD player.

Unit – V Domestic Appliances

Electronic clock – Grinder – Mixing machine – Washing machine – Electric oven – Microwave oven – Stabilizer – Refrigerator – Iron Box – Air cooler – Air conditioner – Mobile phone – UPS.

Books for Study:

1. P.P.Gupta, “Electrical Equipments”, Dhanpat Rai & Sons, Second Edition, 1993.
2. R.G.Gupta, “Audio and Video systems”, TMH Publishing Ltd, Eighth Edition, 2000.
3. Robert L. Goodman, “Maintaining & Repairing Video Cassette Recorders”, BPB Publications, First Edition, 1984.
4. R.C.Vijay, “Servicing Cassette Recorders and Two-in-one”, BPB Publications, Second Edition, 1990.

Books for Reference:

1. Ru.Van Wesel, Gordon J.King, “Video Hand Book”, Newness Technical Books, Second Edition, 1983.

Course title: **Elective-II: 8051Microcontroller and Its Applications**

Subject Code: 13UEC5EL2

Credits: 5

Year: III

Semester: V

Hrs/Week: 5

Unit-I Introduction & 8051 architecture:

Microprocessors and microcontrollers- Z80 and the 8051- a microcontroller survey, development-systems for microcontrollers-8051 micro controller hardware-input/output pins- ports- ports and circuits- external memory-counters and timers- serial data i/o- interrupts.

Unit-II 8051 Instruction set & Programming:

Addressing modes- external data moves- code memory read- PUSH and POP opcodes-data exchanges- Byte-level logical operations- bit-level logical operations- rotate and swap operations-Flags- incrementing and decrementing- addition- subtraction- multiplication and division- decimal-arithmetic-Jump and call program range- jumps- calls and subroutines- interrupts and returns.

Unit-III 8051 microcontroller design:

Microcontroller specifications - 8051 micro controller design - testing the design - timing subroutines -look up tables for 8051- serial data transmission.

Unit-IV Serial data communication & Introduction to other microcontrollers and buses:

Network configuration - 8051 data communication modes – I²C - RS232 - ARM - PIC microcontrollers – **CAN** – USB - SPI & PCI etc families for buses.

Unit-V Applications:

Matrix Keyboard – LCD - pulse measurements-D/A and A/D conversions - multiple interrupts-RTC through DS1307-EEPROM.

Books for Study:

1. The 8051 Microcontroller - Kenneth J. Ayala - 3rd Edition-2005 – Delmar Learning.

Book for Reference:

1. The 8051 Microcontroller and Embedded Systems - Mazidi & Mazidi (PHI)

Subject Code: 13UEC5EL2

Credits: 5

Year: III

Semester: V

Hrs/Week: 5

UNIT I

Principles of single phase inverter, converter, cyclo converter and DC chopper – UPS – HVDC – static circuit breaker – battery charging circuit – **SCR current limiting circuit** breaker – static AC and DC switches – flasher circuits - time delay circuits – fan regulator using TRIAC – thyristor protection circuits: over current protection – over voltage protection – gate protection.

UNIT II

Welding and Heating: resistance welding – types of resistance welding – electronic control in resistance welding: ignitron contractor – heat control – non synchronous timer – synchronous weld timer – sequence timer – energy storage welding systems – induction heating – applications of induction heating – dielectric heating – application of dielectric heating.

UNIT III

Generation of ultrasonic waves – applications of ultrasonic – production of X rays – applications – Measurement of non electrical quantities: pressure measurements – displacement measurements – level measurements – flow measurements – measurement of thickness.

UNIT IV

Application in industrial systems: Thermistor control of quench oil temperature – proportional mode pressure control system – strip tension controller – automatic weighing system – control of relative humidity in a textile moistening process – warehouse humidity controller.

UNIT V

Industrial Robotic Systems: Parts of robotic systems – Classifications of robotic systems – robotic system configurations – degrees of freedom of robotic system – programming robotic systems – motions of robotic systems – sensor for robotic systems – mechanical parts – control systems. Microprocessor based industrial applications: Speed control of DC motor – measurement of physical quantities – water level indicator – firing angle control of thyristor.

TEXT BOOKS

1. Harish C Rai, “Industrial and Power Electronics” 10th edition, Umesh publications 2002
 2. Timothy J Maloni, “Industrial Solid State Electronic Devices and Circuits” 2nd edition 1986
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Course title: **Elective-II: Network Communications**

Subject Code: 13UEC5EL2

Credits: 5

Year: III

Semester: V

Hrs/Week: 5

Unit: I Networking Concepts

Structure of the communication networks - Networks topologies - Telephone networking – Fundamentals of communication theory – Connecting the analog and digital world – Advantages of digital systems – Signal conversion - Synchronizing network components - classification of communication protocols.

Unit: II Components and network distributed architecture

Layering: Physical layer - Data link layer - **Network layer** - Transparent layer - Session layer-presentation layer - Application layer - **Modems:** Modulation techniques - other modems –Advances in modems - **Switching:** circuit switching – Message switching – Packet switching.

Unit: III Communication **Networks and protocols**

Asynchronous transfer mode- ATM logic connections-ATM cells –ATM service categories –**protocols** –Need for a protocols architecture-TCP/IP protocols architecture –Internet protocols architecture-CDMA.

Unit: IV Local Area Network

Introduction- LAN definition –Usage – Major components of LAN- LAN protocols – IEEE standards –CSMA CD –Token ring –Token bus –MAN-Fiber distribution data interface (FDDI)-Logical link control-other LAN (Ethernet, IBM, Token ring).

Unit V:

Wireless network and wireless LAN overview - Wireless LAN requirements – Wireless LAN technology – IEEE 802 architecture – IEEE 802.11 architecture and services – IEEE 802.11 MAC – IEEE 802.11 physical layer – Wireless local loop – IEEE 802.16

Books for Study:

1. Uyless Black, "Computer networks" PHI, II edition, 1999
2. Uyless Black, "Data communication and distributed networks", PHI III edition, 1993.

Unit-I Introduction:

Embedded systems – Processor Embedded into a system – Embedded hardware units and devices in a system – Embedded software in a system – Examples – Embedded system-on-chip (Soc) and use of VLSI circuit design technology – Complex systems design and processors – Design process in Embedded system – Formalization of system design – Design process and design examples – **Classification** – Hardware and skills requirements.

Unit-II Device drivers and interrupt service mechanism:

Programmed-I/O Busy-wait approach without interrupt service mechanism – ISR concept – Interrupt sources – Interrupt servicing mechanism – Multiple interrupts – Context and the periods for Context switching, Interrupt latency and Deadline – Classification of processors interrupt service mechanism from Context-saving angle – Direct memory access – Device driver programming.

Unit-III Programming concepts and Embedded programming in C and C++:

Software programming in ALP and C – C program elements: Header, source files and preprocessor directives – Program elements: Macros and Functions – Data types, Data structures, modifiers, Statements, Loops and Pointers – Object oriented programming – Embedded programming in C++.

Unit-IV Inter process Communication and Synchronization of processes, threads and tasks

Multiple processes in an application - Multiple threads in an application – Tasks – Task states – Task and data – Clear-cut distinction between functions, ISRS and tasks by their characteristics – Concept of Semaphores – Shares data – Inter process communication – Signal function – Semaphore functions – Message Queue functions – Mailbox functions – Pipe functions – Socket functions – RPC functions.

Unit-V **Real-time operating systems:**

OS services – Process management – Timer functions- Event functions – Memory management – Device, file and IO subsystems management – Interrupt routines in RTOS environment and handling of interrupt source calls – Real time operating systems – Basic design using an RTOS – **RTOS task scheduling models**, Interrupt latency and Response of the tasks as performance metrics – OS security issues.

Books for Study:

1. Embedded Systems – Architecture, Programming and Design – Raj Kamal - Second Edition- 2008 – The McGraw Hill Companies.

Course title: **Elective-III: Digital and Mobile Communication**

Subject Code: 13UEC6EL3

Credits: 5

Year: III

Semester: VI

Hrs/Week: 5

Unit - I

Introduction - Historical Developments - Sources & Signals - Basic Signal Processing operations in Digital Communications - Channels for Digital communications - Uncertainty, Information and Entropy - Source Coding Theorem - Huffman Coding - Discrete Memory less Channels - Mutual Information - Channel Capacity - Channel Coding Theorem - Differential Entropy and Mutual Information for Continuous Ensembles - Channel Capacity Theorem.

Unit - II

Sampling Theorem - Quadrature Sampling of Band Pass signals - Reconstruction of a Message Process from its Samples - Signal Distortion in Sampling - Practical Aspects of Sampling and Signal Recovery - Pulse Amplitude Modulation - Time Division Multiplexing.

Unit - III

Pulse Code Modulation - Channel Noise and Error Probability - Quantization noise and Signal to noise ratio - Robust Quantization - Differential Pulse code Modulation - Delta Modulation - Coding Speech at Low Bit Rates - Applications - Discrete PAM Signals - Power Spectra of Discrete PAM Signals – Inter symbol Interference - Nyquist’s Criterion for Distortion less Baseband Binary Transmission - Correlative Coding - Eye Pattern - Baseband M-ary PAM Systems - Adaptive Equalization for Data Transmission.

Unit - IV

Digital Modulation Formats - Coherent Binary Modulation Techniques - Coherent Quadrature - Modulation Techniques - **Noncoherent Binary Modulation** Techniques - Comparison of **Binary and Quaternary Modulation Techniques** - M-ary Modulation Techniques - Power Spectra - Bandwidth Efficiency - M-ary Modulation Formats Viewed in the Light of the channels capacity theorem - Effect of Inter symbol Interference - Bit Versus Symbol Error Probabilities - Synchronization – Applications.

Unit - V:

Introduction to Mobile Communications - Introduction to **Cellular Systems** - **GSM Architecture** - Layer Modeling - Transmission - Data Service - Multiple Access Scheme - Channel Coding Interleaving - Radio resource management - Mobility management – Communication management - Network management - TDMA Architecture - Transmission and Modulation - CDMA – Terms of CDMA - Call Processing - Hand over Procedures.

Book for Study:

1. Simon Haykin - Digital Communications, John Wiley & sons, 2005 (Unit – I- IV)
2. William C.Y. Lee - Mobile Cellular Telecommunication, McGraw Hill Publications, 1995 (Unit - V)

UNIT I CLASSIFICATION OF ROBOTIC SYSTEMS

Basic structure of a robot - Classification of robots: Cartesian, Cylindrical, Spherical, Articulated, SCARA. Accuracy, resolution and repeatability of robots. Robot application in manufacturing: Material transfers - Machine loading and unloading - Processing operations - Assembly and inspection.

DRIVES AND CONTROL SYSTEMS: Hydraulic and Pneumatic systems: cylinders, control valves, hydro motor. Types of mechanical power drive, rotary to linear motion conversion mechanisms. Robot end effectors. Servomotors – operation, stepper motors - control loops using current and voltage amplifier. Robot controllers - configuration of robot controller.

UNIT II SENSORS AND VISION SYSTEMS

Types of sensors, tactile sensors, proximity sensors and speed sensors – Encoder, resolvers. Vision systems: Image processing and analysis, Segmentation, Feature extraction, Object Recognition.

UNIT III ROBOT PROGRAMMING & AUTOMATION

Lead through programming - Textual programming, programming examples - Social and Economical Aspects of Robots - Typical layouts of robots in Industries. **AUTOMATION:** Advantages of automation, building blocks of automation. Automatic feeding lines, material-handling devices, ASRS, transfer lines, automatic inspection, intelligent automation.

UNIT IV PROGRAMMABLE LOGIC CONTROLLERS (PLC)

Basics of PLC, Architecture of PLC, Advantages, Types of PLC, Types of Programming - Simple process control program's using Relay Ladder Logic. Introduction to PLC networking. Introduction to HMI, DCS and SCADA systems.

UNIT V COMPUTER NUMERICAL CONTROL (CNC)

Block diagram of a CNC control system, Advantages, Power supply, CPU. CNC and PLC interfacing, Control loops. Feedback devices in CNC machine, analog and digital CNC systems. Introduction to FMS.

TEXT BOOK

1. Michel P. Grover, “Automation Production systems and Computer Integrated manufacturing”, Prentice-Hall India, New Delhi, 1987. / Pearson Education, New Delhi.

REFERENCES

1. W. Bolton, “Mechatronics”, Pearson Education Asia, 2002.
2. K.S. Fu, R.C. Gonzalez and C S G Lee, “Robotics: Control, Sensing, Vision and Intelligence”, McGraw Hill, New Delhi, 1987.
3. Michel P. Grover, “Industrial Robotics - Technology, Programming and Applications”, McGraw Hill, New Delhi, 1986.