DEPARTMENT OF ELECTRONICS

Program Educational Objectives

The Department of Electronics has developed and maintained a well-defined set of Educational objectives and desired program outcomes. Educational objectives of the program cater to the requirements of the stakeholders such as students, parents, employers, alumni, faculty etc. The program educational objectives are as follows:

PEO1: Provide to graduates with a strong foundation in mathematics and science fundamentals. Also to enable them to devise and deliver efficient solutions to challenging problems in the field of Electronics and Communications Systems allied disciplines.

PEO2: Impart analytic and thinking skills of students to develop initiatives and innovative ideas for R&D, Industry and social requirements.

PEO3: Provide to sound theoretical and practical knowledge in the field of Electronics and Communications Systems. Professional and industrial skills to enable students to contribute to the well being of society with a global outlook

PEO4: Inculcate qualities of teamwork as well as social, interpersonal, leadership skills and an ability to adapt to evolving professional environments in the domains of Science and Engineering.

PEO5: Motivate to graduates to become good human beings and responsible citizens for the overall welfare of the society.

ProgramOutcomes

- Ability to apply the knowledge of mathematics and science to develop real time systems
- Ability to design and conduct experiments / practical's
- An ability to function on multidisciplinary teams
- An ability to communicate effectively and engage in lifelong learning
- Student recognize the need for continuing professional development, ethical, legal, social issues and responsibilities

Program Specific Outcomes

- Ability to design a System, Component or Process to meet desired needs with in realistic constraints
- Ability to Identify, Formulate & Solve problems in the area of Electronics and Communications Systems.
- A broad education necessary to understand the impact of engineering solutions in a Global, Economic, Environmental, and Societal context.
- An ability to use the techniques, skills, and modern engineering tools necessary for Engineering practice.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS), COIMBATORE – 641 020
B.Sc, PROGRAMME IN ELECTRONICS AND COMMUNICATION SYSTEMS
Under Choice Based Credit System (CBCS) and Outcome Based Education System (OBE)
2020 – 2021 onwards
SCHEME OF EXAMINATION

SEMESTER – I

S. NO.	COURSE CODE	PART	COURSE TITLE	HRS / WK	CREDITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
01	20UGC1TA1	I	Tamil – I	6	3	3	50	50	100
02	20UGC1EN1	II	English – I	6	3	3	50	50	100
03	20UEC1C01	III	Core – 1: Circuit and Network Analysis	4	4	3	50	50	100
04	20UEC1C02	III	Core - 2: Semiconductor Devices - I	2	2	2	50	-	50
05	20UEC1AL1	III	Allied- 1: Mathematics – I	6	5	3	50	50	100
06	20UEC2CP1	III	Core Practical– 1: Circuit and Network Analysis @	3	-	-	-	-	-
07	20UEC2CP2	III	Core Practical - 2: Semiconductor Devices @	3	-	-	-	-	-
TOTAL – I				30	17	-	200	250	450

SEMESTER – II

S. NO	COURSE CODE	PART	COURSE TITLE	HRS / WK	CREDITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
01	20UGC2TA2	I	Tamil – II	6	3	3	50	50	100
02	20UGC2EN2	II	English – II	6	3	3	50	50	100
03	20UEC2C03	III	Core -3: Electronic Circuits	4	4	3	50	50	100
04	20UEC2C04	III	Core -4:Semiconductor devices-II	2	2	2	50	-	50
05	20UEC2AL2	III	Allied -2: Mathematics – II	6	5	3	50	50	100
06	20UEC2CP1	III	Core Practical– 1: Circuit and Network Analysis	3	3	3	50	50	100
07	20UEC2CP2	III	Core Practical - 2: Semiconductor Devices	3	3	3	50	50	100
08	20UGC2ENS	IV	Environmental Studies*	-	2	2	-	50	50
TOTAL – II				30	25	-	350	350	700

SEMESTER – III

S. NO	COURSE CODE	PART	COURSE TITLE	HRS/ WK	CREDITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
01	20UEC3C05	III	Core – 5: Electronic Instruments	4	4	3	50	50	100
02	20UEC3C06	III	Core –6: Digital Electronics	4	4	3	50	50	100
03	20UEC3C07	III	Core –7: Principles of communication systems	5	5	3	50	50	100
04	20UEC3AL3	III	Allied- 3: Programming in C	4	4	3	35	35	70
05	20UEC4CP3	III	Core Practical – 3: Electronic Circuits @	3	-	-	-	-	-
06	20UEC4CP4	III	Core Practical – 4: Digital Electronics @	3	-	-	-	-	-
07	20UEC4CP5	III	Core Practical – 5: Electronic Communication @	3	-	-	-	-	-
08	20UEC4AP1	III	Allied Practical 1: Computer Programming in C and C++ @	2	-	-	-	-	-
09	20UEC3NM1	IV	NME:1 #	2	2	2	-	50	50
TOTAL – III				30	20	-	185	235	420

SEMESTER – IV

S. NO	COURSE CODE	PART	COURSE TITLE	HRS/ WK	CREDITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
01	20UEC4C08	III	Core –8: 8085Microprocessor and Interfacing	4	4	3	50	50	100
02	20UEC4C09	III	Core –9: Antenna and Wave Propagation	4	4	3	50	50	100
03	20UEC4EA1/ 20UEC4EB1/ 20UEC4EC1	III	Elective-I: One from Group – I	5	5	3	50	50	100
04	20UEC4AL4	III	Allied- 4: Object Oriented Programming with C++	4	4	3	35	35	70
05	20UEC4CP3	III	Core Practical – 3: Electronic Circuits @	3	3	2	50	50	100
06	20UEC4CP4	III	Core Practical – 4: Digital Electronics @	3	3	3	50	50	100
07	20UEC4CP5	III	Core Practical – 5: Electronic Communication @	3	3	3	50	50	100
08	20UEC4AP1	III	Allied Practical 1: Computer Programming in C and C++	2	2	2	30	30	60
09	20UEC4NM2	IV	NME – 2 :#	2	2	2	-	50	50
10	20UGC4VAE	IV	Value Education	-	2	2	-	50	50
11	20UUGC4NSS/NCC/SPO/ YRC	V	NSS/ NCC/ Sports/YRC	-	1	2	25	25	50
TOTAL – IV				30	33	-	390	490	880

SEMESTER – V

S. NO	COURSE CODE	PART	COURSE TITLE	HRS/ WK	CREDITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
01	20UEC5C10	III	Core - 10 : Biomedical Instrumentation	5	5	3	50	50	100
02	20UEC5C11	III	Core - 11: 8051Microcontroller andIt's Applications	5	4	3	50	50	100
03	20UEC5C12	III	Core - 12: Linear IC's & its Applications	4	4	3	50	50	100
04	20UEC5C13	III	Core - 13: Basics and Practical Aspects of Electronics (On line Exam)	-	3	3	-	100	100
05	20UEC5EA2/ 20UEC5EB2/ 20UEC5EC2	III	Elective-II: One from Group - II	5	5	3	50	50	100
06	20UEC6CP6	III	Core Practical - 6: Linear IC's and Instrumentation @	3	-	-	-	-	-
07	20UEC6CP7	III	Core Practical - 7: Microprocessor and Microcontroller @	3	-	-	-	-	-
08	20UEC6CPR	III	Project Work @	5	-	-	-	-	-
TOTAL –V				30	21	-	200	300	500

SEMESTER – VI

S. NO	COURSE CODE	PART	COURSE TITLE	HRS/ WK	CREDITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
01	20UEC6C14	III	Core - 14: Embedded systemDesign	5	5	3	50	50	100
02	20UEC6C15	III	Core - 15: Optical Fiber Communication	5	4	3	50	50	100
03	20UEC6C16	III	Core - 16: Industrial and Power Electronics	4	4	3	50	50	100
04	20UEC6EA3/ 20UEC6EB3/ 20UEC6EC3	III	Elective-III: One from Group – III	5	5	3	50	50	100
05	20UEC6CP6	III	Core Practical - 6: Linear IC's andInstrumentation	3	3	3	50	50	100
06	20UEC6CP7	III	Core Practical - 7: Microprocessor and Microcontroller	3	3	3	50	50	100
07	20UEC6CPR	III	Project Work	5	5	-	50	50	100
TOTAL –VI				30	29	-	350	350	700

* Common Syllabus Offered by college

@ Exams will be conducted in the even semester

NME Course offered by Computer Science Department

NME Course offered to B.Sc Computer Science Students

SEMESTER – III									
S. NO	**COURSE CODE**	**PART**	**COURSE TITLE**	**HRS/ WK**	**CREDITS**	EXAM HRS	**MAX MARKS**		
							INT	**EXT**	**TOT**
01	20UCS3 NM1	IV	Non Major Elective – 1: PC Hardware Fundamentals	2	2	2	-	50	50

NME Course offered to open choice

SEMESTER – IV									
S. NO	**COURSE CODE**	**PART**	**COURSE TITLE**	**HRS/ WK**	**CREDITS**	EXAM HRS	**MAX MARKS**		
							INT	**EXT**	**TOT**
01	20UEC4 NM2	IV	Non Major Elective – 1: Maintenance of Domestic Appliances	2	2	2	-	50	50

Course	**Credits**	**Marks**
Tamil	6	200
English	6	200
Part III: Core & Elective Allied	103 20	2600 400
Environment Studies	2	50
Non Major Elective	4	100
Value Education	2	50
NSS / NCC / Sports/YRC	1	50
Total	144	3650

List of Electives

Group – I

1. PCB Design and Fabrication
2. MobileandCellular Communication
3. PC Hardware Fundamentals

Group – II

1. Robotics and Automation
2. Arduino and Internet of Things
3. Network Communication
4. Data Science Using R Programming

Group – III

1. Automotive Electronics
2. VLSI Design and VHDL
3. Digital Signal Processing
4. Data Science-II

5.

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 withresistances,capacitive components, as well as semiconductor components.
- Have knowledge about typical uses for resistive circuits, simple capacitive and inductivecircuits.

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
2. https://www.electronics-tutorials.ws/dccircuits/dcp_1.html
3. https://www.tutorialspoint.com/network_theory/network_theory_filters.htm

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Core : Semiconductor Devices -I**	**Course Code**	**:**	20UEC1C02
Year	**:**	**First Year**	**Semester**	**:**	**I**
Hours/Week	**:**	**2**	**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 Junctiondiodes, 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 - PNPN 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
2. https://www.tutorialspoint.com/basic_electronics/basic_electronics_special_purpose_diodes.htm
3. https://www.tutorialspoint.com/basic_electronics/basic_electronics_transistors.htm
4. https://www.tutorialspoint.com/basic_electronics/basic_electronics_transistor_configurations.htm

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Core : Electronic Circuits**	**Course Code**	**:**	20UEC2C03
Year	**:**	**First Year**	**Semester**	**:**	**II**
Hours/Week	**:**	**4**	**Credit**	**:**	**4**

COURSE OBJECTIVES

1. To enable the students to understand the principles of Electronics and Equipment to designcircuits.
2. To understand the concept of Amplifiers and able to design.
3. To understand the concept ofOscillators.

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Design Filter Circuits.	K2
CO2	Classify the Amplifiers	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
3. https://www.tutorialspoint.com/electronic_circuits/electronic_circuits_rectifiers.htm
4. https://www.tutorialspoint.com/electronic_circuits/electronic_circuits_filters.htm

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Core : Semiconductor Devices - II**	**Course Code**	**:**	20UEC2C04
Year	**:**	**First Year**	**Semester**	**:**	**II**
Hours/Week	**:**	**2**	**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	Understand the concept of FET and Transistor	K1
CO2	An ability to understand and utilize the concept of Power electronics	K2
CO3	An ability to understand and analyze the inner optoelectronic devices.	K2&K4

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	M
CO2	S	S	M	L	L		M	M	L	M
CO3	M	M	M	L	L		M	M	M	M

S-Strong; M-Medium; L-Low

Unit-I

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-II

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

Unit-III

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 & II).**
2. S.Salivahanan, N.Suresh Kumar, A.Vallavaraj,"Electronic devices and circuits", TMH publishing company Ltd, New Delhi, 2001 (7Th reprints). (**Unit III)**

e-resources:

1. https://www.tutorialspoint.com/semiconductor_devices/semiconductor_devices_field_effect_transistors.htm
2. https://www.rfwireless-world.com/Terminology/SCR-vs-Diac-vs-Triac-vs-UJT.html
3. https://nptel.ac.in/courses/115/102/115102026/
4. https://www.tutorialspoint.com/basic_electronics/basic_electronics_optoelectronic_diodes.htm

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Core Practical: Circuit and Network Analysis**	**Course Code**	**:**	20UEC2CP1
Year	**:**	**First Year**	**Semester**	**:**	**II**
Hours/Week	**:**	**3**	**Credit**	**:**	**3**

COURSE OBJECTIVES

1. Provide hands-on experience to the students so that they are able to put theoretical concepts to practice.
2. Understand the concept of circuit laws
3. Solve the electrical network using mesh and nodal analysis by applying network theorems
4. Understand the concept of resonance in series and parallel circuits.

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Use basic laboratory equipment and techniques to measure electrical quantities using laboratory test equipment such as multimeters, power supplies, signal generators, and oscilloscopes.	K1
CO2	Explain the concept of circuit laws and network theorems and apply them to laboratory measurements	K2&K3

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

MAPPING

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

S-Strong; M-Medium; L-Low

ANY 18 EXPERIMENTS

1. Ohm's Law Verification
2. Kirchhoff's Laws Verification
3. Verification of Maximum Power Transfer Theorem
4. Verification of Super Position Theorem
5. Verification of Thevenin's Theorem
6. Verification of Norton's Theorem
7. Verification of Millman's Theorem
8. Study on Transient Response RC Components
9. Impedance and Power Factor of RL Circuits
10. Star to Delta and Delta to Star Transformation

11. Series Resonance Circuit - RLC.
12. Parallel Resonance Circuit – RLC.
13. Study of Transformer Ratio
14. Calibration of Low Range Ammeter - Potentiometer
15. Calibration of Low Range Voltmeter- Potentiometer
16. Calibration of High Range Ammeter - Potentiometer
17. Calibration of High Range Voltmeter- Potentiometer
18. Study of Capacitor Network
19. Study of Resistor Network
20. Measurement of L & C using Bridge
21. Measurement of Resistance - Potentiometer
22. Measurement of Resistance - Wheatstone Network

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Core Practical: Semiconductor Devices**	**Course Code**	**:**	20UEC2CP2
Year	**:**	**First Year**	**Semester**	**:**	**II**
Hours/Week	**:**	**3**	**Credit**	**:**	**3**

COURSE OBJECTIVES

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.

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Apply concepts of semiconductor devices to design and analyze circuits.	K2,K3&K4
CO2	Apply fundamentals of semiconductor devices in electronics projects and use computer tools in circuit design, evaluation and analysis	K3&K4

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	S	M	M
CO2	S	S	M	L	L		M	M	L	M

S-Strong; M-Medium; L-Low

ANY 18 EXPERIMENTS

1. Determination of band gap energy of Silicon.
2. Determination of band gap energy of Germanium.
3. PN junction diode characteristics.
4. Zener diode characteristics.
5. Characteristics of CE configuration.
6. Characteristics of CB configuration.
7. Study of self bias circuit.
8. Study of voltage divider bias circuit.
9. FET characteristics.
10. Solar cell characteristics.
11. Photo diode characteristics.
12. Study of Integrator circuits using RC components.
13. Study of Differentiator circuit using RC components.
14. Clipping circuits.
15. Clamping circuits.
16. Low pass filters.
17. High pass filters.
18. Bands pass filters.
19. Band stop filters.
20. Diac characteristics.
21. UJT characteristics.
22. Triac Characteristics.

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
2. 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

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Core : Digital Electronics**	**Course Code**	**:**	20UEC3C06
Year	**:**	**Second Year**	**Semester**	**:**	**III**
Hours/Week	**:**	**4**	**Credit**	**:**	**4**

COURSE OBJECTIVES

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

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Realize different logic gates and analyzing the outputs.	K1&K2
CO2	Demonstrate the knowledge of Boolean algebra including algebraic manipulation/simplification and application of DeMorgan's theorems and Karnaughmapreduction method.	K2&K3
CO3	Analyze and design the combinational and sequential logic circuits.	K4

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	L	L		S	M	M	L
CO3	S	S	M	L	L		S	S	M	M

S-Strong; M-Medium; L-Low

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 - DeMargon'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. Pearson/Prentice Hall, 2009. (Unit-I-III).
2. Donald P.Leach ,"Digital Principles and Applications", Albert Paul Malvino and GoutamSaha, TMH Publishing Company, New Delhi, Sixth edition, 2011. (Unit IV-V).

e-resources:

1. https://nptel.ac.in/courses/117/103/117103064/
2. https://www.slideshare.net/sohamdodia27/flipflop-41659873.
3. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_digital_to_analog_converters.htm.

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Core : Principles of Communication Systems**	**Course Code**	**:**	20UEC3C07
Year	**:**	**Second Year**	**Semester**	**:**	**III**
Hours/Week	**:**	**5**	**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 COMMUNCATION 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, 3rd edition, 1989.

e-resources:

1. 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	**:**	**Allied: Programming in C**	**Course Code**	**:**	20UEC3AL3
Year	**:**	**Second Year**	**Semester**	**:**	**III**
Hours/Week	**:**	**4**	**Credit**	**:**	**4**

COURSE OBJECTIVES

1. To learn in the basic of computers.
2. To enable students to learn about the basic features of C Programming Language.
3. To learn the various decision making and looping statements.
4. To learn how to program using arrays and functions.
5. To learn about structures and pointers.

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Acquire the working of knowledge of computers and programming.	K1&K2
CO2	Ability to write do and loop algorithms.	K3
CO3	Illustrate the representation of arrays, strings and usage of string operations.	K2&K3
CO4	Acquire Knowledge of pointers and dynamic memory allocation.	K2

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	S
CO2	S	S	M	L	L		S	S	M	M
CO3	M	M	L	L	L		M	S	L	M
CO4	S	M	M	M	L		M	L	M	M

S-Strong; M-Medium; L-Low

UNIT-I

Information Technology and Computer basics – Types of data – Representation of characters in computer – Textual data processing – Data processing using Computers – Desktop computer – Computer Software – operating system – Programming Languages – A Classification of Programming Languages – Internet and World Wide Web – LAN – WAN – Internet – E mail – File transfer.

UNIT- II

Computer Algorithms – Developing Algorithms – Programming preliminaries – omitting a program – Input Output Statements – Numeric Constants and Variables – Arithmetic Expressions.

UNIT - III

Conditional Statements – Loops (While – for – Do while) – Arrays – Logical Expressions – Switch, Break, & Continue Statements – Simple programs.

UNIT - IV

Functions – String processing – Enumerated data types – Structure – pointers.

UNIT - V
List and trees – Recursion – Bit level operation files in C

Books for study:

1. V.Rajaraman: 'Computer Basics and C Programming' PHI – New Delhi – 2008.

e-resources:

1. https://www.tutorialspoint.com/computer_concepts/computer_concepts_introduction_to_internet_www_web_browsers.htm.
2. https://www.tutorialspoint.com/what-are-pointers-to-structures-in-c-language
3. https://www.cprogramming.com/tutorial/c/lesson18.html
4. https://overiq.com/c-programming-101/the-break-and-continue-statement-in-c/

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 basedreal-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- Exterritorial 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
3. https://www.slideshare.net/sunilrathore77398/microwavetubes

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Allied: - Object Oriented Programming with C++**	**Course Code**	**:**	20UEC4AL4
Year	**:**	**Second Year**	**Semester**	**:**	**IV**
Hours/Week	**:**	**4**	**Credit**	**:**	**4**

COURSE OBJECTIVES

1. To inculcate knowledge on Object-Oriented programming concepts using C++.
2. Topics include pointers, classes, overloading, data abstraction, information hiding, encapsulation, inheritance, polymorphism, file processing, templates, exceptions, container, Classes, and low-level language features.

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Differentiate between structures oriented programming and object oriented programming	K1&K2
CO2	Use of object oriented programming language like C++ and associated libraries to developobject oriented programs	K2
CO3	Understand and apply various object oriented features like inheritance, data abstraction.	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	M	L		S	M	M	L
CO3	M	M	M	L	L		M	M	L	L

S-Strong; M-Medium; L-Low

Unit – I

Evolution of Programming Languages - Drawbacks of Classical Methods - Need for Object Orientation - Conventional Programming Versus Object Oriented Programming – Properties - Treatment of Object Class and Association of Objects – Object Oriented Analysis.

Unit – II

Object Oriented Design - Object Oriented Database - Object Oriented Interface - Garbage Collection and Exception Handling - Evolution of C++ - C++ Programming Basics - Data Types - Include Directories - Loop and Decisions – Structures - Function.

Unit – III

Object and Classes – Messages - Access Specifier - Data Encapsulation - Definition and Declaration of Member Functions - Static Class Data - Members and Function - Pointers and References - This Pointer – Strings - New and Delete Operators - Object I/O Streams.

Unit – IV

Polymorphism - Operator Over Loading - Function Overloading - Overloading Unary Operators – Overloading Binary Operators - Data Conversion and Pitfalls of Operator Overloading - Friend Function - Friend Class Specifier - Derived and Base Classes – Static and Dynamic Binding - Virtual Function - Pure Virtual Function - Virtual Base Class - Abstract Class.

Unit – V

Files and Streams - String I/O - Object I/O Stream Class-Error Handling – Redirection - Command Line Arguments - Exception Handling Container Classes – Templates - Simple Templates – Class Templates - Function Templates - Templates Argument.

Book for study:

1. E. Balagurusamy - 'Object Oriented Programming with C++' Tata McGraw Hill, 2008.

Books for Reference

1. Bjarne Sroutstrup - 'The C++ Programming Language' 2nd Edition, Addison Wesley 1991.

2. MichealBlaha, James Rambaugh, "Object-Oriented Modeling and Design with UML", Second Edition, Prentice Hall of India Private Limited,2007.

e-resources:

1. https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/
2. https://www.tutorialspoint.com/cplusplus/cpp_files_streams.htm.
3. https://www.tutorialspoint.com/cplusplus/cpp_polymorphism.htm

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Core Practical: Electronic Circuits**	**Course Code**	**:**	20UEC4CP3
Year	**:**	**Second Year**	**Semester**	**:**	**IV**
Hours/Week	**:**	**3**	**Credit**	**:**	**3**

COURSE OBJECTIVES

1. Learn about biasing of BJTs.
2. Construct amplifiers with active loads.
3. Design and evaluate the power supply, feedback amplifiers, push pull amplifier, oscillators, wave-shapingcircuits and filters.

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Design rectification and filter circuits.	K1&K2
CO2	Design Regulated power supply and amplifier circuits.	K2
CO3	Design and construct all multivibrator circuits.	K3
CO4	Apply the principle of oscillator in designing various oscillator 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	L	M
CO2	S	S	M	L	L		S	M	M	L
CO3	S	S	M	L	L		M	M	L	L
CO4	S	M	M	M	L		S	S	M	L

S-Strong; M-Medium; L-Low

ANY 18 EXPERIMENTS

1. Half Wave & Full Wave Rectifier
2. LC & Pi filters
3. Zener diode as a voltage regulator
4. Voltage Doubler & Tripler
5. Common Emitter Amplifier
6. Emitter Follower
7. RC – Coupled Amplifier
8. Feed-Back Amplifier
9. Class A Power Amplifier
10. Class B Power Amplifier
11. UJT – Relaxation Oscillators
12. Hartley Oscillator
13. Colpitts Oscillator
14. Phase Shift Oscillator
15. Wien Bridge Oscillator
16. Free Running Multivibrator
17. Mono-Stable Multivibrator
18. BistableMultivibrator
19. Crystal Oscillator
20. Schmitt Trigger
21. Blocking Oscillator
22. Clapp Oscillator

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Core Practical: Digital Electronics**	**Course Code**	**:**	20UEC4CP4
Year	**:**	**Second Year**	**Semester**	**:**	**IV**
Hours/Week	**:**	**3**	**Credit**	**:**	**3**

COURSE OBJECTIVES

1. Acquire the fundamental knowledge in basic gates.
2. Design and analyze digital electronic circuits.
3. Apply the fundamentals in digital electronics projects.

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Verify the logic gates &Demorgan's theorem.	K1&K2
CO2	Convert the binary and gray code.	K2
CO3	Design adder and Subtractor circuits.	K3
CO4	Construct encoder and decoder circuit.	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	M
CO2	M	M	L	M	L		M	M	L	L
CO3	S	S	M	M	L		S	M	L	M
CO4	S	S	M	L	L		S	M	M	M

S-Strong; M-Medium; L-Low

ANY 18 EXPERIMENTS

1. Construction of 5VDC Power Supply
2. Digital IC's Characteristics
3. Logic Gates Using IC's
4. Verification of Demorgan's Theorems
5. NAND & NOR as Universal Building Block
6. Code Converters
7. Shift Register & Ring Counter
8. Half Adder & Full Adder
9. Half Subtractor& Full Subtractor
10. Up-Down Counter
11. Encoder & Decoder
12. Study of 7490
13. Decade Counter
14. Multiplexer &Demultiplexers
15. Study of Flip-Flops
16. Analog to Digital Converter
17. Digital to Analog Converter
18. Pulse Generators
19. MOD-Counters
20. Four Bit Binary Adder
21. BCD Adder
22. Parity Generators and Checkers

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Core Practical: Electronic Communication**	**Course Code**	**:**	20UEC4CP5
Year	**:**	**Second Year**	**Semester**	**:**	**IV**
Hours/Week	**:**	**3**	**Credit**	**:**	**3**

COURSE OBJECTIVES

1. To experiment the Modulation and Detection techniques.
2. To develop the practical knowledge of digital communication.
3. To experiment the operations of amplifiers for audio systems.

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Learn the concept of Modulation techniques.	K1
CO2	Understand the knowledge of radio receiver.	K1&K2
CO3	Understand the digital modulation techniques.	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	M
CO2	M	M	M	M	L		S	M	M	L
CO3	M	M	M	L	L		M	M	L	L

S-Strong; M-Medium; L-Low

ANY 18 EXPERIMENTS

1. AM generation
2. FM generation
3. RF amplifier
4. First IF amplifier
5. Second IF amplifier
6. AM detector
7. Study of FM receiver
8. FM demodulator
9. HF oscillator
10. Study of Yagi-Uda antenna
11. Pulse Amplitude Modulation
12. Pulse Width Modulation
13. Pulse Position Modulation
14. FSK Generation
15. FSK Demodulation
16. ASK Generation
17. ASK Detection
18. PSK Generation
19. PSK Detection
20. Audio power Amplifier using IC TBA810
21. Power audio amplifier using IC LM380
22. Sync separator

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Allied Practical: Computer Programming in C and C++**	**Course Code**	**:**	20UEC4AP1
Year	**:**	**Second Year**	**Semester**	**:**	**IV**
Hours/Week	**:**	**2**	**Credit**	**:**	**2**

COURSE OBJECTIVES

1. To be familiar with programming in C Language.
2. To understand various programs using decision making and looping statements.
3. To understand simple programs using arrays and functions.
4. To understand simple programs in structures and pointers.

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	An understanding of basic programming concepts.	K1&K2
CO2	An ability to write simple programs using control structures, arrays and functions.	K3
CO3	An ability to implement simple programs using pointers and file concepts.	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	M	M	M
CO2	S	M	M	L	L		S	S	M	L
CO3	S	S	M	M	L		S	M	M	L

S-Strong; M-Medium; L-Low

ANY 18 PROGRAMS

C PROGRAMS

1. Binary to gray
2. Grey to Binary
3. Binary to Decimal
4. Decimal to Binary
5. Matrix Addition
6. Matrix Subtraction
7. Palindrome
8. Fibonacci
9. Mirror no check
10. Factorial
11. Biggest of Three Numbers

C ++ PROGRAMS

1. Binary to gray.
2. Grey to Binary
3. Binary to Decimal.
4. Decimal to Binary.
5. Matrix Addition.
6. Matrix Subtraction.
7. Palindrome.
8. Fibonacci.
9. Mirror no check.
10. Factorial.
11. Biggest of Three Numbers

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 ofmedical 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**	**Semester**	**:**	**V**
Hours/Week	**:**	**5**	**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 knowledge of programming	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^2C - 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 - 3rdEdition – 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

Programme : B.Sc. Electronics and Communication Systems

COURSE OBJECTIVES

Course Title	**:**	**Core : Linear IC's and ItsApplications**	**Course Code**	**:**	20UEC5C12
Year	**:**	**Third Year**	**Semester**	**:**	**V**
Hours/Week	**:**	**4**	**Credit**	**:**	**4**

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, 4th edition2004.
2. Botkar K.R, "Integrated Circuits", Khanna Publishers, 9thEdition 2000.

e-resources:

1. https://nptel.ac.in/courses/108/106/108106068/
2. 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_integrated_circuits_applications_phase_locked_loop_ic.htm
4. http://www.ajlontech.com/5.voltageregulator.pdf

Course Title	**:**	**Core :Embedded system design**	**Course Code**	**:**	20UEC6C14
Year	**:**	**Third Year**	**Semester**	**:**	**VI**
Hours/Week	**:**	**4**	**Credit**	**:**	**4**

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 knowledge of RTOS	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 anRTOS.

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
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 : Optical Fibre Communication**	**Course Code**	**:**	20UEC6C15
Year	**:**	**Third Year**	**Semester**	**:**	**VI**
Hours/Week	**:**	**5**	**Credit**	**:**	**4**

COURSE OBJECTIVES

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

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Acquire the knowledge of construction and design of optical fiber.	K1,K2&K3
CO2	Acquire the knowledge of fabrication techniques	K2
CO3	Learn the concept of couplers and various losses	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	L		S	S	M	M
CO2	M	M	M	L	L		M	M	M	M
CO3	M	M	L	L	L		M	M	L	L

S-Strong; M-Medium; L-Low

Unit-I

Introduction - Propagation of light waves in optical fiber-Acceptance angle andAcceptance 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- Phasilsystem-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:

Subir Kumar Sarkar, "Optical fibers and fiber optic communication system", S.Chand&Company Ltd, 1997**.**

Book for reference:

Gerd Keiser, "Optical Fiber Communications", 3rd edition, Aug 20, 2013.

e-resources:

1. https://nptel.ac.in/courses/117/101/117101054/
2. https://www.youtube.com/watch?v=zi7ConumClw
3. https://www.youtube.com/watch?v=7AmmD410wuE
4. https://www.youtube.com/watch?v=fnIebfgEgW8

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 voltageprotection – gateprotection.

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.

UNITIII

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.

UNITIV

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 publications2002.
2. Timothy J Maloni, “Industrial Solid State Electronic Devices and Circuits” 2nd edition 1986.

e-resources:

1. 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	**:**	**Core Practical: Linear IC's and Instrumentation**	**Course Code**	**:**	20UEC6CP6
Year	**:**	**Third Year**	**Semester**	**:**	**VI**
Hours/Week	**:**	**3**	**Credit**	**:**	**3**

COURSE OBJECTIVES

1. To understand the concept of operational amplifier
2. To understand the various application of operational amplifier
3. To Study the different oscillator circuit

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	acquire the knowledge of basic application using op-amp	K1
CO2	acquire the knowledge to construct amplifiers using operational amplifier	K2 & K3
CO3	design oscillators	K4

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	M	M	L	L	L		S	L	M	M
CO3	S	S	M	L	L		S	M	L	M

S-Strong; M-Medium; L-Low

ANY 18 EXPERIMENTS

USING OPERATIONAL AMPLIFIER

1. Parameters
2. Frequency Response andGain
3. Input and OutputImpedance
4. Adder andSubtractor
5. Integrator and Differentiator
6. Sine, Square and Triangular WaveGenerator
7. Wien BridgeOscillator
8. Phase ShiftOscillator
9. InvertingandNon-Inverting
10. Voltage follower
11. Voltage Shunt Feedback
12. Voltage Series Feedback
13. Current Shunt Feedback
14. Current Series feedback
15. HartleyOscillator
16. ColpittsOscillator
17. Schmitt Trigger Using741
18. Study o fVCOandPLL
19. Study ofParameter– IC555
20. Schmitt Trigger – Using IC555
21. InstrumentationAmplifiers
22. VoltageRegulator

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Core Practical: Microprocessor and Microcontroller**	**Course Code**	**:**	20UEC6ECP7
Year	**:**	**Third Year**	**Semester**	**:**	**VI**
Hours/Week	**:**	**3**	**Credit**	**:**	**3**

COURSE OBJECTIVES

1. To develop the skills of assembly language programming and interfacing of 8085 microprocessor and 8051microcontroller.
2. To prepare the students to be able to solve different problems by developing different programs.
3. To develop the quality of assessing and analyzing the obtained data.

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Gain knowledge of arithmetic Programming of 8085 and 8051	K1
CO2	Differentiate Microprocessor and Controller architecture	K2&K3
CO3	Applythe Concept of interfacing	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	M	M	L
CO2	M	M	L	L	L		M	M	L	M
CO3	S	M	M	M	L		S	M	M	M

S-Strong; M-Medium; L-Low

Any 18 Experiments (9 from 8085 and 9 from 8051)

8085 Microprocessor Experiments:

1. 8-Bit Addition and Subtraction
2. 16-Bit Addition and Subtraction
3. 8-Bit multiplication and Division
4. Block Datatransfer
5. Maximum, Minimum Number in anArray
6. Ascending and DescendingOrder
7. SeriesAddition
8. Complements
9. DACInterface
10. ADCinterface
11. SteppermotorInterface

8051 MicrocontrollerExperiments:

1. 8-Bit Addition and Subtraction
2. 16-Bit Addition and Subtraction
3. 8-Bit multiplication and Division
4. Block Datatransfer
5. Maximum, Minimum Number in anArray
6. Ascending and DescendingOrder
7. SeriesAddition
8. Complements
9. LogicalPrograms
10. Addition- Cprogramming
11. Ascending and Descending Order- Cprogramming

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Elective-I: PCB Design and Fabrication**	**Course Code**	**:**	**20UEC4EA1**
Year	**:**	**Second Year**	**Semester**	**:**	**IV**
Hours/Week	**:**	**5**	**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 though 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 managementin cellular mobile system.
3. To go in depth for understanding the popular GSM cellular mobile standard and wirelessstandards.

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 mobile system specifications.	K1&K2
CO3	Classify frequency and handoff management techniques in Mobile Communication.	K2
CO4	Outline cellular mobile communication standards.	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
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
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. Balasubaramanian, 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
2. http://jhigh.co.uk/ComputingSG/ComputerSystems/CS_backStorage1.html
3. https://slideplayer.com/slide/4502628/
4. https://www.youtube.com/watch?v=MGqJa20Lqwc

Programme	**:**	**B.Sc. Electronics and Communication Systems**			
Course Title	**:**	**Elective-II: Robotics and Automation**	**Course Code**	**:**	**20UEC5EA2**
Year	**:**	**Third Year**	**Semester**	**:**	**V**
Hours/Week	**:**	**5**	**Credit**	**:**	**5**

COURSE OBJECTIVES

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

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Learn the concept robotic system	K1
CO2	Acquire the knowledge of PLC	K2
CO3	Acquire the knowledge of computer numerical control	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		M	M	L	M
CO2	M	M	M	L	M		S	M	M	L
CO3	M	M	L	M	L		S	M	M	M

S-Strong; M-Medium; L-Low

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.

Books for study:

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

Books for reference:

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.

e-resources:

1. https://neostencil.com/upsc-science-tech-classification-of-robots
2. https://www.brainkart.com/article/Introduction-Robot-Drive-Systems_5132/
3. https://www.electrical4u.com/programmable-logic-controllers/
4. https://theunboxfactory.com/cnc-machine-working/

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**

COURSE OBJECTIVES

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	Understandthe structure of Arduino boardsandprogrammingconcepts.	K2
CO2	Describe the functionof Arduino UNO andinterfacingconcepts.	K1&K2
CO3	Understand the basicprinciples,requirements,functionsand system architecture ofIoT.	K2
CO4	Understand Prototype embedded devicesforIoT and M2M,embeddedplatformsand design software forIoTapplications	K3
CO5	Analyze the functioning of IoT applications in smart premises,connected car, environmentmonitoringandagriculturethroughquantitative 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

IntroductiontoArduino – FunctionalblockdiagramofArduino- Arduino family of boards – ArduinoUNO – Features – CommunicationPlatform-Terminology – IntroductiontoArduinoProgramming-Keywords –InbuiltFunctions –Variables and data types – Libraries- Arduino Boot Loader

Unit: II: ATMEGA328:

Pin functionofArduino UNO – DigitalGPIOProgrammingWorking with pinsasinputand output-Working with PWM outputsworking with analog inputsusing on-chip ADC Serialcommunication between Arduino hardware and PC – Interrupt-Blinking of LED- InterfacingLCD.

Unit: III: INTERNETOFTHINGS:IOT

Definition –vision-Smartandhyperconnected devices-IoTConceptualframework-IoTArchitecturalview-technology behindIoT- BigDataAnalytics.

Unit: IV: DESIGNPRINCIPLES FORCONNECTEDDEVICES

IoT/M2M systemslayersanddesignsstandardization;communication technologies-Design principles for Web Connectivity-Web Communication Protocols for Connected Devices-Internet connectivity Principles-Internet Connectivity-Internet BasedCommunication

Unit V:APPLICATIONS OFIOT

IoTapplicationforsmarthomes-Smartcity-Smart cityparking-Connectedcarandservices-SmartEnvironmentmonitors–WeathermonitoringSystem-AirpollutionMonitoringSystem–ForestFire Detection – Agriculture-Smart irrigation-Smart wine quality enhancing- SmartcitystreetlightsControl.

Books for study:

1. Michael McRoberts, BeginningArduino,SecondEdition,Apress,2013.(UnitI& II)
2. RajKamal,InternetofThingsArchitectureand Design Principles,McGraw Hill EducationPvt.Ltd.2011,[Firstedition](UnitIII,IV&V)

Books for reference:

1. John-DavidWarren, Josh Adams, HaraldMolle, ArduinoRobotics, A press, 2011.
2. RajkumarBuyya, Amir VahidDastjerdi. Internet of Things: Principles and
3. Paradigms,.MorgonKaufmannPublications, 2016.

e-resources:

1. 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 - Transparent layer - Session layer-presentation layer - Application layer - Modems**:** Modulation techniques- other modems –Advances in modems - **Switching:** circuit switching – Message switching – Packet switching.

Unit: III Communication Networks and protocols

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

Unit: IV Local Area Network

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

Unit V:

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

Books for study:

1. Uyless Black," Computer networks" PHI, IIedition,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: Automotive Electronics**	**Course Code**	**:**	**20UEC6EA3**
Year	**:**	**Third Year**	**Semester**	**:**	**VI**
Hours/Week	**:**	**5**	**Credit**	**:**	**5**

COURSE OBJECTIVES

1. To understand the concepts of Automotive Electronics and its evolution and trendsautomotivesystems& subsystems overview.
2. To understand sensors and sensor monitoring mechanisms aligned to automotive
3. Systems, different signal conditioning techniques, interfacing techniques and actuator
4. To understand, design and model various automotive control systems using Modelbaseddevelopment technique.

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Understand the need and basics of automotive instrumentation	K1&K2
CO2	Design and working principles of various automotive techniques knowing the working principle of automotive braking and traction systems	K3
CO3	Design of engine management systems	K3

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

MAPPING

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

S-Strong; M-Medium; L-Low

UNIT I Introduction:

Automotive Component, Operation, Electrical Wiring Terminals and Switching,Multiplexed Wiring Systems, Circuit Diagrams and Symbols. Charging Systems and Starting Systems: Charging Systems Principles, Alternations and Charging Circuits, New Developments, Requirements of the Starting System, Basic Starting Circuit.

UNIT II Ignition Systems:

Ignition Fundamental, Electronic Ignition Systems. Programmed Ignition, Distribution Less Ignition, Direct Ignition, Spark Plugs. Electronic Fuel Control: Basics of Combustion, Engine Fuelling and Exhaust Emissions, Electronic Control of Carburetion Petrol Fuel Injection, Diesel Fuel Injection.

UNIT III Instrumentation Systems:

Introduction to Instrumentation Systems, Various Sensors Used for Different Parameters, Sensing Driver Instrumentation Systems, Vehicle Condition Monitoring Trip Computer, Different Types of Visual Display.

UNIT IV Electronic Control of Braking and Traction:

Introduction and Description Control Elements and Control Methodology, Electronic Control of Automatic Transmission: Introduction and Description Control Of Gear Shift and Torque Converter Lockup, Electric Power Steering, Electronic Clutch.

UNIT V Engine Management Systems:

Combined Ignition And Fuel Management Systems, Exhaust Emission Control, Digital Control Techniques, Complete Vehicle Control Systems, Artificial Intelligence and Engine Management, Automotive Microprocessor Uses. Lighting and Security Systems: Vehicles Lighting Circuits, Signaling Circuit, Central Locking and Electric Windows Security Systems, Airbags and Seat Belt Tensioners, Miscellaneous Safety and Comfort Systems.

Books for study:

1. TOM DENTON, Automobile Electrical and Electronic Systems, Edward Arnoldpublications,1995

Books for reference:

1. DON KNOWLES, Automotive Electronic and Computer controlled IgnitionSystems, Don Knowles, Prentice Hall, Englewood Cliffs, New Jersey 1988.
2. WILLIAM, T.M., Automotive Mechanics, McGraw Hill Book Co,1970.

e-resources:

1. https://slideplayer.com/slide/4499614/
2. https://onlinecourses.nptel.ac.in/noc20_de06/preview
3. https://www.youtube.com/watch?v=W94iksaQwUo

Programme : B.Sc. Electronics and Communication Systems
Course Title : Elective-III: VLSI Design and VHDL **Course Code : 20UEC6EB3**
Year : Third Year **Semester : VI**
Hours/Week : 5 **Credit : 5**

COURSE OBJECTIVES

1. To exposure to different methods of VHDL Programming in VLSI design and theprinciples.
2. To understand the concepts of VHDL and its capabilities.
3. To understand the different types of modeling techniques
4. To understand the design of Programmable Logic Devices

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Describe the capabilities of the VHDL language, its concepts, syntax.	K1&K2
CO2	Understand the different method of VHDL programming	K2
CO3	Design the digital building blocks like combinational logic circuits, sequential logic circuits using VHDL	K3
CO4	Realize importance of HDL in logic circuit design	K2
CO5	Understand the programmable logic architectures and circuits	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	M	L
CO2	S	M	M	L	L		M	M	L	M
CO3	S	M	M	L	M		S	M	L	M
CO4	M	M	M	L	L		M	L	M	L
CO5	M	M	M	L	M		M	L	L	M

S-Strong; M-Medium; L-Low

UNIT I Introduction and Basic Concept of VHDL

History of VHDL - capabilities of VHDL - Hardware abstraction - Basic terminology - Entity Declaration - Architecture body declaration - Basic language elements: Identifiers - Data Objects - Data type operators.

UNIT II Behavioral Modeling

Entity declaration - Architecture declaration - Process statements - Variable assignment statements - Signal assignments statements - Wait statement - IF statement - Case statement - Null statement - Loop statement - Exit statement - Next statement - Assertion statement - Report statements - Multiple process - Postponed process.

UNIT III Data Flow Style of Modeling:

Concurrent signal assignment statement versus Signal assignment statement; multiple drivers - Conditional signal assignment statement; Selected signal assignment statement; Unaffected value; Block statement.StructuralModeling:Component declaration; Component instantiation.**Examples:** Half andFull adder, Parallel binary adder; Multiplexer; De-multiplexer; Decoders and Encoders; Flip-Flops; Counters.

UNIT IV Generics and Configuration

Generics - Configuration - Configuration specification; Configuration declaration; Default rules; Conversion functions; Direct instantiation - Sub programs; Sub program overloading; Operator overloading; Signatures; Default value of parameters - Package declaration; Package body.

UNIT V Designing with Programmable Logic Devices: Read-only memories; Programmable Logic Array (PLA); Programmable Array Logic (PAL) - Xilinx 3000 series FPGA and Xilinx 4000 series - Altera Complex Programmable Logic Devices (CPLD's): Altera 7000 series and Altera Flex 10K series.

Books for study:

1. Bhasker. J, "*A VHDL Primer*", PHI Learning Pvt. Ltd., Third edition, 2008.
2. Charless H Roth,Jr., "*Digital Systems Design using VHDL*" , Thomson asiapvt. Ltd, Seventh reprint, 2005.

Books for references:

1. Douglas L. Perry, "*VHDL Programming by Example*", Tata McGraw Hill, Fourth edition. 2002.
2. Stephen Brown and ZvonkoVranesic, "*Fundamentals of Digital Logic Design with VHDL*", Tata McGraw-Hill, Second edition, 2007.

e-resources:

1. http://nptel.ac.in/courses/117106092/
2. https://www.tutorialspoint.com/vlsi_design/vlsi_design_vhdl_introduction.htm
3. https://www.tutorialspoint.com/digital_circuits/digital_circuits_programmable_logic_devices.htm

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 timeand frequency domain.
2. To make the student learn, Theory of DSP, design of digital signal processing applications andan 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 (FIIR filter) – Design of FIR filter by windowing Techniques- design of FIR filter by KaiserWindowmethod.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 McGrawhill, 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/

Program: B.Sc. Computer Science

Course Title	**:**	**NME-1: PC Hardware Fundamentals**	**Course Code**	**:**	**20UCS3NM1**
Year	**:**	**Second Year**	**Semester**	**:**	**III**
Hours/Week	**:**	**2**	**Credit**	**:**	**2**

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 PC 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	M		M	M	L	M
CO2	S	M	M	M	L		S	M	M	L
CO3	S	M	M	L	M		S	M	M	L

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 - Hard Disk Drive Sub-Assemblies – Hard Disk Controller.

Unit – II

I/O Devices: Key Board – Mouse – Scanner – Digitizer – Digital Camera – VGA Monitors – Display Controller – Display Adaptors - CD-Rom Disk & Drive – Sound Blaster – Video on the PC – Dot Matrix Printer – Plotter – Printer controller – Laser printer – Inkjet Printer.

Unit - III

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. Balasubaramanian – Computer Installation and Service – Tata McGraw Hill, 2005.

Book for reference:

1. Peter Norton – Inside the PC – Prentice Hall of India, 1997.

e-resources:

1. https://www.tutorialspoint.com/computer_fundamentals/computer_hardware.htm
2. http://jhigh.co.uk/ComputingSG/ComputerSystems/CS_backStorage1.html
3. https://slideplayer.com/slide/4502628/
4. https://www.youtube.com/watch?v=MGqJa20Lqwc

Open Choice Elective

Course Title	**:**	**NME-2: Maintenance of Domestic Appliances**	**Course Code**	**:**	**20UEC4NM2**
Year	**:**	**Second Year**	**Semester**	**:**	**IV**
Hours/Week	**:**	**2**	**Credit**	**:**	**2**

COURSE OBJECTIVES

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

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Ability to identify AC and DC sources	K2&K3
CO2	Acquire the knowledge of Earthing system.	K1
CO3	Acquire the knowledge of indicating system.	K2
CO4	Acquire the knowledge of Audio and Video Systems.	K2

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

MAPPING

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

S-Strong; M-Medium; L-Low

Unit – I Basics of DC, AC and Wiring Systems

Sources of DC and AC - 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 – II 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 – III Domestic Appliances

Audio and Video Systems; Closed circuit Television (Basics) - Electronic clock – Grinder – Mixing machine – Washing machine – Electric oven – Microwave oven – Stabilizer – Refrigerator – Iron Box – Electric Fan - 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.

e-resources:

1. https://www.electricaltechnology.org/2015/05/earthing-and-electrical-grounding-types-of-earthing.html.
2. https://www.electronicshub.org/voltage-stabilizer-working-and-its-importance/
3. https://physics.info/refrigerators/

Course Title	**:**	**Basic and practical aspect of electronics**	**Course Code**	**:**	20UEC5C13
Year	**:**	**Third Year**	**Semester**	**:**	**V**
			Credit	**:**	**3**

COURSE OBJECTIVES:

- To acquire basic knowledge of Electronics components and soldering techniques for electronics circuit design.
- To acquire skill and knowledge of current information.

***COURSE OUTCOMES*:**

After learning the course, the students will be able to

CO1	Understand the basic concept of electronic components	**K1 & K2**
CO2	Analyse the active and passive components.	**K3 &K4**
CO3	Design a circuits using theorem and laws	**K3 &K4**

K1 - Remember; K2 - Understand; K3 - Apply; K4 –Analyze

MAPPING

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

S-Strong; M-Medium; L-Low

We have Prepared 500 questions from general electronics course from these questions only 100 multiple choice questions are randomly given as online mode. Questions are in designing and analyzing aspects

Course Title	**:**	**Project Work**	**Course Code**	**:**	20UEC6CPR
Year	**:**	**Third Year**	**Semester**	**:**	**VI**
Hours/Week	**:**	**5**	**Credit**	**:**	**5**

COURSE OBJECTIVES:

- To acquire basic knowledge of Electronics components and soldering techniques for electronics circuit design.
- To acquire skill and knowledge of current information, technological tools and technics specific to the selected project field.
- To develop Electronic Hardware working model suitable for real practical environment.

***COURSE OUTCOMES*:**

After learning the course, the students will be able to

CO1	Understand the project characteristics and various stages of a project.	**K1 & K2**
CO2	Undertake problem identification, formulation and solution.	**K3 &K4**
CO3	Demonstrate a sound technical knowledge of their selected project topic.	**K2, K3 &K4**
CO4	Develop Electronic Hardware working model suitable for real time applications.	**K3 &K4**

K1 - Remember; K2 - Understand; K3 - Apply; K4 –Analyze

MAPPING

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

S-Strong; M-Medium; L-Low

Develop Electronic Hardware working model suitable for real practical environment by implementing the theoretical and practical knowledge gained through the curriculum.