

Programme : B.Sc. Electronics and Communication Systems

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

Course Code : 20UEC1C01

Year : First Year

Semester : I

Hours/Week : 4

Credit : 4

### ***COURSE OBJECTIVES***

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

### ***COURSE OUTCOMES***

After learning the course, the students will be able to

CO1	An ability to combine acquired knowledge and skills in mathematics and circuit analysis to analyse electrical circuits.	K2,K3&K4
CO2	An ability to use basic circuit theory to solve problems in electronics and analyse and design simple circuits	K1,K3&K2
CO3	An ability to use laboratory equipment such as volt meter, ampere meter, oscilloscope and signal generator	K1&K2
CO4	An ability to use acquired laboratory knowledge for the practical analysis of circuit systems	K1&K2
CO5	An ability to use state of the art tools and development circuit boards	K1&K2

K1 - Remember; K2 - understand; K3 - Apply; K4 - Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	S	S	L	M	L		S	S	M	S
CO2	S	S	L	M	L		S	S	M	S
CO3	M	S	L	M	L		S	S	S	L
CO4	S	M	L	M	L		S	S	S	M
CO5	L	M	L	M	L		S	S	L	L

S-Strong; M-Medium; L-Low

### **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)**.

### **e – resources:**

1. [https://www.tutorialspoint.com/network\\_theory/network\\_theory\\_active\\_elements.htm](https://www.tutorialspoint.com/network_theory/network_theory_active_elements.htm)
2. [https://www.electronics-tutorials.ws/dccircuits/dcp\\_1.html](https://www.electronics-tutorials.ws/dccircuits/dcp_1.html)
3. [https://www.tutorialspoint.com/network\\_theory/network\\_theory\\_filters.htm](https://www.tutorialspoint.com/network_theory/network_theory_filters.htm)

Programme : B.Sc. Electronics and Communication Systems

Course Title : Core : Semiconductor Devices -I

Year : First Year

Hours/Week : 2

Course Code : 20UEC1C02

Semester : I

Credit : 2

### ***COURSE OBJECTIVES***

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

### ***COURSE OUTCOMES***

After learning the course, the students will be able to

CO1	An ability to utilize semiconductor models to analyze carrier densities and carrier transport	K1&K4
CO2	An ability to understand and utilize the basic governing equations to analyze semiconductor	K2&K4
CO3	An ability to understand and analyze the inner working of semiconductor P-N Junction diodes, Schottky barrier diodes and new semiconductor devices.	K2&K4

K1 – Remember; K2– understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	S	M	L	M	M		M	S	M	M
CO2	S	M	L	M	M		M	S	L	M
CO3	S	M	L	S	L		S	M	M	Ls

S-Strong; M-Medium; L-Low

## **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

Backward Diode - Varactor Diode – Step recovery Diode - Point Contact Diode - Schottky Diode - Tunnel Diode - Gunn Diode - IMPATT Diode – TRAPATT Diode - PIN Diode - PNP Diode

## Unit-III

**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-feedback bias and voltage divider bias - Transistor as a switch.

### Book for study:

1. V.K.Metha “Principles of Electronics”, S.Chand& Company Ltd., Ram Nagar, New Delhi-110055, Reprints 1999. **(Unit I & III).**
2. S.Salivahanan, N.SureshKumar, A.Vallavaraj, “Electronic devices and circuits”, TMH publishing company Ltd, New Delhi, 2001 (7th reprints). **(Unit II).**

### e -resources:

1. [https://www.tutorialspoint.com/basic\\_electronics/basic\\_electronics\\_diodes.htm](https://www.tutorialspoint.com/basic_electronics/basic_electronics_diodes.htm)
2. [https://www.tutorialspoint.com/basic\\_electronics/basic\\_electronics\\_special\\_purpose\\_diodes.htm](https://www.tutorialspoint.com/basic_electronics/basic_electronics_special_purpose_diodes.htm)
3. [https://www.tutorialspoint.com/basic\\_electronics/basic\\_electronics\\_transistors.htm](https://www.tutorialspoint.com/basic_electronics/basic_electronics_transistors.htm)
4. [https://www.tutorialspoint.com/basic\\_electronics/basic\\_electronics\\_transistor\\_configurations.htm](https://www.tutorialspoint.com/basic_electronics/basic_electronics_transistor_configurations.htm)

Programme : B.Sc. Electronics and Communication Systems

Course Title : Core : **Electronic Circuits**

Year : First Year

Hours/Week : 4

Course Code : 20UEC2C03

Semester : II

Credit : 4

### ***COURSE OBJECTIVES***

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 OUTCOMES***

After learning the course, the students will be able to

CO1	Design Filter Circuits.	K2
CO2	Classify the <b>Amplifiers</b>	K1
CO3	Design oscillator based on the applications.	K2&K3
CO4	Design and make use of multivibrator circuits.	K3

K1 – Remember; K2– understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	L		S	S	M	S
CO2	M	M	L	L	L		M	M	L	M
CO3	S	S	M	L	L		S	S	M	M
CO4	S	M	M	L	L		S	S	M	M

S-Strong; M-Medium; L-Low

## **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 feedback 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

**e-resources:**

1. <https://nptel.ac.in/courses/108/102/108102095/>
2. [https://www.tutorialspoint.com/sinusoidal\\_oscillators/sinusoidal\\_hartley\\_oscillator.htm](https://www.tutorialspoint.com/sinusoidal_oscillators/sinusoidal_hartley_oscillator.htm)
3. [https://www.tutorialspoint.com/electronic\\_circuits/electronic\\_circuits\\_rectifiers.htm](https://www.tutorialspoint.com/electronic_circuits/electronic_circuits_rectifiers.htm)
4. [https://www.tutorialspoint.com/electronic\\_circuits/electronic\\_circuits\\_filters.htm](https://www.tutorialspoint.com/electronic_circuits/electronic_circuits_filters.htm)

**Programme : B.Sc. Electronics and Communication Systems**

**Course Title : Core : Electronic Instruments**

**Course Code : 20UEC3C05**

**Year : Second Year**

**Semester : III**

**Hours/Week : 4**

**Credit : 4**

### ***COURSE OBJECTIVES***

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

### ***COURSE OUTCOMES***

After learning the course, the students will be able to

CO1	Acquire the knowledge of various bridges and applications	K1
CO2	Acquire the knowledge of different analysers	K2
CO3	Acquire the knowledge of traducers and its applications	K1&K4

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	M	M	L	L	L		M	M	M	M
CO2	S	M	M	L	L		S	L	L	M
CO3	S	M	M	L	L		M	M	M	M

S-Strong; M-Medium; L-Low



## **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.HelfrickPrentice Hall India Learning Private Limited,  
1992.
2. Instrumentation Devices & Systems - C S Rangan, G.R.  
Sharma,V.S.V.Mani,New Delhi : Tata McGraw-Hill,1983.

**e-resources:**

1. [https://www.tutorialspoint.com/electronic\\_measuring\\_instruments/electronic\\_measuring\\_instruments\\_bridges.htm](https://www.tutorialspoint.com/electronic_measuring_instruments/electronic_measuring_instruments_bridges.htm)
2. [https://www.tutorialspoint.com/electronic\\_measuring\\_instruments/electronic\\_measuring\\_instruments\\_transducers.htm](https://www.tutorialspoint.com/electronic_measuring_instruments/electronic_measuring_instruments_transducers.htm)
3. [https://www.tutorialspoint.com/electronic\\_measuring\\_instruments/electronic\\_measuring\\_instruments\\_data\\_acquisition\\_systems.htm](https://www.tutorialspoint.com/electronic_measuring_instruments/electronic_measuring_instruments_data_acquisition_systems.htm)

Programme : B.Sc. Electronics and Communication Systems

Course Title : Core : Principles of Communication Systems

Year : Second Year

Hours/Week : 5

Course Code : 20UEC3C07

Semester : III

Credit : 5

### ***COURSE OBJECTIVES***

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

### ***COURSE OUTCOMES***

After learning the course, the students will be able to

CO1	Acquire the knowledge of the basic building blocks of communication systems.	K1
CO2	Analyze the performance of amplitude modulation techniques.	K4
CO3	Demonstrate Balance Modulator.	K3
CO4	Ability constructed to AM transmitter and FM transmitter.	K2&K3

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	M	M	M	L	L		S	M	M	M
CO2	S	S	M	L	L		S	S	M	M
CO3	M	S	M	M	M		S	M	M	L
CO4	S	S	S	M	M		S	M	M	M

S-Strong; M-Medium; L-Low

### **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,1996. (Unit I & II)
2. Sanjeev Gupta – “Electronic communication systems”, Kanna publications, 1992. (Unit III & V)

**Books for reference:**

D.Roddy&J.Coolen – “Electronic communication”, PHI, 3<sup>rd</sup> edition, 1989.

**e-resources:**

1. [https://www.tutorialspoint.com/principles\\_of\\_communication/principles\\_of\\_communication\\_sideband\\_modulation.htm](https://www.tutorialspoint.com/principles_of_communication/principles_of_communication_sideband_modulation.htm)
2. <https://www.electronics-notes.com/articles/radio/superheterodyne-receiver/block-diagram.php>
3. <https://www.daenotes.com/electronics/communication-system/am-transmitter>

**Programme : B.Sc. Electronics and Communication Systems**

**Course Title : Core : 8085 Microprocessor and Interfacing**

**Course Code : 20UEC4C08**

**Year : Second Year**

**Semester : IV**

**Hours/Week : 4**

**Credit : 4**

### ***COURSE OBJECTIVES***

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 OUTCOMES***

After learning the course, the students will be able to

CO1	Understand the Architecture of microprocessor.	K1&K2
CO2	Learn the various instructions of 8085.	K1
CO3	Knowledge of writing assembly language programming.	K2&K3
CO4	Learn the concept of interfacing.	K2
CO5	Ability to design small control system devices.	K4

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	M	M	M	L	M		S	S	M	M
CO2	S	S	M	M	L		M	S	L	M
CO3	S	S	M	M	M		S	S	M	M
CO4	S	S	M	L	L		S	M	M	M
CO5	S	S	L	L	L		S	S	M	L

S-Strong; M-Medium; L-Low

## **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. RameshS.Gaonkar, “Microprocessor Architecture, Programming and Applications with the 8085” Penram International publishing (P) Ltd, Fifth Edition, 1995.

### **e-resources:**

1. <https://www.slideshare.net/suvam011096/microprocessor-8085-complete>
2. <https://nptel.ac.in/courses/108/107/108107029/>
3. <https://www.slideshare.net/shehrevard/programming-with-8085>

**Programme : B.Sc. Electronics and Communication Systems**

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

**Course Code : 20UEC4C09**

**Year : Second Year**

**Semester : IV**

**Hours/Week : 4**

**Credit : 4**

### ***COURSE OBJECTIVES***

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 OUTCOMES***

After learning the course, the students will be able to

CO1	Acquire the knowledge of electromagnetic waves	K1&K2
CO2	Acquire the knowledge of antennas	K2
CO3	Acquire the knowledge of radar	K2

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	M	M	L	L	L		M	M	L	L
CO2	S	M	M	L	L		S	M	M	M
CO3	M	M	M	L	L		M	M	L	M

S-Strong; M-Medium; L-Low



## **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- Extraterritorial Communications.

## **UNIT - III: ANTENNAS**

Basic considerations –Electromagnetic radiation- Wire radiator in space: Current and Voltage Distribution-Resonant antennas, Radiation Patterns and Length calculation- Non-resonant 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. M..Kulkarni – ‘Microwave and Radar Engineering’, Umesh Publications, Second Edition. 2007. (UnitI).
2. George Kennedy ‘Electronic Communication Systems’ TMH Publishing Company Limited, Third Edition,1998.(Unit-II toV)

### **Book for reference:**

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

### **e-resources:**

1. <https://www.electronics-notes.com/articles/antennas-propagation/rf-feeders-transmission-lines/waveguide-modes-te-tm-tem.php>
2. [https://www.tutorialspoint.com/radar\\_systems/radar\\_systems\\_tutorial.pdf](https://www.tutorialspoint.com/radar_systems/radar_systems_tutorial.pdf)
3. <https://www.slideshare.net/sunilrathore77398/microwavetubes>

**Programme : B.Sc. Electronics and Communication Systems**

**Course Title : Core : Bio Medical Instrumentation**

**Course Code : 20UEC5C10**

**Year : Third Year**

**Semester : V**

**Hours/Week : 5**

**Credit : 5**

### ***COURSE OBJECTIVES***

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

### ***COURSE OUTCOMES***

After learning the course, the students will be able to

CO1	Acquire the knowledge of human anatomy.	K1
CO2	Learn the various electrodes.	K2
CO3	Acquire the Knowledge of recording systems of various medical equipments.	K2
CO4	Learn the concept of diathermy.	K3

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	M	M	M	M	L		M	M	L	L
CO2	M	M	M	L	L		M	M	M	L
CO3	S	M	M	M	L		M	M	L	L
CO4	S	M	M	M	M		M	M	L	L

S-Strong; M-Medium; L-Low

## **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 – Bio potential 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 – Anaesthesia 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-feedback 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.

**e-resources:**

1. <http://www.authorstream.com/Presentation/lonewalkerdevil-3006563-13-eeg-ecg-emg/>
2. <https://www.slideshare.net/UthamalingamMurali/diathermy-in-surgery>
3. <https://www.slideshare.net/ErFarukBinPoyen/bio-potential-and-bio-electrodes>
4. <https://www.slideshare.net/PrincyRandhawa/biomedical-instrumentation-60215990>

**Programme : B.Sc. Electronics and Communication Systems**

**Course Title : Core : 8051Microcontroller and Its Applications** Course Code : 20UEC5C11

Year : Third Year

Hours/Week : 5

Semester : V

Credit : 4

### ***COURSE OBJECTIVES***

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

### ***COURSE OUTCOMES***

After learning the course, the students will be able to

CO1	Apply knowledge to demonstrate the hardware interfaces	K1,K2&K3
CO2	Acquire the <b>knowledge of programming</b>	K1 &K2

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M		S	S	M	M
CO2	M	M	M	L	L		S	S	M	M

S-Strong; M-Medium; L-Low

### **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 – I<sup>2</sup>C - 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:**

The 8051 Microcontroller - Kenneth J. Ayala - 3<sup>rd</sup> Edition – Delmar Learning, 2005.

### **Book for reference:**

The 8051 Microcontroller and Embedded Systems – Mazidi&Mazidi(PHI), 2011.

### **e - resources:**

1. <https://nptel.ac.in/courses/117/104/117104072/>
2. <https://technobyte.org/keypad-matrix-8051-interfacing/>
3. <https://www.slideshare.net/KanchanPatil34/8051-interfacing>

Course Title : Core : **Linear IC's and Its Applications**  
Year : Third Year  
Hours/Week : 4

Course Code : 20UEC5C12  
Semester : V  
Credit : 4

### ***COURSE OBJECTIVES***

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

### ***COURSE OUTCOMES***

After learning the course, the students will be able to

CO1	acquire the knowledge to construct amplifiers using operational amplifier	K2&K3
CO2	ability to design of oscillators	K4
CO3	acquire the knowledge of basic application using op-amp	K2

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	L	L		S	M	M	M
CO2	S	S	L	L	L		S	L	M	M
CO3	M	M	M	L	L		M	M	L	M

S-Strong; M-Medium; L-Low

## **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 – Monostablemultivibrator – 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 – Astableoperations – Applications – Schmitt trigger – PLL: Introduction – Basic principles – Phase detector – Comparator – VCO – Low pass filter - PLL Applications.

### **Books for study:**

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

### **Book for reference:**

1. Ramakant AGayakwad, “Op-Amps and Linear Integrated Circuits”, PHI, 4<sup>th</sup> edition2004.
2. Botkar K.R, “Integrated Circuits”, Khanna Publishers, 9<sup>th</sup>Edition 2000.

### **e-resources:**

1. <https://nptel.ac.in/courses/108/106/108106068/>



2. [https://www.tutorialspoint.com/linear\\_integrated\\_circuits\\_applications/linear\\_](https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_waveform_generators.htm)

**Programme : B.Sc. Electronics and Communication Systems**

**Course Title : Core : Embedded System Design**

**Course Code : 20UEC6C14**

[integrated\\_circuits\\_applications\\_waveform\\_generators.htm](https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_waveform_generators.htm)

3. [https://www.tutorialspoint.com/linear\\_integrated\\_circuits\\_applications/linear\\_](https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_phase_locked_loop_ic.htm)  
[integrated\\_circuits\\_applications\\_phase\\_locked\\_loop\\_ic.htm](https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_phase_locked_loop_ic.htm)
4. <http://www.ajlontech.com/5.voltageregulator.pdf>

**Year : Third Year**  
**Hours/Week : 5**

**Semester : VI**  
**Credit : 5**

### ***COURSE OBJECTIVES***

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

### ***COURSE OUTCOMES***

After learning the course, the students will be able to

CO1	Acquire the knowledge of principles in embedded systems	K1&K2
CO2	Acquire the <b>knowledge of RTOS</b>	K1&K2

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	S	M	M	M	L		M	M	L	L
CO2	S	S	M	M	L		S	L	L	M

S-Strong; M-Medium; L-Low

### **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**

OperatingSystemBasics-TypesofOperatingSystems – Tasks-ProcessandThreads-Multiprocessing and Multitasking-TaskScheduling.

#### **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**.

#### **Books for study:**

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

#### **Books for reference:**

- 1.Embedded Systems - Raj Kamal,TMH, 2003.
- 2.Embedded System Design - Frank Vahid, TonyGivargis, Wiley, 2006.

#### **e-resources:**

1. [https://www.tutorialspoint.com/embedded\\_systems/es\\_overview.htm](https://www.tutorialspoint.com/embedded_systems/es_overview.htm)
2. <https://www.youtube.com/watch?v=-HL-VnLnmIE>
3. <https://www.youtube.com/watch?v=On3p6zZBG0E>

**Programme : B.Sc. Electronics and Communication Systems**

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

**Course Code : 20UEC6C16**

**Year : Third Year**

**Semester : VI**

**Hours/Week : 4**

**Credit : 4**

### ***COURSE OBJECTIVES***

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

### ***COURSE OUTCOMES***

After learning the course, the students will be able to

CO1	Acquire the knowledge to construct inverters, converters etc	K2&K3
CO2	Acquire the knowledge of welding	K2
CO3	Acquire the knowledge of robotic systems	K2

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	L	L		S	S	M	M
CO2	S	S	M	M	L		M	M	L	L
CO3	S	S	M	M	M		S	S	M	M

S-Strong; M-Medium; L-Low

## 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.

### Books for study:

1. Harish C Rai, "Industrial and Power Electronics" 10th edition, Umesh publications 2002.
2. Timothy J Maloni, "Industrial Solid State Electronic Devices and Circuits" 2<sup>nd</sup> edition 1986.

**e-resources:**

1. [https://www.tutorialspoint.com/power\\_electronics/power\\_electronics\\_choppers.htm](https://www.tutorialspoint.com/power_electronics/power_electronics_choppers.htm)
2. <https://www.elprocus.com/resistance-welding-working-principle-types-and-applications/>
3. <https://nptel.ac.in/courses/108/105/108105066/>

**Programme** : B.Sc. Electronics and Communication Systems  
**Course Title** : Elective-I: PCB Design and Fabrication  
**Year** : Second Year  
**Hours/Week** : 5

**Course Code** : 20UEC4EA1  
**Semester** : IV  
**Credit** : 5

***COURSE OBJECTIVES***

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

***COURSE OUTCOMES***

After learning the course, the students will be able to

CO1	Ability to design simple PCB.	K1,K2
CO2	Acquire the Knowledge of film preparation in dark room.	K2
CO3	Ability to make simple soldering.	K2&K3

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	M	M		S	M	M	M
CO2	S	M	M	M	L		M	M	L	M
CO3	S	S	M	M	L		S	M	M	M

S-Strong; M-Medium; L-Low

**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- **Layoutapproaches-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.

### **e-resources:**

1. <https://learn.sparkfun.com/tutorials/pcb-basics/all>
2. <https://www.pcbcart.com/article/content/single-layer-vs-multi-layer-pcbs.html>
3. <https://www.ourpcb.com/pcb-artwork.html>
4. <https://www.youtube.com/watch?v=ESnDQl7ZM5o>



**Programme** : B.Sc. Electronics and Communication Systems  
**Course Title** : Elective-I: **Mobile and Cellular Communication** **Course Code** : 20UEC4EB1  
**Year** : Second Year **Semester** : IV  
**Hours/Week** : 5 **Credit** : 5

### ***COURSE OBJECTIVES***

1. To understand the basic cellular system concepts.
2. To have an insight into the interference, frequency management and handoff management in cellular mobile system.
3. To go in depth for understanding the popular GSM cellular mobile standard and wireless standards.

### ***COURSE OUTCOMES***

After learning the course, the students will be able to

CO1	Discuss cellular radio concepts.	K1&K2
CO2	To have knowledge of the <b>mobile system specifications</b> .	K1&K2
CO3	Classify frequency and handoff management techniques in Mobile Communication.	K2
CO4	Outline cellular <b>mobile communication standards</b> .	K3
CO5	Analyze various methodologies to improve the cellular capacity	K4

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	S	M	L	L	L		S	M	M	M
CO2	S	S	M	L	L		S	M	L	M
CO3	S	M	M	M	L		M	M	M	L
CO4	M	M	M	L	L		M	L	M	L
CO5	S	S	M	M	L		S	M	L	M

S-Strong; M-Medium; L-Low

## **Unit – I**

**Introduction:** Wireless Communication Systems - Applications of Wireless Communication Systems - Types of Wireless Communication Systems - Trends in Mobile Communication Systems.

**Cellular Mobile Systems:** Basic Cellular Systems - Performance Criteria - Uniqueness of Mobile Radio Environment - **Operation of Cellular Systems** – Analog & Digital Cellular Systems.

## **Unit - II**

**Elements of Cellular Radio System Design:** Concept of Frequency Reuse Channels – Co-channel Interference Reduction Factor - Desired C/I From a Normal Case in an Omni-directional Antenna System - Handoff Mechanism - Cell Splitting.

## **Unit - III**

**Frequency Management, Channel Assignment and Handoffs:** Frequency Management - Frequency-Spectrum Utilization - Set-up Channels - Fixed Channel Assignment Schemes -Non Fixed Channel Assignment Schemes - Concept of Handoff - Initiation of a Hard Handoff - Delaying a Handoff - Forced Handoffs - Queuing of Handoffs - Power Difference Handoffs - Mobile Assisted Handoff - Soft Handoffs - Cell-site Handoff - Intersystem Handoff - Dropout Calls.

## **Unit - IV**

**GSM System Overview:** GSM System Architecture - GSM Radio Subsystem - GSM Channel Types - Frame Structure for GSM - Signal Processing in GSM - GPRS and EDGE.

## **Unit - V:**

**Wireless Networks:** Overview of Wi-Fi - WiMAX and Bluetooth Technology: Basic Features and Physical Specifications.

## **Book for Study:**

1. Mobile Cellular Telecommunications: Analog and Digital Systems, W. C. Y. Lee; TataMcGraw Hill Publication, 2006.
2. Wi-Fi, Bluetooth, Zigbee and WiMax, H. Labiod, H. Afifi and C. D. Santis, Springer, 2007.
3. Wireless Communications: Principles and Practice, Theodore S. Rappaport, Pearson Publication, 2002.
4. Publication, 2002.
5. Wireless Communications and Networks: 3G and Beyond, I. S. Misra, Tata McGraw Hill Publication, 2010.
6. Wireless and Digital Communications by K. Feher; PHI Publication, 2003.

**e-resources:**

1. <https://www.globalspec.com/reference/81094/203279/chapter-2-introduction-to-cellular-systems>.
2. [https://www.tutorialspoint.com/gsm/gsm\\_overview.htm](https://www.tutorialspoint.com/gsm/gsm_overview.htm)
3. <https://www.electronics-notes.com/articles/connectivity/wifi-ieee-802-11/what-is-wifi.php>
4. <https://www.tutorialspoint.com/Wireless-Networks>

**Programme : B.Sc. Electronics and Communication Systems**

**Course Title : Elective-I: PC Hardware Fundamentals**

**Course Code : 20UEC4EC1**

**Year : Second Year**

**Semester : IV**

**Hours/Week : 5**

**Credit : 5**

### ***COURSE OBJECTIVES***

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 OUTCOMES***

After learning the course, the students will be able to

CO1	Acquire the knowledge of personal computer	K1
CO2	Ability to assemble the PC	K2&K3
CO3	Acquire the knowledge of installation and troubleshooting.	K2

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	M	M	M	L	L		M	M	L	M
CO2	S	S	M	M	L		S	M	M	L
CO3	S	M	M	M	M		S	M	L	M

S-Strong; M-Medium; L-Low

### **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, 2005.

### **Book for reference:**

1. Peter Norton, Inside the PC – Prentice Hall of India, 1999.

### **e-resources:**

1. [https://www.tutorialspoint.com/computer\\_fundamentals/computer\\_hardware.html](https://www.tutorialspoint.com/computer_fundamentals/computer_hardware.html)
2. [http://jhigh.co.uk/ComputingSG/ComputerSystems/CS\\_backStorage1.html](http://jhigh.co.uk/ComputingSG/ComputerSystems/CS_backStorage1.html)
3. <https://slideplayer.com/slide/4502628/>
4. <https://www.youtube.com/watch?v=MGqJa20Lqwc>

**COURSE OBJECTIVES****Programme : B.Sc. Electronics and Communication Systems****Course Title : Elective-II: Arduino and Internet of Things****Course Code : 20UEC5EB2****Year : Third Year****Semester : V****Hours/Week : 5****Credit : 5**

1. To understand how multiple smart electronic devices can connect themselves together through internetworking.
2. To acquire the fundamentals of designing, programming and configuring devices for the smart infrastructure development and maintenance.

**COURSE OUTCOMES**

After learning the course, the students will be able to

CO1	Understand the structure of Arduino boards and programming concepts.	K2
CO2	Describe the function of Arduino UNO and interfacing concepts.	K1&K2
CO3	Understand the basic principles, requirements, functions and system architecture of IoT.	K2
CO4	Understand Prototype embedded devices for IoT and M2M, embedded platforms and design software for IoT applications	K3
CO5	Analyze the functioning of IoT applications in smart premises, connected car, environment monitoring and agriculture through quantitative case studies	K4

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

**MAPPING**

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	M	M	M	L	M		S	M	M	L
CO2	M	M	L	M	L		S	M	M	L
CO3	M	M	M	L	L		M	M	L	L
CO4	M	L	M	L	L		M	L	M	L
CO5	S	M	M	L	M		S	M	M	L

S-Strong; M-Medium; L-Low

## **Unit: I: Arduino**

Introduction to Arduino – Functional block diagram of Arduino- Arduino family of boards – Arduino UNO – Features – Communication Platform-Terminology – Introduction to Arduino Programming-Keywords – Inbuilt Functions – Variables and data types – Libraries- Arduino Boot Loader

## **Unit: II: ATMEGA328:**

Pin function of Arduino UNO – Digital GPIO Programming Working with pins as input and output-Working with PWM outputs working with analog inputs using on-chip ADC Serial communication between Arduino hardware and PC – Interrupt- Blinking of LED- Interfacing LCD.

## **Unit: III: INTERNET OF THINGS: IOT**

Definition – vision-Smart and hyperconnected devices-IoT Conceptual framework-IoT Architectural view-technology behind IoT- Big Data Analytics.

## **Unit: IV: DESIGN PRINCIPLES FOR CONNECTED DEVICES**

IoT/M2M systems layers and design standardization; communication technologies- Design principles for Web Connectivity-Web Communication Protocols for Connected Devices-Internet connectivity Principles-Internet Connectivity-Internet Based Communication

## **Unit V: APPLICATIONS OF IOT**

IoT application for smart homes-Smart city-Smart city parking- Connected car and services-Smart Environment monitors- Weather monitoring System- Air pollution monitoring System-Forest Fire Detection – Agriculture-Smart irrigation-Smart wine quality enhancing- Smart city street lights Control.

### **Books for study:**

1. Michael McRoberts, Beginning Arduino, Second Edition, Apress, 2013. (Unit I & II)
2. Raj Kamal, Internet of Things Architecture and Design Principles, McGraw Hill Education Pvt. Ltd. 2011, [First edition] (Unit III, IV & V)

### **Books for reference:**

1. John-David Warren, Josh Adams, Harald Molle, Arduino Robotics, Apress, 2011.
2. Rajkumar Buyya, Amir Vahid Dastjerdi. Internet of Things: Principles and Paradigms, Morgan Kaufmann Publications, 2016.

### **e-resources:**

1. [https://www.tutorialspoint.com/arduino/arduino\\_overview.htm](https://www.tutorialspoint.com/arduino/arduino_overview.htm)
2. <https://nptel.ac.in/courses/106/105/106105166/>
3. <https://nptel.ac.in/courses/108/108/108108098/>

**Programme : B.Sc. Electronics and Communication Systems**

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

**Course Code : 20UEC5EC2**

**Year : Third Year**

**Semester : V**

**Hours/Week : 5**

**Credit : 5**

### ***COURSE OBJECTIVES***

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

### ***COURSE OUTCOMES***

After learning the course, the students will be able to

CO1	Acquire the knowledge of network layers.	K1&K2
CO2	Acquire the knowledge of network protocols.	K2
CO3	Acquire the knowledge to analyze LAN.	K4

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	S	M	M	M	L		S	M	M	L
CO2	M	M	M	L	M		M	M	L	L
CO3	S	M	M	M	L		S	M	M	M

S-Strong; M-Medium; L-Low



## **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 - Transport 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.

## **e-resources:**

1. <https://ecomputernotes.com/computernetworkingnotes/computer-network/local-area-network>
2. <https://nptel.ac.in/courses/106/105/106105183/>

**Programme : B.Sc. Electronics and Communication Systems**

**Course Title : Elective-III: Digital Signal Processing**

**Course Code : 20UEC6EC3**

**Year : Third Year**

**Semester : VI**

**Hours/Week : 5**

**Credit : 5**

### ***COURSE OBJECTIVES***

1. To introduce the concept of analyzing continuous and discrete time signals & systems in the time and frequency domain.
2. To make the student learn, Theory of DSP, design of digital signal processing applications and an introduction to DSP processors.

### ***COURSE OUTCOMES***

After learning the course, the students will be able to

CO1	Apply DFT for the analysis of digital signals & systems	K2&K3
CO2	Design IIR and FIR filters	K3
CO3	Acquire the knowledge of programmable DSPs	K2

K1 – Remember; K2 – understand; K3 – Apply; K4 – Analyze

### ***MAPPING***

	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4
CO1	S	M	M	L	L		S	M	M	M
CO2	M	S	M	M	L		S	M	M	M
CO3	M	M	M	L	M		M	M	L	M

S-Strong; M-Medium; L-Low

### **UNIT-I: SIGNALS SYSTEM**

Types of signal processing – Classification of signals – singularity function – classification of system – simple manipulations of discrete time system – Linear time invariant system – properties of a DSP system – difference equation and its relationship with system function, Impulse response and frequency response. Z transform – properties of Z transform – Inverse Z transform – application of inverse Z transform.

### **UNIT-II: FOURIER, DISCREET AND FAST FOURIER TANSFORM**

Fourier transform – properties of Fourier transform – Discrete Fourier transform – properties of discrete Fourier transform – Discrete time Fourier transform. Fast Fourier transform – Decimation in time algorithm (DIT) – Decimation in frequency algorithm (DFT).

### **UNIT-III: FIR AND IIR**

Finite impulse response filter (FIR filter) – Design of FIR filter by windowing Techniques- design of FIR filter by KaiserWindow method.Infinite impulse response filter – IIR filter design by impulse invariant method – IIR filter design by bilinear transformation – Butterworth filter – Chebyshev and Elliptic filter.

### **UNIT-IV: PROGRAMMABLE DSP**

Introduction to programmable DSPs – architecture of TMS 32C5X – assembly language instructions.

### **UNIT-V: MEMORY ORGANISATION**

Organization – cache memory – peripherals – addressing modes and assembly language instruction of C3X.

### **BOOKS FOR STUDY**

1. S.Salivahannan, A.Vallavaraj, C.Gnanapriya, Digital signal processing, Tata McGraw hill, 2000.
2. B.Vengataramani and M.Bhaskar, Digital signal processors architecture programming and applications, McGraw hill, 2002

### **e-resources:**

1. <https://www.slideshare.net/sudhirshelke73/unit-ifundamental-of-programmable-dsp>
2. <https://dspguru.com/dsp/faqs/iir/basics/>
3. <https://dspguru.com/dsp/faqs/fir/basics/>