

Program: B.Sc Electronics and Communication System

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

Subject Code: 18UEC1C01

Year: I

Semester: I

Credits: 4

Hrs/Week: 4

Educational Objective:

1. Understand the basic of Electronic components (Resistor, Capacitor and Inductor).
2. Understand the basic theory and mathematical relationships in circuit analysis.
3. Understand basic terms and results from the theory about circuits with resistances, capacitive components, as well as semiconductor components.
4. Have knowledge about typical uses for resistive circuits, simple capacitive and inductive circuits.

Course Learning Outcomes:

1. An ability to combine acquired knowledge and skills in mathematics and circuit analysis to analyse electrical circuits.
2. An ability to use basic circuit theory to solve problems in electronics and analyse/design simple circuits.
3. An ability to use laboratory equipment such as volt meter, ampere meter, oscilloscope and signal generator.
4. An ability to use acquired laboratory knowledge for the practical analysis of circuit systems.
5. An ability to use state of the art tools and development circuit boards.

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’ TMHE PVT, 2010, **(Unit III - V)**.

Program: B.Sc Electronics and Communication System

Course title: **Core : Semiconductor Devices**

Subject Code: 18UEC2C02

Year: I

Semester: II

Credits: 4

Hrs/Week: 4

Educational Objective:

1. Introduce the physics of semiconductors and the inner working of semiconductor devices.
2. Provide the insight useful for understanding new semiconductor devices and technologies.

Course Learning Outcomes:

1. An ability to utilize semiconductor models to analyze carrier densities and carrier transport.
2. An ability to understand and utilize the basic governing equations to analyze semiconductor devices.
3. An ability to understand and analyze the inner working of semiconductor p-n diodes, Schottky barrier diodes and new semiconductor devices.

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, TMH publishing company Ltd, New Delhi, 2001 (7Th reprints). (**Unit V**)

Program: B.Sc Electronics and Communication System

Course title: **Core: Electrical Machines and Instruments** Subject Code: 18UEC3C03

Year: II

Semester: III

Credits: 4

Hrs/Week: 4

Educational Objective:

1. To understand the concept of **DC motors and generators.**
2. To understand the concept of the AC machines.
3. To understand the principles of transformer.
4. To get the knowledge of instruments and meters.

Course Learning Outcomes:

1. Ability to **design motors and generators.**
2. Acquire the knowledge of stepper motor and servo meter.
3. Knowledge of **design and Construct the transformer.**
4. Knowledge of using instruments and meters for circuits.

Unit-I DC Machines

DC generators: Principles-Single loop-Practical generator - Types of generator – EMF equation. **DC motors:** Principle-Comparison of generator and motor-Torque equation-Back EMF-Types of motor-Speed control of DC motor.

Unit-II AC Machines

AC Generator - Induction motor: Principle-Construction-Working. Special machines: Stepper motor-Step angle-Permanent Magnet Stepper motor. Synchronous motor: Types-Applications of synchronous motor. Servo motor: AC and DC servo motor.

Unit-III Transformers

Transformers: Working principle-Construction-Core and Shell type-EMF equation-Transformation ratio-Parts of transformer-Losses and testing- Three phase and Auto transformer.

Unit-IV Instruments

Types of Instruments: D'Arsonal galvanometer-PMMC-Moving Iron-Thermocouple and Rectifier type Instruments. Extension of Instruments: Ammeter shunt and Voltmeter multiplier-Multimeter.

Unit-V Meters

Energy meter: Single phase induction type meter-Poly-phase energy meter. Wattmeter: Power in AC and DC circuit-types of meter-Induction type watt meter-Power measurements in poly phase circuits.

Books for study

1. D.S.Dhokal, "Basic Electrical Engineering with numerical problem" Vol – I & II

(Unit I to III)

2. A.K.Shawney "A course in Electrical and Electronic Measurement and Instrumentation"

Program: B.Sc Electronics and Communication System

Course title: **Core : Digital Electronics**

Subject Code: 18UEC3C04

Year: II

Semester: III

Credits: 4

Hrs/Week: 4

Educational Objective:

1. To enable the students to know the number systems, codes, methods for simplifying Boolean expressions, logic gates and circuits.
2. To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits. It is also to encourage the students to learn the concepts of A/D, D/A conversions and memories.

Course Learning Outcomes:

1. Realize different logic gates and analyzing the outputs.
2. Demonstrate the knowledge of Boolean algebra including algebraic manipulation/simplification and application of DeMorgan's theorems and Karnaugh map reduction method.
3. Analyze and **design the combinational and sequential logic circuits.**

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-100 002. 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 : Principles of Communication Systems** Subject Code: 18UEC3C05

Year: II

Semester: III

Credits: 5

Hrs/Week: 5

Educational Objective:

1. Understand AM and FM communication systems.
2. Apply the essential facts about **single sideband** modulation for radio communications systems.
3. Design and analyze performance of the Super Heterodyne receiver.

Course Learning Outcomes:

1. Acquire the knowledge of the basic building blocks of **communication systems**.
2. Analyze the performance of **amplitude modulation** techniques.
3. Demonstrate Balance Modulator.
4. Ability constructed to **AM transmitter and FM transmitter**.

UNIT I: AM AND SSB MODULATION:

Noises: External and Internal noise-Noise calculation-Noise figure- Amplitude modulation: frequency spectrum –Representation and Power relations of AM wave. Generation of AM: Basic requirement-Grid modulated class C amplifier-Plate modulated class C amplifier. SSB system: Balanced modulator. SSB generation: filter system – phase shift method.

UNIT II: FM MODULATION

Frequency and phase modulation: Mathematical representation of FM-Frequency spectrum of the FM wave-Phase modulation. Noise and Frequency Modulation: Effect of noise on carrier-Pre-emphasis and de-emphasis-Comparison of wideband and narrowband FM. Generation FM: FM methods-Direct method-AFC-Indirect method– Comparison between FM and AM systems- FM generation: Direct method and indirect method.

UNIT III: PULSE COMMUNICATION

Pulse Modulation: sampling theorem – PAM – PWM – PPM –PCM - Differential PCM – Delta modulation –adaptive delta modulation – FSK – ASK –PSK.

UNIT IV: BROAD BAND COMMUNICATION SYSTEM

Multiplexing – frequency division multiplexing – time division multiplexing – wave length division multiplexing – coaxial cable systems- micro wave links – optical communication systems – submarine cables.

UNIT V: RADIO TRANSMITTER AND RECEIVER

AM transmitter - Super heterodyne receiver: RF amplifier – Local oscillator – Mixer – IF amplifier – AM detector – AGC – Communication receivers – **FM transmitter** - FM receivers: Amplitude limiter – FM demodulators – Ratio detector - Stereo FM receiver – SSB receiver.

Books for study:

1. George Kennedy – “Electronic communication systems”, III Edition, McGraw-hill Book Company. (Unit I & II)
2. Sanjeev Gupta – “Electronic communication systems”, Kanna publications, 1992. (Unit III - V)

Books for reference:

1. D.Roddy & J.Coolen – “Electronic communication”, PHI, 3rd edition, 1989.

Program: B.Sc Electronics and Communication System

Course title: **Core : 8085 Microprocessor and Interfacing** Subject Code: 18UEC4C06

Year: II

Semester: IV

Credits: 4

Hrs/Week: 4

Educational Objective:

1. Recall and apply a **basic concept of digital fundamentals to Microprocessor** based system.
2. Understand the basic concepts and working principles of 8085 Microprocessor.
3. Familiarize with the assembly level programming using 8085 Microprocessor.
4. Formulate appropriate computing solution and apply it to the Microprocessor based real-time applications.

Course Learning Outcomes:

1. Understand the **Architecture of microprocessor**.
2. Learn the various **instructions of 8085**.
3. Knowledge of writing assembly language programming.
4. Learn the concept of interfacing.
5. Ability to design **small control system devices**.

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:

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

Books for Reference:

1. Ramesh S.Gaonkar, “Microprocessor Architecture, Programming and Applications with the 8085” Penram International publishing (P) Ltd, Fifth Edition, 1995.

Program: B.Sc Electronics and Communication System

Course title: **Core : Electronic Circuits**

Subject Code: 18UEC4C07Year: II

Semester: IV

Credits: 4

Hrs/Week: 4

Educational Objective:

1. To enable the students to understand the principles of Electronics and Equipment to design circuits.
2. To Understand the concept of Amplifiers and able to design.
3. To Understand the concept of **Oscillators**.

Course Learning Outcomes:

1. Design Filter Circuits.
2. Classify the **Amplifiers**.
3. Design oscillator based on the applications.
4. Design and make use of multivibrator circuits.

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** - Effect of Negative Feedback - Types of Negative Feedback Configurations - Stability of feed back Amplifiers

Unit - V: Oscillators and Waveform Generators

Introduction - Classification of Oscillators - Condition for Oscillation (Barkhausen criterion) - Hartley Oscillator - Colpitts Oscillator – RC Oscillator (Phase Shift) - Wien Bridge Oscillator - Crystal Oscillator - Frequency Stability of Oscillator - Multivibrators – Schmitt trigger.

Books for Study:

1. S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, “Electronic Devices and Circuits”, TMH Publishing Company Ltd., Seventh Reprint 2001.

Books for Reference:

1. V.K. Mehta, “Principles of Electronics”, S Chand and Company Ltd., 2nd Edition, 2001.
2. R. S. Sedha, “A test book of Applied Electronics”, S Chand and Company Ltd., 2nd Edition, 2001

Program: B.Sc Electronics and Communication System

Course title: **Core : Antenna and Wave Propagation** Subject Code: 18UEC5C08

Year: III

Semester: V

Credits:5

Hrs/Week:5

Educational Objective:

1. Understand the concept of microwaves
2. Understand the concept of propagation
3. To understanding the basic principles of antennas
4. Understand the concept of radar systems

Course Learning Outcomes:

1. Acquire the knowledge of electromagnetic waves
2. Acquire the knowledge of antennas
3. Acquire the knowledge of radar

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. (UnitI).
2. George Kennedy ‘Electronic Communication Systems’ TMH Publishing Company Limited, Third Edition.1998.(Unit-II toV)

Book for Reference

3. Dennis Roddy and John Coolen, ‘Electronic Communications’ Pearson, Fourth Edition,2011.

Program: B.Sc Electronics and Communication System

Course title: **Core: 8051Microcontroller and Its Applications** Subject Code: 18UEC5C09

Year: III

Semester: V

Credits:4

Hrs/Week:5

Educational Objective:

1. Understand the basic blocks of microcontroller
2. Understand the **concept of networks**
3. Understand the concept of buses

Course Learning Outcomes:

1. Apply knowledge to demonstrate the hardware interfaces
2. Acquire the **knowledge of programming**

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)

Program: B.Sc Electronics and Communication System

Course title: **Core : Linear IC's and Its Applications** Subject Code:18UEC5C10

Year: III

Semester V

Credits: 4

Hrs/Week:4

Educational Objective:

1. Understand the concept of operational amplifier
2. Understand the concept of waveform generators
3. Study the internal structure of timer ICs

Course Learning Outcomes:

1. Acquire the knowledge to construct amplifiers using operational amplifier
2. Ability to design of oscillators
3. Acquire the knowledge of basic application using op-amp

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.

Program: B.Sc Electronics and Communication System

Course title: **Core : Modern Instrumentation**
III Semester: VI Credits: 5

Subject Code:18UEC6C11 Year:
Hrs/Week:5

Educational Objective:

1. Understand the concept of bridges
2. Study the internal structure of oscillators
3. Understand the concept of traducers

Course Learning Outcomes:

1. Acquire the knowledge of various bridges and applications
2. Acquire the knowledge of different analysers
3. Acquire the knowledge of traducers and applications

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:

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

Program: B.Sc Electronics and Communication System

Course title: **Core : Optical Fibre Communication**
Year: III Semester: VI Credits: 4

Subject Code: 18UEC6C12
Hrs/Week:5

Educational Objective:

1. Understand the concept of optical fiber
2. Understand the concept of light sources
3. Study fiber fabrication techniques

Course Learning Outcomes:

1. Acquire the **knowledge of construction and design of optical fiber**
2. Acquire the knowledge of fabrication techniques
3. Learn the concept of couplers and various losses

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.

Program: B.Sc Electronics and Communication System

Course title: **Core: Industrial and Power Electronics**

Subject Code: 18UEC6C13

Year: III

Semester: VI Credits: 4

Hrs/Week:4

Educational Objective:

1. Understand the concept of thyristor
2. Understand the concept of welding systems
3. Understand the basic concepts and working principles of robotics

Course Learning Outcomes:

1. Acquire the knowledge to construct inverters, converters etc
2. Acquire the knowledge of welding
3. Acquire the knowledge of robotic systems

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

Program: B.Sc Electronics and Communication System

Course title: **Elective I : Bio Medical Instrumentation** Subject Code: 18UEC4EL1

Year: II

Semester: IV

Credits: 5

Hrs/Week: 5

Educational Objective:

1. To understand basic principles and phenomena in the area of medical diagnostic instrumentation and sensor operations.
2. To acquire the knowledge of bio potential electrodes.
3. To learn the operation of pacemaker and defibrillators circuits.
- 4.. **To understanding the basic principles of ECG interpretation**

Course Learning Outcomes:

1. Acquire the knowledge of human anatomy.
2. Learn the various electrodes.
3. Acquire the **Knowledge of recording systems of various medical equipments.**
4. Learn the concept of diathermy.

Unit - I: Introduction to **Biomedical Instrumentation**

Biometrics – **Introduction to the Man Instrument system** - components of the man Instrument system – Physiological system of the body-Problems encountered in measuring a living system – Resting and action potentials – Propagation of action potentials – The Bio-electric potentials.

Unit - II: Transducers & Electrodes

Transducer for Biomedical applications: Force – Pressure – Flow – Temperature. Electrode Theory – Biopotential electrodes: Micro electrodes – Body surface electrodes – Needle electrodes – Biochemical transducers: Reference electrodes – pH electrode – Blood gas electrodes.

Unit - III: Bio-potential Recorders

Introduction – Characteristics of the recording system – **Electrocardiography (ECG)** – **Electroencephalography (EEG)** – **Electromyography (EMG)** – Blood Pressure meters– Blood flow meters – Cardiac output measurements.

Unit - IV: **Operation Theatre Equipment**

Introduction – Surgical diathermy – Shortwave diathermy – Microwave diathermy – Ultrasonic diathermy – Ventilators – Anesthesia machine – Elements of Intensive care monitoring – Pace maker – Defibrillator – Heart-Lung machine – Kidney machine.

Unit - V: Advances in Biomedical Instrumentation

Introduction – computers in medicine – Lasers in medicine – Endoscope – Cryogenic surgery – Nuclear imaging techniques – Computer tomography – Thermograph – Ultrasonic Imaging systems – Magnetic resonance imaging – Positron emission tomography – Digital subtraction angiography – Bio-feed back instrumentation – Bio materials.

Books for Study:

1. Leslie Cromwell, Fred J.Weibell, Erich A. Pfeiffer, “Biomedical Instrumentation and measurements”, Prentice hall of India Pvt Limited, Second edition 1995, (Unit I - II).
2. Dr. M. Arumugam, “Biomedical Instrumentation”, Anuradha agencies, Publishers, First edition 1993 (Unit III - V)

Books for Reference:

1. R.S.Khandpur, “Handbook of Biomedical Instrumentation”, Tata McGraw Hill Publishing co. Ltd, second edition 2003.

Program: B.Sc Electronics and Communication System

Course title: **Elective-I: PCB Design and Fabrication** Subject Code: 18UEC4EL1 Year: II
Semester: IV Credits: 5 Hrs/Week: 5

Educational Objective:

1. Understand the design and fabrication techniques.
2. Understand preparation PCB layers.
3. Understand the concept of film preparation.
4. Understand soldering techniques.

Course Learning Outcomes:

1. Ability to design simple PCB.
2. Acquire the Knowledge of film preparation in dark room.
3. Ability to make simple soldering.

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.

Program: B.Sc Electronics and Communication System

Course title: **Elective I: TV and Satellite Communication**

Subject Code: 18UEC4EL1 Year: II

Semester: IV Credits: 5

Hrs/Week: 5

Educational Objective:

1. Understand the basic of television systems.
2. Study the internal structure of TV circuit board.
3. Understand the concept of colour television.
4. Understand the concept of satellite communications.

Course Learning Outcomes:

1. Acquire the Knowledge of scanning techniques.
2. Knowledge RF, IF, audio and video section.
3. Acquire the Knowledge of satellite transmission and reception.

Unit - I

Scanning - Flicker - Vertical Resolution - Kell Factor - Horizontal Resolution - Interlaced Scanning - Video Signal Components - Horizontal & Vertical Synchronous & Blanking standards - Complete Channel Bandwidth - Vestigial Sideband - Composite Video Signal Camera Tubes - Plumbicon - Vidicon - Block Diagram of TV Transmitter.

Unit - II

Monochrome Receivers – Quarter wave matching section - balun - Receiver block diagram – Vestigial Sideband Correction - Choice of IF - Sound Separation - VHF Tuner Block diagram - Video IF Section - block diagram - Block Diagram of Vertical deflection system - Block Diagram of Horizontal deflection system

Unit - III

ESSENTIAL OF COLOUR TELEVISION: Compatibility- Frequency Interleaving Colour Perception-Three Colour Theory-Tri stimulus Value of Spectral Colour-Luminance, hue, saturation-colour TV camera -production of colour difference signal - Modulation of Color difference signal values of luminance and polarity of colour difference signals.

Unit - IV

COLOUR TV **TRANSMISSION AND RECEPTION**: Colour burst – PAL system of colour TV transmission and reception – cancellation of phase error – PAL encoder – PAL

decoder – PAL D colour receiver – colour picture tubes: Delta gun colour picture tube – precision in line colour picture tube –Trinitron colour picture tube.

Unit -V

PRINCIPLES OF **SATELLITE COMMUNICATION**: Orbital aspects – height of geostationary orbit –geostationary satellite –communication satellite – station keeping – satellite frequency plans and allocation –satellite uplinks –satellite downlinks –satellite transponders
Satellite access: frequency division multiple access –time division multiple access – demand access systems

Book for Study:

2. R.R. Gulati - Monochrome and Color Television, Wiley Eastern Ltd, 1984. (Unit I – II)
3. J.S.Chitode “Communication engineering”, Technical Publications, Pune, Second Revised Edition, 2004. (Unit-III - V)

Books for Reference:

1. A.M.Dhake - Television and Video Engineering, Tata McGraw Hill, 1999.

Electives

Program: B.Sc Electronics and Communication System

Course title: **Elective-II: Robotics and Automation**

Subject Code: 18UEC5EL2

Year: III

Semester: V

Credits: 5

Hrs/Week: 5

Educational Objective:

1. Understand the concept of robotic systems
2. Understand the concept of sensors
3. Understand the concept of PLC

Course Learning Outcomes:

1. Learn the **concept robotic system**
2. Acquire **the knowledge of PLC**
3. Acquire the knowledge of computer numerical control

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.

Program: B.Sc Electronics and Communication System

Course title: **Elective-II: PC Hardware Fundamentals**

Subject Code: 18UEC5EL2

Year: III

Semester: V

Credits:5

Hrs/Week:5

Educational Objective:

1. Understand the basic of computer systems
2. Study the I/O devices of computer systems
3. Understand the concept of floppy disk and hard disk devices

Course Learning Outcomes:

1. Acquire the knowledge of personal computer
2. Ability to assemble the PC
3. Acquire the knowledge of installation and troubleshooting

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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Program: B.Sc Electronics and Communication System

Course title: **Elective-II: Network Communications**

Subject Code: 18UEC5EL2

Year: III

Semester: V

Credits:5

Hrs/Week:5

Educational Objective:

1. Understand the basic of networking concepts
2. Understand the concept of local area network
3. Understand the concept of wireless network

Course Learning Outcomes:

1. Acquire the knowledge of network layers
2. Acquire the knowledge of network protocols
3. Acquire the knowledge of using LAN

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

Program: B.Sc Electronics and Communication System

Elective-III: EMBEDDED SYSTEMS DESIGN Subject Code: 18UEC6EL3

Year: III

Semester: VI

Credits:5

Hrs/Week:5

Educational Objective:

1. Understand the basic of embedded systems
2. Understand the basic of RTOS
3. Understand the basic of firmware

Course Learning Outcomes:

1. Acquire the knowledge of principles in embedded systems
2. Acquire the knowledge of RTOS

UNIT -I: Introduction to Embedded Systems

Definition of Embedded System-Embedded Systems Vs General Computing Systems- History of Embedded Systems-Classification-Major Application Areas-Purpose of Embedded Systems-Characteristics and Quality Attributes of Embedded Systems.

UNIT -II: Typical Embedded System: Core of the Embedded System:

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

UNIT -III: Embedded Firmware

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

UNIT -IV: RTOS Based Embedded System Design

Operating System Basics-Types of Operating Systems-Tasks-Process and Threads- Multiprocessing and Multitasking-Task Scheduling.

UNIT -V: Task Communication:

Shared Memory-Message Passing-Remote Procedure Call and Sockets-Task Synchronization: Task Communication/Synchronization Issues-Task

Synchronization Techniques-Device Drivers-How to Choose an **RTOS**.

TEXT BOOKS:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill. Second reprint-2010

REFERENCE BOOKS:

1. Embedded Systems - Raj Kamal, TMH.
2. Embedded System Design - Frank Vahid, Tony Givargis

Program: B.Sc Electronics and Communication System

Elective-III: Domestic Electric and Electronics Appliances

Subject Code: 18UEC6EL3

Year: III

Semester:VI

Credits:5

Hrs/Week:5

Educational Objective:

1. Understand the basic of wiring systems
2. Understand the concept of indicating systems
3. Understand the concept of audio and video

Course Learning Outcomes:

1. Acquire the knowledge of electrical wiring
2. Acquire the knowledge of indicating system
3. Acquire the knowledge of audio and video systems.

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.