Electronics & Telecommunication

Engineering Department

Course Outcome

Department Vision

To recognize as excellent department offering competent technical education to create competent Electronics & Telecommunication Engineers for benefits of common masses.

Department Mission

Committed to serve the needs of society through innovative teaching – learning process, promoting industry- institute interaction to provide competent and cultured Electronics and Telecommunication Engineers.

Program Educational Objectives

1.To impart state of art technical education in the Electronics & Telecommunication Engineering.

2.To promote society beneficial projects and activities.

3.To develop soft skill, team work, professional ethics and multidisciplinary approach for the carrier enhancement.

4.To bridge the gap between Industry-Institute through collaboration with Industries, Institutions and Universities.

5.To provide suitable infrastructure and facilities in tuned with advancing technological evaluation.

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PS01	Should be able to clearly understand and demonstrate design & test of electronics system that perform analog and digital functions.
PS02	Should possess the ability to use of technique, skill & engineering tools necessary for engineering practices.
PS03	Should demonstrate the ability to apply fundamental knowledge of electronics and communication subjects in real world.

SECOND YEAR COURSE OUTCOMES

AY 2018-19

SEMESTER - I

C201	SIGNALS & SYSTEMS
C201.1	Understand mathematical description and representation of continuous and discrete time signals and systems.
C201.2	Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system.
C201.3	Understand and resolve the signals in frequency domain using Fourier series.
C201.4	Understand and resolve the signals in frequency domain using Fourier transforms.
C201.5	Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain.
C201.6	Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.

C202	ELECTRONICS DEVICES & CIRCUITS
C202.1	Understand the parameters & analyze small signal model of JFET
C202.2	Understand the parameters & perform DC analysis of MOSFET
C202.3	Understand the concept of MOSFET as an amplifier and discuss it as a basic element in VLSI
C202.4	Describe various applications of MOSFET
C202.5	Understand & analyze different feedback amplifiers and oscillators using FET
C202.6	Design an adjustable voltage regulator circuits

C203	ELECTRONICS CIRCUITS & MACHINE
C203.1	Analyze basic AC & DC circuit using KVL, KCL, and network theorems
C203.2	Understand Types and Construction of Transformers
C203.3	Understand the working principle of different electrical DC Machine
C203.4	Understand 3 phase AC Induction motors, construction and operation
C203.5	Understand BLDC Motor and its Construction and its applications
C203.6	Understand construction, principle & applications of Stepper Motor and Servo motor

C204	DATA STRUCTURE & APPLICATION
C204.1	Write and understand the programs that use arrays & pointers in C
C204.2	Discuss the computational efficiency of the principal algorithms such as sorting & searching
C204.3	Implement stacks & queues for various applications
C204.4	Describe how arrays, records, linked structures are represented in memory and use them in algorithms
C204.5	Understand various terminologies and traversals of trees and use them for various applications
C204.6	Understand various terminologies and traversals of graphs and use them for various applications

C205	DIGITAL ELECTRONICS
C205.1	Use the basic logic gates and various reduction techniques to design and implement combinational logic circuit
C205.2	Design and implement sequential logic circuits
C205.3	Design and implement digital logic circuits using finite state machines.
C205.4	Understand different digital logic families, do comparative and interface CMOS & TTL
C205.5	Identify different programmable logic devices and semiconductor memories to design combinational logic circuits
C205.6	Understand the architecture and use of microcontrollers for basic operations and Simulate using simulation software

C206	ELECTRONICS MEASUREMENT & TESTING
C206.1	To understand fundamental of various electrical measurements.
C206.2	To understand and describe specifications, features and capabilities of electronic Instruments.
C206.3	To finalize the specifications of instrument and select an appropriate instrument For given measurement.
C206.4	To carry out required measurement using various instruments under different Setups.
C206.5	To compare measuring instruments for performance parameters.
C206.6	To Select appropriate instrument for the measurement of electrical parameter professionally

SECOND YEAR COURSE OUTCOMES

AY 2018-19

SEMESTER - II

C207	MATEMATICS - III
C207.1	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
C207.2	Solve problems related to Fourier transform, Z-transform and applications to Communication systems and Signal processing.
C207.3	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.
C207.4	Perform vector differentiation and use it to solve vector Identities.
C207.5	Apply Vector Integration to compute Line, surface and Volume Integrals.
C207.6	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.

C208	INTEGRATED CIRCUITS
C208.1	Understand the characteristics of IC and Op-Amp and identify the internal structure
C208.2	Derive and determine various performances based parameters and their significance for Op-Amp.
C208.3	Analyze and identify the closed loop stability considerations and I/O limitations
C208.4	Analyze and identify linear and nonlinear applications of Op-Amp.
C208.5	Understand and verify results (levels of V & I) with hardware implementation
C208.6	Understand and apply the functionalities of PLL & Filters

C209	CONTROL SYSTEMS
C209.1	Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.
C209.2	Determine the (absolute) stability of a closed-loop control system and perform time domain stability analysis.
C209.3	Apply root-locus, Frequency Plots technique to analyze control systems.
C209.4	Perform time domain and frequency domain correlation analysis.
C209.5	Able to express and solve system equations in state variable form.
C209.6	Understand the concepts of PID controllers and digital control systems

C210	ANALOG COMMUNICATION
C210.1	To familiarize students with the fundamentals of communication systems and comprehensive description the public telephone network.
C210.2	To provide students with mathematical and theoretical description of linear and angle modulation
C210.3	Have detailed understanding of linear and nonlinear modulators and demodulators
C210.4	To understand basic concepts of radio transmitter and receiver
C210.5	To describe the basic concepts of sources of noise & probability and random variables
C210.6	Acquired knowledge about of basics digital communication. Identify and explain the techniques used for waveform coding viz. PAM, PPM ,PCM& different digital modulation schemes

C211	OBJECT ORIENTED & PROGRAMMING
C211.1	Understand the principles of object oriented programming and basic of C++.
C211.2	Apply the concepts of data encapsulation, inheritance in C++
C211.3	Understand basic program constructs in Java
C211.4	Apply the concepts of classes, methods and use array , strings To write programs Java.
C211.5	Use inheritance, packages and interfaces to write programs in Java.
C211.6	Apply the concepts in Java to create user friendly program

C212	EMPLOYABILITY SKILL DEVELOPMENT
C212.1	Have soft skills and readiness to face aptitude tests
C212.2	Equipped with essential communication skills (writing, verbal and non-verbal)
C212.3	Develop Analytical reasoning
C212.4	Build team and lead it to the target
C212.5	Understand virtue of listening and fundamentals of time
C212.6	Identify various problems and evaluate alternatives

THIRD YEAR COURSE OUTCOME
AY 2018-19
SEMESTER – I

C301	DIGITAL COMMUNICATION
C301.1	Acquired knowledge about of basics analog and digital communication. Identify and explain the techniques used for waveform coding viz. PAM and PCM. Describe different digital modulation schemes
C301.2	Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency. Acquired knowledge about of inter symbol interference
C301.3	Describe random variables and random processes in terms of their mean, variance, and correlation functions and characterize important random variables and processes.
C301.4	Model digital communication systems using appropriate mathematical techniques (probability distributions, signal-space analysis, constellation diagrams, trellis graphs)
C301.5	Acquired knowledge about different M-aray modulation techniques.
C301.6	Identify the presence of error bits signal, and calculate nknown phase of noise in the received signal. Describe spread spectrum and pseudo noise sequence.

C302	DIGITAL SIGNAL PROCESSING
C302.1	Understand the conversion process of analog signals to discrete signals required for digital signal processing
C302.2	Understand the use of Discrete Fourier transform to analyze the discrete time Signals and system
C302.3	Understand the use of Z transform to analyze the discrete time signals and systems
C302.4	Able to Design and implement IIR filter for LTI systems for filtering different real-world signals
C302.5	Able to Design and implement FIR filter for LTI systems for filtering different real-world signal
C302.6	Understand application of DSP for real world

C303	ELECTROMAGNETICS
C303.1	Understand the basic mathematical concepts related to electromagnetic vector fields.
C303.2	Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.
C303.3	Apply the principles of magnetostatics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density
C303.4	Understand the concepts related to Faraday's law, induced emf and Maxwell's equations.
C303.5	Apply Maxwell's equations to solutions of problems relating to transmission lines and uniform plane wave propagation
C303.6	Apply Maxwell's equations to solutions of problems uniform plane wave propagation.

C304	MICROCONTROLLER
C304.1	Students will be able to Learn importance of microcontroller in designing embedded application and architecture of 8051 microcontroller
C304.2	Students will be able to understand hardware and software tools used for interfacing of 8051 microcontroller with input & output devices
C304.3	Students will be able to Develop interfacing to real world devices using 8051 microcontroller
C304.4	Students will be able to understand architecture and peripherals of PIC18F microcontroller
C304.5	Students will be able to uitilise hardware and software tools used for interfacing of PIC18F microcontroller with input & output devices
C304.6	Students will be able to Develop interfacing to real world devices using PIC18F microcontroller

C305	MECHATRONICS
C305.1	Be able to draw block diagram of Mechatronics system.
C305.2	Be able to select proper Transducer/Sensor for Mechatronics System.
C305.3	To identify the components of Hydraulic system.
C305.4	Be able to identify the components of Pneumatic system.
C305.5	Be Able to select proper actuator for any Mechatronics system.
C305.6	Be able to write any case study as a mechatronic system in our daily life.

C306	SIGNAL PROCESSING & DIGITAL COMMUNICATION
C306.1	Understand the signal flow in a digital communication system.
C306.2	Analyze the performance of a baseband and pass band digital communication system in terms of error rate, sampling & convolution
C306.3	Analyze different transformation technique, discrete time signals and systems and error performance with noise and other interferences.
C306.4	Analyze concept of spread spectrum techniques, line code formats, the stability of various systems.
C306.5	Select appropriate filters for different types of digital systems.
C306.6	Implement various digital signal processing functions and building blocks of digital communication system.

C307	MICROCONTROLLERS AND MECHATRONICS LAB
C307.1	To understand Interfacing of application I/O devices with 8051 microcontroller.
C307.2	To understand Interfacing of application I/O devices with PIC microcontroller.
C307.3	Able to design embedded system
C307.4	Understand basic principal of Sensors and Transducer.
C307.5	Select proper actuator for mechatronics system
C307.6	Prepare case study of the system given

C308	ELECTRONICS SYSTEM DESIGN
C308.1	Apply the fundamental concepts and working principles of electronic devices to design SMPS and validate its performance by simulating the same
C308.2	Shall be able to interpret datasheets and thus select appropriate components, transducer and signal conditioning circuit to design prototype of Data Acquisition System and validate its performance by simulating the same
C308.3	Create, manage the database and query handling using suitable tools
C308.4	Design an electronic communication system and validate its performance by simulating the same
C308.5	Shall be able to use an EDA tool for PCB Design

THIRD YEAR COURSE OUTCOME

AY 2018-19

SEMESTER - I

C309	POWER ELECTRONICS
C309.1	Design & implement a triggering / gate drive circuit for a power device
C309.2	Understand & analyze different AC to DC controlled converters
C309.3	Understand & analyze different DC to AC controlled converters
C309.4	Understand different DC-DC converters, evaluate battery backup time & design a battery charger
C309.5	Understand & analyze various over voltage / over current protection circuit
C309.6	Describe various applications of Power Electronics

C310	INFORMATION THEORY CODING AND COMMUNICATION NETWORKS
C310.1	Should be able to perform information theoretic analysis of communication system
C310.2	Should be able to design a data compression scheme using suitable sourse coding technique
C310.3	Should be able to to findout type of channels and their capacities
C310.4	Should be able to design a channel coding scheme for a communication system
C310.5	Should be able to understand and apply fundamental principles of data communication and networking
C310.6	Should be able to apply flow and error control techniques in communication networks

C311	BUSINESS MANAGEMENT
C311.1	To get awareness about various domains in Business Management
C311.2	Understand concept of Quality Management
C311.3	Understand concept of Financial Management and Project Management
C311.4	Learn Human Resource Management &challenges to HR professionals
C311.5	To promote Entrepreneurship
C311.6	Introduce marketing environment & consumer behavior

C312	ADVANCED PROCESSORS
C312.1	Understand and compare different ARM microcontroller
C312.2	Understand ARM7 microcontroller architectures and its feature
C312.3	Develop circuits by interfacing advanced input and output devices to ARM7 microcontroller
C312.4	Design embedded system with available resources
C312.5	Understand DSP processor architectures and its feature
C312.6	Students will be able to apply resources for signal processing applications

C313	SYSTEM PROGRAMMING & OPERATING SYSTEM
C313.1	Demonstrate the knowledge of and compare and analyze the different implementation approach of system programming abstractions.
C313.2	Demonstrate knowledge of linker and loader along with implementation of simple compiler scheme
C313.3	Demonstrate the knowledge of Operating Systems
C313.4	Formulate the Problem and develop the solution for same.
C313.5	Compare and analyze the different implementation approach of Memory Management in OS.
C313.6	Interpret various OS functions used in Linux / Ubuntu

C314	INFORMATION THEORY CODING AND COMMUNICATION NETWORKS-PRACTICALS
C314.1	Students will be able to design & implement a triggering / gate drive circuit for SCR
C314.2	Students will be able to understand, perform & analyze single semi and full converters
C314.3	Students will be able to Single phase AC voltage controller using scrs
C314.4	Understand the different types of channels and their capacities
C314.5	Understand the sourse coding techniques huffman and shannon fano
C314.6	Understand the error Control channel coding techniques linear block code,cyclic ,bch and convolutional code

C315	ADVANCE MICROCONTROLLER & SYSTEM PROGRAMMING LAB
C315.1	Able to understand GPIO configuration of LPC2148
C315.2	Able to Implement interfacing of input and output devices with LPC2148
C315.3	Able to Implement DSP applications on TMS320C6748 DSP Development kit
C315.4	Able to Understand & implement Shell Command
C315.5	Able to Implement basic modules of system programing
C315.6	Able to Implement basic modules of Operating system

C316	EMPLOYABILITY SKILLS AND MINI PROJECT
C316.1	Understand, plan and execute a Mini Project with team
C316.2	Implement electronic hardware by learning PCB artwork design
C316.3	Implement electronic hardware by learning soldering techniques
C316.4	Implement electronic hardware by learning testing and troubleshooting
C316.5	Prepare a technical report based on the Mini project
C316.6	Deliver technical seminar based on the Mini Project work carried out

FINAL YEAR COURSE OUTCOME

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SEMESTER - I

C401	VLSI DESIGN & TECHNOLOGY
C401.1	Model digital circuit with HDL
C401.2	Select application specific integrates circuit (ASIC), Field-programmable gate arrays (FPGA) and complex programmable logic device (CPLD) for design of VLSI Integrated circuit
C401.3	Understand system on chip and interconnect issue in VLSI Design.
C401.4	Design digital CMOS circuits for specified applications
C401.5	Understand concept analog CMOS circuits for specified applications
C401.6	Understand chip level issues and need of testability

C402	COMPUTER NETWORK & SECURITY
C402.1	To understand state-of-the-art in network protocols, architectures, and applications
C402.2	To provide students with a theoretical and practical base in computer networks issues
C402.3	To outline the basic network configurations
C402.4	To understand the transmission methods underlying LAN and WAN technologies
C402.5	To understand different functionalities of application layer
C402.6	To understand security issues involved in LAN and Internet

C403	RADIATION & MICROWAVE TECHNIQUES
C403.1	Formulate the wave equation in wave guide for analysis..
C403.2	Identify the use of microwave components and devices in microwave applications.
C403.3	Carry out the microwave network analysis
C403.4	Understand the working principles of all the microwave tubes
C403.5	Understand the working principles of all the solid state devices
C403.6	Choose a suitable microwave measurement instruments and carry out the required measurements

C404A	ELECTIVE-I EMBEDDED SYSTEMS & RTOS
C404A.1	Get insight of design metrics of Embedded systems to design real time applications to match recent trends in technology.
C404A.2	To understand, analyze and design of real time system using RTOS
C404A.3	To understand and demonstrate micro os2 Services.
C404A.4	To understand Advanced embedded architectures and able to design an application specific systems.
C404A.5	To Understand Linux operating system and to develop implementation skill for application specific systems.
C404A.6	To understand open source platform for embedded system

C404B	ELECTIVE-I INTERNET OF THINGS
C404B.1	Understand the various concepts, terminologies and architecture of IoT systems.
C404B.2	Use sensors and actuators for design of IoT.
C404B.3	Understand and apply various protocols for design of IoT systems
C404B.4	Understand and apply advanced protocols for design of IoT systems
C404B.5	Use various techniques of data storage and analytics in IoT
C404B.6	Understand various applications of IoT

C405A	ELECTRONICS PRODUCT DESIGN ELECTIVE -II
C405A.1	Understand various stages of product (hardware / software) design
C405A.2	Learn different hardware design and testing methods
C405A.3	Learn different software design and testing methods
C405A.4	Able to understand different methods of pcb designing and different tools for it
C405A.5	Able to understand the importance of different testing and debugging methods for product designing
C405A.6	Able to understand the importance of documentation for product design cycle

C405B	ARTIFICIAL INTELLIGENCE – ELECTIVE -II
C405B.1	To learn various types of algorithms useful in Artificial Intelligence
C405B.2	To convey the ideas in AI research and programming language related to emerging technology
C405B.3	To apply knowledge representation techniques and problem solving strategies to common AI applications.
C405B.4	To understand the concepts of machine learning, pattern recognition, and natural language processing.
C405B.5	To understand the concepts of pattern recognition
C405B.6	To understand the concepts of natural language processing.

C405C	ELECTRONICS IN AGRICULTURE -ELECTIVE-II
C405C.1	Understand Role of computers & virtual instrumentation
C405C.2	Able to Provide communication solution for interpreting environmental parameters with Electronics systems
C405C.3	Describe Instrument technology used in agriculture
C405C.4	Apply knowledge of Electronics in Agriculture
C405C.5	Understand Greenhouse Technology
C405C.6	Understand role of Electronics Governance

C406	LAB PRACTICE -I COMPUTER NETWORKS & SECURITY PR
C406.1	To understand implementation & testing of LAN
C406.2	To understand Installation and configuration of server for different applications
C406.3	To Study different tools/ software for computer networking
C406.4	Study the fundamental theory & design of various radiating elements.
C406.5	To understand Analysis of waveguides and gain knowledge about Microwave Components
C406.6	To understand working principles of active & passive components of microwave systems, to various microwave measurement

C407	LAB PRACTICE II (VLSI + ELECTIVE I)
C407.1	To understand ucos 2 and rtlinus operating features (semaphore, mutex , mutlitasking).
C407.2	To use appropriate feature of LPC1768.
C407.3	To implement simple Arduino application.
C407.4	To understand CMOS circuit.
C407.5	To simulate and synthesis circuit with PLD Devices.
C407.6	To design simple VLSI application.
C407.7	Understand the concept of IOT and different boards using for IOT
C407.8	Student should be able to interface sensors and actuators with Arduino/RaspberryPi board
C407.9	Able to design IOT applications using different IOT boards

C408	PROJECT PHASE -I
C408.1	Apply critical and creative thinking in the design of complex/multi-disciplinary engineering projects facilitating to society.
C408.2	As a team Plan and manage your time effectively
C408.3	Formulate the business context and commercial positioning of designed devices or systems

FINAL YEAR COURSE OUTCOME

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SEMESTER - II

C409	MOBILE COMMUNICATION
C409.1	To understand switching techniques for voice and data traffic.
C409.2	To nurture students with knowledge of traffic engineering to design networks.
C409.3	To realize importance of cellular concepts and its propagation mechanism.
C409.4	To understand architecture of GSM system
C409.5	To understand GPRS, SMS GSM system channels, used for communication
C409.6	To overview 4G LTE and 5G technologies

C410	BROADBAND COMMUNICATION SYSTEMS
C410.1	Understand the basic components of fiber optic communication link.
C410.2	Carry out Link power budget and Rise Time Budget analysis by proper selection of components and check its viability.
C410.3	Understand the system design issues and the role of WDM components in advanced light wave systems.
C410.4	Understand the basics of orbital mechanics and the look angles from ground stations to the satellite.
C410.5	Understand satellite subsystems like Attitude and control systems (AOCS), Telemetry, Tracking, Command and Monitoring, Power systems, Communication subsystems.
C410.6	Carry out Satellite Link design for Up Link and Down Link.

C411	PLC S AND AUTOMATION - ELECTIVE III
C411.1	Understand process control and industrial automation
C411.2	Develop signal conditioning for industrial applications using standards
C411.3	Understand controllers and actuators using for industrial applications
C411.4	Understand PLC architecture and Develop PLC ladder programs for simple industrial applications
C411.5	Understand SCADA architecture and its industrial applications
C411.6	Understand basics of CNC machine and industrial communication

C412	ROBOTICS - ELECTIVE IV
C412.1	Familiar with the history, concept development and key components of robotics technologies.
C412.2	Select proper drivers and sensor for particular robot-application..
C412.3	Select proper end effectors and actuators for particular robot-application..
C412.4	Implement basic mathematics manipulations of spatial coordinate representation and transformation.
C412.5	Understand different robot programming methods and algorithms
C412.6	Design models for mechanic arms and lifting systems

C413	LAB PRACTICE-III (MC+BCS)
C413.1	Understand AT commands for voice and data operation, VoIP call routing process, PSTN switch
C413.2	Analyze Lost call system/delay system of voice/data traffic, bit error rate in presence of AWGN, GMSK/QPSK/QAM Modulation
C413.3	Measure bit error rate in presence of Hata/ Multipath propagation model for Link budget, Multiple access techniques such as TDMA/CDMA/OFDMA. Visit to Mobile Telephone Switching Office (MTSO).
C413.4	Understand Numerical aperture of optical fiber & characteristics of various sources and detectors.
C413.5	Analyze optical fiber attenuation, Power and time budget, direct communication link between Uplink Transmitter and Downlink Receiver
C413.6	Create AUDIO-VIDEO satellite link between Transmitter and Receiver

C414	LAB PRACTICE IV (ELECTIVE III)
C414.1	Understand PLC architecture
C414.2	Develop PLC ladder programs for simple industrial applications
C414.3	Design Automation systems for industrial applications
C414.4	Implement the Engineering Automation using PLC approach.

C415	PROJECT PHASE -II
C415.1	Apply knowledge to the 'real world' situations that a professional engineer can encounter.
C415.2	Use fundamental knowledge and skills along with ethics in engineering and apply it effectively on a multi-disciplinary environment.
C415.3	Design and develop a functional product prototype while working in a team considering environmental constraints.
C415.4	Timely reflect on your own and peers technical and non-technical learning
C415.5	Present and demonstrate your proto type to peers, academics, general and industry community.