2.6.1: Teachers and students are aware of the stated Programme and course outcomes of the Programmes offered by the institution.

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1. LIST OF PROGRAM OUTCOMES AND COURSE OUTCOMES

1.1 Bachelor of Electronics Engineering

PROGRAMME NAME: Electronics Engineering.

PROGRAMME CODE: 318537610

PROGRAMME OUTCOMES

PO	DESCRIPTION
PO1	**Engineering knowledge**: Apply 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 specified needs with appropriate consideration for 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	**Ethics**: 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.

PROGRAMME SPECIFIC OUTCOMES

PSO	DESCRIPTION
PSO1	Graduates will be able to apply the fundamentals of analog electronics and digital electronics systems.
PSO2	Design a variety of Hardware and Software based systems for applications in the fields of communication, networking, power electronics and control systems.

COURSE OUTCOMES
SEMESTER - III
COURSE NAME:Electronic Devices & Circuits - I(ELC302)

CO	DESCRIPTION
CO1	Explain working of semiconductor devices.
CO2	Analyze characteristics of semiconductor devices.
CO3	Perform DC and AC analysis of Electronics circuits.
CO4	Compare various biasing circuits as well as various configurations of BJT and MOSFETs.
CO5	Select the best circuit for the given specifications/application.
CO6	Design electronics circuits for given specifications.

SEMESTER - III

COURSE NAME:Electrical Network Analysis & Synthesis(ELC304)

CO	DESCRIPTION
CO1	Explain basic electrical circuits with nodal and mesh analysis and apply network theorems.
CO2	Apply Laplace Transform for steady state and transient analysis.
CO3	Determine different network functions and solve complex circuits using network parameters.
CO4	Realize electrical networks for given network functions using synthesis concepts.
CO5	Design various types of filters.

SEMESTER - IV

COURSE NAME:Microcontroller Applications(ELC403)

CO	DESCRIPTION
CO1	To explain fundamental concepts of microcontrollers.
CO2	To develop programming skills for microcontrollers using Assembly and C concepts.
CO3	To interface various devices to the microcontroller.
CO4	To design and implement microcontroller-based systems.

SEMESTER - IV

COURSE NAME:Principles of Communication Engineering(ELC404)

CO	DESCRIPTION
CO1	Describe the various elements of the communication system.
CO2	Recognize the need for multiplexing techniques
CO3	Analyze the performance of different analog modulation methods.
CO4	Illustrate generation and detection of amplitude and frequency modulated systems.
CO5	Characterize pulse modulation techniques.

SEMESTER - V

COURSE NAME:Electromagnetic Engineering(ELX503)

CO	DESCRIPTION
CO1	Analyze the behaviour of electromagnetic waves in different media.
CO2	Evaluate various parameters of transmission lines and radiating systems.
CO3	Apply computational techniques to analyze electromagnetic field distribution.
CO4	Understand different mechanisms of radio wave propagation.

SEMESTER - V

COURSE NAME: Design with Linear Integrated Circuits(ELX504)

CO	DESCRIPTION
CO1	Demonstrate an understanding of fundamentals of integrated circuits.
CO2	Analyze the various applications and circuits based on particular linear integrated circuits.
CO3	Select and use an appropriate integrated circuit to build a given application.
CO4	Design an application with the use of an integrated circuit.

SEMESTER - VI

COURSE NAME:VLSI Design(ELX 603)

CO	DESCRIPTION
CO1	Demonstrate a clear understanding of choice of technology, scaling, MOS models and system level design issues.
CO2	Design and analyze MOS based inverters.
CO3	Design MOS based circuits with different design styles.
CO4	Design semiconductor memories, adders and multipliers.

SEMESTER - VI

COURSE NAME:Microwave Engineering(ELX6021)

CO	DESCRIPTION
CO1	Understand the importance and applications of microwaves.

CO2	Explain the process of generation and amplification of microwaves.
CO3	Analyse the electromagnetic field distribution in various microwave components.
CO4	Measure various microwave parameters.

SEMESTER - VII
COURSE NAME:Power Electronics(ELX702)

CO	DESCRIPTION
CO1	Discuss trade-offs involved in power semiconductor devices.
CO2	Design of triggering, commutation and protection circuits for SCRs.
CO3	Analyse different types of single-phase rectifiers and DC-DC converters .
CO4	Analyse different types of DC-AC converters (inverters).
CO5	Analyse different types of AC Voltage Controllers and Cycloconvertors.

SEMESTER - VII
COURSE NAME:NEURAL NETWORKS & FUZZY LOGIC(ELXDLO7031)

CO	DESCRIPTION
CO1	Choose between different types of neural networks.
CO2	Design a neural network for a particular application.
CO3	Understand the applications of neural networks.
CO4	Appreciate the need for fuzzy logic and control.

SEMESTER -VIII
COURSE NAME:Internet of Things(ELX 801)

CO	DESCRIPTION
CO1	Understand the concepts of Internet of Things.
CO2	Analyze basic web connectivity in IoT.
CO3	Understand Data handling in IoT.

CO4	Design basic applications based on IoT using specific components.

SEMESTER - VIII

COURSE NAME:Analog and Mixed VLSI Design(ELX802)

CO	DESCRIPTION
CO1	Discuss trade offs involved in analog VLSI Circuits.
CO2	Analyze building blocks of CMOS analog VLSI circuits.
CO3	Design building blocks of CMOS analog VLSI circuits.
CO4	Carry out verifications of issues involved in analog and mixed signal circuits.

1.2 Bachelor of Computer Engineering

PROGRAMME NAME: Computer Engineering

PROGRAMME CODE: 318524510

PROGRAMME OUTCOMES

PO	DESCRIPTION
PO1	**Engineering knowledge**: Apply 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 specified needs with appropriate consideration for 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.
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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.

PROGRAMME SPECIFIC OUTCOMES

PSO	DESCRIPTION
PSO1	**Professional Skills** - The ability to develop programs for computer based systems of varying complexity and domains using standard practices.
PSO2	**Successful Career** - The ability to adopt skills, languages, environment and platforms for creating innovative career paths, being successful entrepreneurs or for pursuing higher studies.

COURSE OUTCOMES
SEMESTER - III
COURSE NAME: Data Structure(CSC303)

CO	DESCRIPTION
CO1	Students will be able to implement Linear and Non-Linear data structures.
CO2	Students will be able to handle various operations like searching, insertion, deletion and traversals on various data structures.
CO3	Students will be able to explain various data structures, related terminologies and its types.
CO4	Students will be able to choose appropriate data structure and apply it to solve problems in various domains.
CO5	Students will be able to analyze and Implement appropriate searching techniques for a given problem.
CO6	Students will be able to demonstrate the ability to analyze, design, apply and use data structures to solve engineering problems and evaluate their solutions.

SEMESTER - III

COURSE NAME:Computer Graphics(CSC305)

CO	DESCRIPTION
CO1	Describe the basic concepts of Computer Graphics.
CO2	Demonstrate various algorithms for basic graphics primitives.
CO3	Apply 2-D geometric transformations on graphical objects.
CO4	Use various Clipping algorithms on graphical objects.
CO5	Explore 3-D geometric transformations, curve representation techniques and projections methods.
CO6	Explain visible surface detection techniques and Animation.

SEMESTER - IV

COURSE NAME:Database Management System(CSC403)

CO	DESCRIPTION
CO1	Recognize the need for a database management system.
CO2	Design ER and EER diagrams for real life applications.
CO3	Construct relational models and write relational algebra queries.
CO4	Formulate SQL queries.
CO5	Apply the concept of normalization to relational database design.
CO6	Describe the concept of transaction, concurrency and recovery.

SEMESTER - IV

COURSE NAME:Operating System(CSC404)

CO	DESCRIPTION
CO1	Understand the objectives, functions and structure of the OS.
CO2	Analyze the concept of process management and evaluate performance of process scheduling algorithms.

CO3	Understand and apply the concepts of synchronization and deadlocks.
CO4	Evaluate performance of Memory allocation and replacement policies.
CO5	Understand the concepts of file management.
CO6	Apply concepts of I/O management and analyze techniques of disk scheduling.

SEMESTER - V

COURSE NAME:Computer Network (CSC 503)

CO	DESCRIPTION
CO1	Demonstrate the concepts of data communication at the physical layer and compare ISO - OSI model with TCP/IP model.
CO2	Demonstrate the knowledge of networking protocols at the data link layer.
CO3	Design the network using IP addressing and subnetting / supernetting schemes.
CO4	Analyze various routing algorithms and protocols at the network layer.
CO5	Analyze transport layer protocols and congestion control algorithms.
CO6	Explore protocols at the application layer.

SEMESTER - V

COURSE NAME:Multimedia System (CSDLO5011)

CO	DESCRIPTION
CO1	To identify basics of multimedia and multimedia system architecture.
CO2	To understand different multimedia components.
CO3	To explain file formats for different multimedia components.
CO4	To analyze the different compression algorithms.
CO5	To describe various multimedia communication techniques.
CO6	To apply different security techniques in a multimedia environment.

SEMESTER - VI

COURSE NAME:Cryptography and System Security (CSC604)

CO	DESCRIPTION
CO1	Understand system security goals and concepts, classical encryption techniques and acquire fundamental knowledge on the concepts of modular arithmetic and number theory.
CO2	Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication.
CO3	Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.
CO4	Apply different digital signature algorithms to achieve authentication and design secure applications.
CO5	Understand network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP.
CO6	Analyze and apply system security concepts to recognize malicious code.

SEMESTER - VI

COURSE NAME:Machine Learning(CSDLO6021)

CO	DESCRIPTION
CO1	Gain knowledge about basic concepts of Machine Learning.
CO2	Identify machine learning techniques suitable for a given problem.
CO3	Solve the problems using various machine learning techniques.
CO4	Apply Dimensionality reduction techniques.
CO5	Design application using machine learning techniques.

SEMESTER - VII

COURSE NAME:Artificial Intelligence & Soft Computing (CSC703)

CO	DESCRIPTION
CO1	Identify the various characteristics of Artificial Intelligence and Soft Computing techniques.
CO2	Choose an appropriate problem solving method for an agent to find a sequence of

	actions to reach the goal state.
CO3	Analyse the strength and weakness of AI approaches to knowledge representation, reasoning and planning.
CO4	Construct supervised and unsupervised ANN for real world applications.
CO5	Design fuzzy controller system.
CO6	Apply Hybrid approach for expert system design.

SEMESTER - VII

COURSE NAME:Advanced System Security and Digital Forensics(CSDLO7031)

CO	DESCRIPTION
CO1	Understand cyber attacks and apply access control policies and control mechanisms.
CO2	Identify malicious code and targeted malicious code.
CO3	Detects and counter threats to web applications.
CO4	Understand the vulnerabilities of Wi-Fi networks and explore different measures to secure wireless protocols, WLAN and VPN networks.
CO5	Understand the ethical and legal issues associated with cyber crimes and be able to mitigate the impact of crimes with suitable policies.
CO6	Use different forensic tools to acquire and duplicate data from compromised ystems and analyse the same.

SEMESTER -VIII

COURSE NAME:Human Machine Interaction(CSC801)

CO	DESCRIPTION
CO1	Identify User Interface (UI) design principles.
CO2	Analysis of effective user friendly interfaces.
CO3	Apply Interactive Design process in real world applications.
CO4	Evaluate UI design and justify.
CO5	Create application for social and technical task.

SEMESTER - VIII

COURSE NAME:Distributed Computing(CSC802)

CO	DESCRIPTION
CO1	Demonstrate knowledge of the basic elements and concepts related to distributed system technologies.
CO2	Illustrate the middleware technologies that support distributed applications such as RPC, RMI and Object based middleware.
CO3	Analyze the various techniques used for clock synchronization and mutual exclusion.
CO4	Demonstrate the concepts of Resource and Process management and synchronization algorithms.
CO5	Demonstrate the concepts of Consistency and Replication Management.
CO6	Apply the knowledge of Distributed File System to analyze various file systems like NFS, AFS and the experience in building large-scale distributed applications.

1.3 Bachelor of Instrumentation Engineering

PROGRAMME NAME: Bachelor of Instrumentation Engineering

PROGRAMME CODE: 318546610

PROGRAMME OUTCOMES

PO	DESCRIPTION
PO1	**Engineering knowledge**: Apply 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 specified needs with appropriate consideration for 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	**Ethics**: 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.

PROGRAMME SPECIFIC OUTCOMES

PSO	DESCRIPTION
PSO1	Apply the concepts of measurement using various sensors/transducers along with associated signal processing for controlling machines or processors using automation tools like PLC, DCS with proper planning and documentation.
PSO2	Apply the concept of automatic control including measurement, feedback and feed forward regulation for the operation of continuous and discrete systems using mathematics as the basis of modeling and design.
PSO3	Apply the concepts of physics, chemistry and electricity/electronics to measurement, control and communication for design and implementation of various instruments and systems utilizing analog and/or digital circuits and control devices.

COURSE OUTCOMES
SEMESTER - III
COURSE NAME: Transducers-I(ISC302)

CO	DESCRIPTION
CO1	Explain the measurement systems, sources errors of measurement.
CO2	List and compare various standards used for selection of transducers/sensors.
CO3	Describe the working principles of various displacement sensors and transducers.
CO4	Interpret and apply different temperature transducers/sensors for industrial applications.
CO5	Formulate and Design the solutions for given applications using appropriate level sensors and transducer.

CO6	Apply the techniques of speed and vibration measurement in different industries.

SEMESTER - III

COURSE NAME:Electrical Networks and Measurements(ISC305)

CO	DESCRIPTION
CO1	Analyze AC and DC circuits using different theorems.
CO2	Evaluate transient and steady-state the parameters of passive electrical networks.
CO3	Analyze network using poles and zeros and determine their parameters like Z, Y, and ABCD.
CO4	Synthesize the networks using canonical forms.
CO5	Demonstrate construction and working principle and applications of analog and digital instruments.
CO6	Formulate electrical bridges and evaluate electrical parameters like R, L, C.

SEMESTER - IV

COURSE NAME:Transducer -II(ISC402)

CO	DESCRIPTION
CO1	Explain the working principle of strain gauges.
CO2	Explain the working principle of pressure transducers.
CO3	Learn transducers for vacuum measurement.
CO4	Identify types of flow and use different transducers for flow measurement.
CO5	Explain the terminologies of electrochemical sensors and their applications in industry.
CO6	Identify sensors for power, density, humidity, pH measurement.

SEMESTER - IV

COURSE NAME:Feedback Control System(ISC403)

CO	DESCRIPTION

CO1	Identify open and closed loop control system.
CO2	Formulate mathematical model for physical systems.
CO3	Simplify representation of complex systems using reduction techniques.
CO4	Use standard test signals to identify performance characteristics of first and second-order systems.
CO5	Apply root locus technique for stability analysis.
CO6	Analyze performance characteristics of the system using Frequency response methods.

SEMESTER - V

COURSE NAME:Control System Design(ISC503)

CO	DESCRIPTION
CO1	Obtain state-space model of electrical circuits, translational/rotational mechanical systems and electromechanical systems etc with emphasis on linear time-invariant systems.
CO2	Obtain solution of state equations by using Laplace transform methods, Cayley Hamilton method etc.
CO3	Examine system for its stability, controllability and observability and design controller and observer with given transient specifications.
CO4	Design Lead, Lag and Lead –lag compensator using time domain method.
CO5	Design Lead, Lag and Lead –lag compensator using frequency domain method.
CO6	Study the PID controller tuning by Ziegler Nicholas and Cohen-coon methods.

SEMESTER - V

COURSE NAME:Control System Components(ISC504)

CO	DESCRIPTION
CO1	Study, select & implement various pneumatic system components & circuits.
CO2	Select & Compare various control systems like Hydraulic, pneumatic & electric.
CO3	Apply knowledge to classify, select & use various Transmitters.

CO4	Select, classify & use various control valves & their accessories.
CO5	Describe the Need of Auxiliary process control components & study their industrial usage.
CO6	Apply knowledge of Industrial Control Components & their application.

SEMESTER - VI

COURSE NAME:Process Instrumentation System(ISC601)

CO	DESCRIPTION
CO1	Understand & Learn Process Control Terminologies, Process Dynamics & their mathematical model.
CO2	Understand different types of control actions & their selection.
CO3	Learn Features & Classify controllers like electronic, pneumatic and hydraulic & their Tuning Techniques.
CO4	Learn various process control schemes & their applications and selection.
CO5	Understand Multivariable Control systems & their Interaction.
CO6	Develop relay logic for various processes & symbols.

SEMESTER - VI

COURSE NAME:Industrial Data Communication(ISC602)

CO	DESCRIPTION
CO1	Explain the importance of modulation in communication.
CO2	Examine the importance of OSI,TCP/IP model,and various networking components.
CO3	Compare the different types of networks at various levels of field communication.
CO4	Use HART for communication.
CO5	Establish Foundation fieldbus communication.
CO6	Investigate the various wireless devices.

SEMESTER - VII

COURSE NAME:Biomedical Instrumentation(ISC702)

CO	DESCRIPTION
CO1	To identify various Bio-potential with their specifications and perform their measurements.
CO2	To discuss various Physiological systems and to identify their parameters and related measurements.
CO3	To explain the principle and working of various cardiovascular parameters and their measurement techniques with applications.
CO4	To relate between the different life support instruments and to describe their applications.
CO5	To distinguish between the various medical imaging techniques based on the principles and concepts involved in them.
CO6	To describe the significance of electrical safety in biomedical measurement.

SEMESTER - VII

COURSE NAME:Industrial Automation(ISC703)

CO	DESCRIPTION
CO1	Describe automation, need, importance and applications in industry.
CO2	Identify components of PLC, and develop PLC ladder using instructions of PLC and design PLC based application by proper selection and sizing criteria.
CO3	Explain evolution and architecture of DCS, hierarchical control in DCS, programming DCS through Function Block Diagram (FBD) method.
CO4	Describe SCADA architecture, communication in SCADA and develop any application based on SCADA along with GUI using SCADA software.
CO5	Explain database and alarm management system.
CO6	Recognize the need of SIS and describe risk reduction methods.

SEMESTER -VIII

COURSE NAME:Instrumentation Project Documentation and Execution(ISC801)

CO	DESCRIPTION
CO1	Interpret types of project and execute it by knowing relationship between customer, designer and constructor.

CO2	Use standards in instrumentation project.
CO3	Design engineering documents such as loop diagram, hook-up, JB schedule.
CO4	Develop and test system integration.
CO5	Schedule and evaluate activities like procurement, commissioning, installation.
CO6	Support and evaluate documentation software packages used in industry.

SEMESTER - VIII

COURSE NAME:Instrument and System Design(ISC802)

CO	**DESCRIPTION**
CO1	Select, design and calibrate transducers
CO2	Select and size control valves and actuators.
CO3	Apply knowledge to size the control panels.
CO4	Apply knowledge to design electronic product and enclosure design.
CO5	Describe the terms used in Reliability engineering.
CO6	Apply knowledge in designing control room layout and its environment.

1.4 Bachelor of Electronics and telecommunication Engineering

PROGRAMME NAME: Electronics and Telecommunication Engineering.

PROGRAMME CODE: 318537210

PROGRAMME OUTCOMES

PO	DESCRIPTION
PO1	**Engineering knowledge**: Apply 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 specified needs with appropriate consideration for 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.
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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	**Ethics**: 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.

PROGRAMME SPECIFIC OUTCOMES

PSO	DESCRIPTION
PSO1	Apply their electronics and communication fundamentals to develop prototypes using analysis, synthesis, programming skills and realization.
PSO2	To demonstrate the ability to develop engineering solutions for modern electronics and communication problems of the industry.

COURSE OUTCOMES
SEMESTER - III
COURSE NAME: Electronic Devices & Circuits(ECC302)

CO	DESCRIPTION
CO1	Know functionality and applications of various electronic devices.
CO2	Explain working of various electronics devices with the help of V-I characteristics.
CO3	Derive expressions for performance parameters of BJT and MOSFET circuits.
CO4	Evaluate performance of Electronic circuits (BJT and MOSFET based).
CO5	Select appropriate circuit for given application.
CO6	Design electronic circuit (BJT, MOSFET based) circuits for given specifications.

SEMESTER - III
COURSE NAME:Network Theory(ECC304)

CO	DESCRIPTION
CO1	Apply their knowledge in analyzing Circuits by using network theorems.
CO2	Apply the time and frequency method of analysis.
CO3	Evaluate circuit using graph theory
CO4	Find the various parameters of two port networks.
CO5	Apply network topology for analyzing the circuit.
CO6	Synthesize the network using passive elements.

SEMESTER - IV

COURSE NAME:Linear Integrated Circuits(ECC403)

CO	DESCRIPTION
CO1	Outline and classify all types of integrated circuits.
CO2	Understand the fundamentals and areas of applications for the integrated circuits.
CO3	Develop the ability to design practical circuits that perform the desired operations.
CO4	Understand the differences between theoretical & practical results in integrated circuits.
CO5	Identify the appropriate integrated circuit modules for designing engineering applications.

SEMESTER - IV

COURSE NAME:Principles of Communication Engineering(ECC405)

CO	DESCRIPTION
CO1	Understand the basic components and types of noises in communication system.
CO2	Analyze the concepts of amplitude modulation and demodulation.
CO3	Analyze the concepts of angle modulation and demodulation.
CO4	Compare the performance of AM and FM receivers.
CO5	Describe analog and digital pulse modulation techniques.
CO6	Illustrate the principles of multiplexing and demultiplexing techniques.

SEMESTER - V

COURSE NAME:Discrete Time Signal Processing(ECC504)

CO	DESCRIPTION
CO1	Understand the concepts of discrete-time Fourier transform and fast Fourier transform.
CO2	Apply the knowledge of design of IIR digital filters to meet arbitrary specifications.
CO3	Apply the knowledge of design of FIR digital filters to meet arbitrary specifications.
CO4	Analyze the effect of hardware limitations on performance of digital filters.
CO5	Apply the knowledge of DSP processors for various applications.

SEMESTER - V

COURSE NAME: Data Compression & Encryption(ECCDLO5014)

CO	DESCRIPTION
CO1	Implement text, audio and video compression techniques.
CO2	Understand Symmetric and Asymmetric Key Cryptography schemes.
CO3	Understand network security.

SEMESTER - VI

COURSE NAME:Computer Communication Networks(ECC602)

CO	DESCRIPTION
CO1	Design a small or medium sized computer network including media types, end devices, and interconnecting devices that meets a customer‘s specific needs.
CO2	Perform basic configurations on routers and Ethernet switches.
CO3	Demonstrate knowledge of programming for network communications.
CO4	Learn to simulate computer networks and analyse the simulation results.
CO5	Troubleshoot connectivity problems in a host occurring at multiple layers of the OSI model.
CO6	Develop knowledge and skills necessary to gain employment as computer network engineer and network administrator.

SEMESTER - VI

COURSE NAME:Antenna & Radio Wave Propagation(ECC603)

CO	DESCRIPTION
CO1	Define Basic antenna parameters like radiation pattern, directivity and gain.
CO2	Derive the field equations for the basic radiating elements like linear wire antenna and loop antenna.
CO3	Design of uniform linear and planar antenna arrays using isotropic and directional Sources.
CO4	Implement special types of Antennas like microstrip antennas and reflectors.

SEMESTER - VII

COURSE NAME:Mobile Communication System(ECC702)

CO	DESCRIPTION
CO1	Explain the cellular fundamentals and estimate the coverage and capacity of cellular systems.
CO2	Classify different types of propagation models and analyze the link budget.
CO3	Illustrate the fundamentals and system architecture of GSM, 2.5G and IS-95.
CO4	Apply the concepts of 3G technologies of UMTS and CDMA 2000.
CO5	Elaborate the principles of 3GPP LTE.
CO6	Identify the emerging technologies for upcoming mobile communication systems.

SEMESTER - VII

COURSE NAME:Optical Communication(ECC703)

CO	DESCRIPTION
CO1	List, write and explain fundamentals and transmission characteristics of optical fiber Communication.
CO2	List, write and explain principles and characteristics of various sources ,detectors and various fiber optic components.

CO3	Calculate parameters for optical link budgeting and analyze the link.

SEMESTER -VIII

COURSE NAME:RF Design(ECC801)

CO	**DESCRIPTION**
CO1	Design impedance matching networks and passive RF filters.
CO2	Design and appraise RF amplifiers and oscillators.
CO3	Analyze EMI and EMC in RF circuits.

SEMESTER - VIII

COURSE NAME:Satellite Communication(ECCDLO8043)

CO	**DESCRIPTION**
CO1	Explain basics of satellite communication, space segment and earth segment.
CO2	Understand different satellite orbits and orbital parameters.
CO3	Explain and analyze link budget of satellite signal for proper communication.
CO4	Understand various applications of satellite communications.

1.5 Bachelor of Information Technology

PROGRAMME NAME: Information Technology

PROGRAMME CODE: 318524610

PROGRAMME OUTCOMES

PO	DESCRIPTION
PO1	**Engineering knowledge**: Apply 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 specified needs with appropriate consideration for 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	**Ethics**: 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.

PROGRAMME SPECIFIC OUTCOMES

PSO	DESCRIPTION
PSO1	Professional Skills - The ability to develop programs for computer based systems of varying complexity and domains using standard practices.
PSO2	Successful Career – The ability to adopt skills, languages, environment and platforms for creating innovative career paths, being successful entrepreneurs or for pursuing higher studies.

COURSE OUTCOMES
SEMESTER - III
COURSE NAME: Data Structure and Analysis(ITC302)

CO	DESCRIPTION
CO1	Classify and Apply the concepts of stacks, queues and linked list in real life problem solving.
CO2	Classify, apply and analyze the concepts trees in real life problem solving.
CO3	Illustrate and justify the concepts of graphs in real life problem solving.
CO4	List and examine the concepts of sorting, searching techniques in real life problem solving.
CO5	Use and identify the concepts of recursion, hashing in real life problem solving.

CO6	Examine and justify different methods of stacks, queues, linked list, trees and graphs to various applications.

SEMESTER - III
COURSE NAME:Database Management System(ITC303)

CO	DESCRIPTION
CO1	Identify the need of Database Management System.
CO2	Design conceptual model for real life applications.
CO3	Create Relational Model for real life applications
CO4	Formulate query using SQL commands.
CO5	Apply the concept of normalization to relational database design.
CO6	Demonstrate the concept of transaction, concurrency and recovery.

SEMESTER - IV
COURSE NAME:Operating System(ITC403)

CO	DESCRIPTION
CO1	Understand the basic concepts related to Operating Systems.
CO2	Describe the process management policies and illustrate scheduling of processes by CPU.
CO3	Explain and apply synchronization primitives and evaluate deadlock conditions as handled by the Operating System.
CO4	Describe and analyze the memory allocation and management functions of Operating System.
CO5	Analyze and evaluate the services provided by Operating System for storage management.
CO6	Compare the functions of various special-purpose Operating Systems.

SEMESTER - IV
COURSE NAME:Automata Theory(ITC404)

CO	DESCRIPTION

CO1	Explain, analyze and design Regular languages, Expression and Grammars.
CO2	Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.
CO3	Analyze and design Context Free languages and Grammars.
CO4	Design different types of Push down Automata as Simple Parser.
CO5	Design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine.
CO6	Develop understanding of applications of various Automata.

SEMESTER - V

COURSE NAME:Advanced Data Management Technology(ITC503)

CO	DESCRIPTION
CO1	Explain and understand the concept of a transaction and how ACID properties are maintained when concurrent transactions occur in a database.
CO2	Measure query costs and design alternate efficient paths for query execution.
CO3	Apply sophisticated access protocols to control access to the database.
CO4	Implement alternate models like Distributed databases and Design applications using advanced models like mobile, spatial databases.
CO5	Organize strategic data in an enterprise and build a data Warehouse.
CO6	Analyze data using OLAP operations so as to take strategic decisions.

SEMESTER - V

COURSE NAME:Cryptography & Network Security(ITC504)

CO	DESCRIPTION
CO1	Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory.
CO2	Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication.
CO3	Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message

	sizes.
CO4	Apply different digital signature algorithms to achieve authentication and create secure applications.
CO5	Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP.
CO6	Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure applications.

SEMESTER - VI

COURSE NAME:Software Engineering with Project Management(ITC601)

CO	DESCRIPTION
CO1	Define various software application domains and remember different process model used in software development.
CO2	Explain needs for software specifications also they can classify different types of software requirements and their gathering techniques.
CO3	Convert the requirements model into the design model and demonstrate use of software and user-interface design principles.
CO4	Distinguish among SCM and SQA and can classify different testing strategies and tactics and compare them.
CO5	Justify the role of SDLC in Software Project Development and they can evaluate the importance of Software Engineering in PLC.
CO6	Generate project schedules and can construct, design and develop network diagrams for different types of Projects. They can also organize different activities of the project as per Risk impact factor.

SEMESTER - VI

COURSE NAME:Cloud Computing & Services(ITC603)

CO	DESCRIPTION
CO1	Define Cloud Computing and memorize the different Cloud service and deployment models.
CO2	Describe the importance of virtualization along with their technologies.

CO3	Use and Examine different cloud computing services.
CO4	Analyze the components of open stack & Google Cloud platform and understand Mobile Cloud Computing.
CO5	Describe the key components of Amazon web Service
CO6	Design & develop backup strategies for cloud data based on features.

SEMESTER - VII
COURSE NAME:Infrastructure Security(ITC702)

CO	**DESCRIPTION**
CO1	Understand the concept of vulnerabilities, attacks and protection mechanisms.
CO2	Analyze and evaluate software vulnerabilities and attacks on databases and operating systems.
CO3	Explain the need for security protocols in the context of wireless communication.
CO4	Understand and explain various security solutions for Web and Cloud infrastructure.
CO5	Understand, and evaluate different attacks on Open Web Applications and Web services.
CO6	Design appropriate security policies to protect infrastructure components.

SEMESTER - VII
COURSE NAME:Artificial Intelligence(ITC703)

CO	**DESCRIPTION**
CO1	Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
CO2	Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
CO3	Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing.
CO4	Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
CO5	Formulate and solve problems with uncertain information using Bayesian

	approaches.
CO6	Apply the concept Natural Language processing to problems leading to understanding of cognitive computing.

SEMESTER -VIII
COURSE NAME:Big Data Analytics(ITC801)

CO	DESCRIPTION
CO1	Explain the motivation for big data systems and identify the main sources of Big Data in the real world.
CO2	Demonstrate an ability to use frameworks like Hadoop, NOSQL to efficiently store, retrieve and process Big Data for Analytics.
CO3	Implement several Data Intensive tasks using the Map Reduce Paradigm.
CO4	Apply several newer algorithms for Clustering Classifying and finding associations in Big Data.
CO5	Design algorithms to analyze Big data like streams, Web Graphs and Social Media data.
CO6	Design and implement successful Recommendation engines for enterprises.

SEMESTER - VIII
COURSE NAME:Internet of Everything(ITC802)

CO	DESCRIPTION
CO1	Apply the concepts of IOT.
CO2	Identify the different technologies.
CO3	Apply IOT to different applications.
CO4	Analysis and evaluate protocols used in IOT.
CO5	Design and develop smart cities in IOT.
CO6	Analysis and evaluate the data received through sensors in IOT.

1.6 Master of Electronics and Telecommunication Engineering

PROGRAMME NAME: Master of Electronics and Telecommunication Engineering

PROGRAMME CODE: 318537210

PROGRAMME OUTCOMES

PO	DESCRIPTION
PO1	An ability to independently carry out research /investigation and development work to solve practical problems.
PO2	An ability to write and present a substantial technical report or document.
PO3	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

PROGRAMME SPECIFIC OUTCOMES

PSO	DESCRIPTION
PSO1	Apply their electronics and communication fundamentals to develop innovative solutions using analysis, synthesis, programming skills and realization.
PSO2	To demonstrate the ability to propose, present and develop engineering solutions of societal problems using signal processing, communication, networking, embedded systems, artificial intelligence and machine learning.

COURSE OUTCOMES
SEMESTER - I
COURSE NAME:Statistical Signal Processing(ETC101)

CO	DESCRIPTION
CO1	Understand basics of linear algebra in communication engineering.
CO2	Apply appropriate statistical tools for handling design and analysis of systems that involve randomness.

CO3	Analyze random processes for LTI systems and estimation theory.
CO4	Evaluate role of probability models in engineering design.

SEMESTER - I

COURSE NAME:Next Generation Networks(ETDLO1011)

CO	DESCRIPTION
CO1	Relate and compare the core differences between traditional and new telecommunication technologies.
CO2	Analyze, implement and apply the components of NGN architecture with NGN standards.

SEMESTER - II

COURSE NAME:Wireless Adhoc and Sensor Networks(ETC202)

CO	DESCRIPTION
CO1	Understand and explain the concept of adhoc and sensor networks and their applications.
CO2	Set up and evaluate performance of various protocols in wireless sensor and adhoc networks.
CO3	Understand TCP performance over adhoc network.
CO4	Understand integration of MANET, cellular Network and WLAN.

SEMESTER - II

COURSE NAME:RF and Microwave Engineering(ETC203)

CO	DESCRIPTION
CO1	Characterize devices at higher frequencies.
CO2	Design and analyze RF circuits and components.
CO3	Design and analyze amplifiers, oscillators and mixers at microwave frequencies.
CO4	Demonstrate skills of planning, design and deployment of microwave networks.

1.7 Master of Information Technology Engineering

PROGRAMME NAME: Master of Information Technology

PROGRAMME CODE: 318524610

PROGRAMME OUTCOMES

PO	DESCRIPTION
PO1	An ability to independently carry out research /investigation and development work to solve practical problems.
PO2	An ability to write and present a substantial technical report or document.
PO3	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

PROGRAMME SPECIFIC OUTCOMES

PSO	DESCRIPTION
PSO1	Professional Skills - The ability to develop programs for computer based systems of varying complexity and domains using standard practices.
PSO2	Successful Career – The ability to adopt skills, languages, environment and platforms for creating innovative career paths, being successful entrepreneurs or for pursuing higher studies.

COURSE OUTCOMES
SEMESTER - I
COURSE NAME:IT Infrastructure Design(ME-ITC102)

CO	DESCRIPTION
CO1	Design Enterprise wide network design considering various QoS Parameters.
CO2	Explain the design challenge of a large scale data center.

CO3	Implementation of SDN and how it will impact current Design practice.
CO4	Explain the latest trend in SDN.

SEMESTER - I

COURSE NAME:Advances in Software Engineering(ME-ITC103)

CO	DESCRIPTION
CO1	Compare and choose a process model for a software project development.
CO2	Analyze and model software requirements of a software system.
CO3	Design and Modeling of a software system with tools.
CO4	Prepare the SRS, Design document, Project plan of a given software system.

SEMESTER - II

COURSE NAME:Security & Risk Management(ME-ITC201)

CO	DESCRIPTION
CO1	Able to explain the knowledge about information security and Risk Management.
CO2	Able to analyze Risk assessment methodology and risk mitigation approaches.
CO3	Able to explain security management concepts and configuration management.
CO4	Able to explain IT audit and its activities.

SEMESTER - II

COURSE NAME:High Performance Computing(ME-ITC202)

CO	DESCRIPTION
CO1	Determine the complexity of a given parallel algorithm.
CO2	Identify design Issues and limitations in Parallel Computing.
CO3	Design algorithms suited for Multicore processor and GPU systems using CUDA, MPI, OpenMP.
CO4	Analyze and optimize performance parameters.

1.8 Master of Instrumentation and Control Engineering

PROGRAMME NAME: Master of Instrumentation Engineering

PROGRAMME CODE: 318546410

PROGRAMME OUTCOMES

PO	DESCRIPTION
PO1	An ability to independently carry out research /investigation and development work to solve practical problems.
PO2	An ability to write and present a substantial technical report or document.
PO3	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

PROGRAMME SPECIFIC OUTCOMES

PSO	DESCRIPTION
PSO1	Apply the concepts of measurement using various sensors/transducers along with associated signal processing for controlling machines or processors using automation tools like PLC, DCS with proper planning and documentation.
PSO2	Apply the concept of automatic control including measurement, feedback and feedforward regulation for the operation of continuous and discrete systems using mathematics as basis of modelling and design.
PSO3	Apply the concepts of physics, chemistry and electricity/electronics to measurement, control and communication for design and implementation of various instruments and systems utilising analog and/or digital circuits and control devices.

COURSE OUTCOMES
SEMESTER - I

COURSE NAME:Higher Mathematics for Control Engineering(ISEC101)

CO	DESCRIPTION
CO1	Demonstrate ability to solve systems of linear equations.
CO2	Demonstrate ability to work with Vector Spaces.
CO3	Demonstrate ability to get least square solutions to systems.
CO4	Demonstrate ability to effect linear transformation.

SEMESTER - I

COURSE NAME:Robust Control(ISEC103)

CO	DESCRIPTION
CO1	The students should be able to understand the robustness properties of the system against uncertainties.
CO2	Students should be able to design the robust control that overcomes parametric uncertainties.
CO3	Students should be able to design the internal model control for uncertain systems.
CO4	Students should be able to understand the concept of Quantitative feedback techniques.
CO5	Students should be able to design the sliding mode control for uncertain systems.

SEMESTER - II

COURSE NAME:State Estimation and Stochastic Processes(ISEC202)

CO	DESCRIPTION
CO1	The students should be able to understand the Stochastic Properties of random variables in terms of pdf.
CO2	Students should be able to understand the concept of stochastic processes.
CO3	Students should be able to understand the concept of least square estimation.
CO4	Students should be able to realize the significance of the Kalman filter and its applications to linear and nonlinear systems.

SEMESTER - II

COURSE NAME:Advanced Process Control and Automation(ISEC203)

CO	DESCRIPTION
CO1	The students should be able to design the process and behavioral model of the process.
CO2	The students should be able to select appropriate control configuration to minimize interaction between different loops.
CO3	The students should be able to design PLC and DCS based systems.
CO4	The students should be able to calculate Safety Integrity Level for a given process.

1.9 Masters in Computer Applications

PROGRAMME NAME: Masters in Computer Applications

PROGRAMME CODE: 318524110

PROGRAMME OUTCOMES

PO	DESCRIPTION
PO1	**Computational Knowledge:** Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
PO2	**Problem Analysis:** Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
PO3	**Design /Development of Solutions:** Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex Computing 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, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
PO6	**Professional Ethics:**Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.
PO7	**Life-long Learning:**Recognize the need, and have the ability to engage in independent learning for continual development as a computing professional.
PO8	**Project management and finance:**Demonstrate knowledge and understanding of the computing 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.
PO9	**Communication Efficacy:** Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
PO10	**Societal and Environmental Concern:** Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.
PO11	**Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
PO12	**Innovation and Entrepreneurship:** Identify a timely opportunity and use innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

PROGRAMME SPECIFIC OUTCOMES

PSO	DESCRIPTION
PSO1	The ability to develop and apply computer based applications of varying complexity and domains using standard practice.
PSO2	Demonstrate the ability to use the latest technology and tools in developing the software thus helping our product to be Employable and become a Successful Entrepreneur.

COURSE OUTCOMES
SEMESTER - I
COURSE NAME: Advanced Java(MCA12)

CO	DESCRIPTION
CO1	Demonstrate use of data structure and data manipulation concept using Java Collection Framework and Lambda expressions.
CO2	Create JSP using standard actions, custom tags, Introduction to JSP Standard Tag

	Library (JSTL) and JSTL Tags.
CO3	Understand and develop applications using Spring Framework, Lightweight Container and Dependency Injection with Spring.
CO4	Develop applications using Aspect Oriented Programming with Spring.
CO5	Apply JDBC Data Access with Spring and demonstrateData access operations with Jdbc Template and Spring.
CO6	Create Spring Boot Web Application and Spring Boot RESTful WebServices.

SEMESTER - I

COURSE NAME:Software Project Management(MCA14)

CO	DESCRIPTION
CO1	Define the key concepts of Software Project Management.
CO2	Demonstrate understanding of the requirements Analysis and Application of UML Models.
CO3	Make use of estimation logic for estimation of software size as well as cost of software.
CO4	Examine the need of change management during software development as well as application of quality tools.
CO5	Assess various factors influencing project management, quality assurance and risk assessment.
CO6	Develop process for successful quality project delivery.

SEMESTER - II

COURSE NAME: Artificial Intelligence And Machine Learning(MCA22)

CO	DESCRIPTION
CO1	Interpret Artificial Intelligence concepts intelligence concepts.
CO2	Apply Artificial intelligence techniques for problem solving.
CO3	Analyze the fundamentals of machine learning, the learning algorithms and the paradigms of supervised and unsupervised learning.
CO4	Identify methods to improve machine learning results for better predictive

	performance.

SEMESTER - II
COURSE NAME:Information Security(MCA23)

CO	DESCRIPTION
CO1	Discuss the requirement of information security , private and public key algorithms and to examine the mathematics of cryptography.
CO2	Analyze authentication and integrity techniques available.
CO3	Interpret the importance of firewalls and intrusion detection systems and signatures.
CO4	Relate to the security issues and technologies used in the web, internet, database and operating system.

SEMESTER - III
COURSE NAME:Big Data Analytics and Visualization(MCA31)

CO	DESCRIPTION
CO1	Demonstrate the key issues in big data management and its associated application for business decisions.
CO2	Develop problem solving and critical thinking skills in fundamental enabling techniques like Map Reduce , NoSQL, Hadoop Ecosystem.
CO3	Use of RDD and Dataframe to create Application in Spark.
CO4	Implement exploratory data analysis using visualization

SEMESTER - III
COURSE NAME:Distributed System and Cloud Computing(MCA32)

CO	DESCRIPTION
CO1	Illustrate principles and communication protocols of Distributed systems.
CO2	Analyze clock synchronization and various algorithms.
CO3	Analyze Distributed shared memory and management concepts.

CO4	Analyze Cloud computing and cloud models.

SEMESTER - IV
COURSE NAME: Internship(MCAI41)

CO	DESCRIPTION
CO1	Demonstrate skills to use modern tools, software and equipment to analyze problems.
CO2	Develop an exposure to real life organizational and environmental situations.
CO3	Apply SDLC phases in developing software projects and in writing the project document.
CO4	Create computing solutions for the real life problems as per the requirements of the domain.
CO5	Adapt professional and interpersonal ethics.

SEMESTER - IV
COURSE NAME:Research Paper (MCAR42)

CO	DESCRIPTION
CO1	Show data coherently, effectively and counter-hypothesis.
CO2	Apply experience in preparation of research material for publication or presentation.
CO3	Identify relevant previous work that supports their research.
CO4	Analyze data and synthesize research findings.
CO5	Create a research paper.

1.10 Bachelor of Artificial Intelligence and Data Science

PROGRAMME NAME: Artificial Intelligence and Data Science

PROGRAMME CODE: 318599510

PROGRAMME OUTCOMES

PO	DESCRIPTION
PO1	**Engineering knowledge**: Apply 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 specified needs with appropriate consideration for 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	**Ethics**: 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.

PROGRAMME SPECIFIC OUTCOMES

PSO	DESCRIPTION
PSO1	**Professional Skills:** Understand, analyze and develop essential proficiency in the areas related to artificial intelligence and data science like mathematics, computational methods and statistics.
PSO2	**Successful Career:** Ability to design and implement novel solutions using state of the art Artificial Intelligence and Data Science techniques such as Machine Learning, Reinforcement and Deep Learning, Natural Language Processing leading to successful careers.

COURSE OUTCOMES
SEMESTER - III
COURSE NAME:Data Structure(CSC303)

CO	DESCRIPTION
CO1	Students will be able to implement Linear and Non-Linear data structures.
CO2	Students will be able to handle various operations like searching, insertion, deletion and traversals on various data structures.
CO3	Students will be able to explain various data structures, related terminologies and its types.
CO4	Students will be able to choose appropriate data structure and apply it to solve problems in various domains.

CO5	Students will be able to analyze and Implement appropriate searching techniques for a given problem.
CO6	Students will be able to demonstrate the ability to analyze, design, apply and use data structures to solve engineering problems and evaluate their solutions.

COURSE OUTCOMES
SEMESTER - III
COURSE NAME:Data Structures Lab(CSL301)

CO	DESCRIPTION
CO1	Students will be able to implement linear data structures & be able to handle operations like insertion, deletion, searching and traversing on them.
CO2	Students will be able to implement nonlinear data structures & be able to handle operations like insertion, deletion, searching and traversing on them.
CO3	Students will be able to choose appropriate data structure and apply it in various problems.
CO4	Students will be able to select appropriate searching techniques for given problems.

COURSE OUTCOMES
SEMESTER - IV
COURSE NAME: Analysis of Algorithms(CSC402)

CO	DESCRIPTION
CO1	Students will be able to analyze the running time and space complexity of algorithms.
CO2	Students will be able to describe, apply and analyze the complexity of divide and conquer strategy.
CO3	Students will be able to describe, apply and analyze the complexity of greedy strategy.
CO4	Students will be able to describe, apply and analyze the complexity of dynamic programming strategy.
CO5	Students will be able to explain and apply backtracking, branch and bound.
CO6	Students will be able to explain and apply string matching techniques.

COURSE OUTCOMES
SEMESTER - IV

COURSE NAME:Operating System Lab(CSL403)

CO	DESCRIPTION
CO1	Students will be able to demonstrate basic Operating system Commands, Shell scripts, System Calls and API wrt Linux.
CO2	Students will be able to implement various process scheduling algorithms and evaluate their performance.
CO3	Students will be able to implement and analyze concepts of synchronization and deadlocks.
CO4	Students will be able to implement various Memory Management techniques and evaluate their performance.
CO5	Students will be able to implement and analyze concepts of virtual memory.
CO6	Students will be able to demonstrate and analyze concepts of file management and I/O management techniques.

COURSE OUTCOMES
SEMESTER - V
COURSE NAME:Computer Networks(CSC501)

CO	DESCRIPTION
CO1	Students will be able to demonstrate the concepts of data communication at the physical layer and compare ISO - OSI model with TCP/IP model.
CO2	Students will be able to explore different design issues at the data link layer.
CO3	Students will be able to design the network using IP addressing and subnetting / supernetting schemes.
CO4	Students will be able to analyze transport layer protocols and congestion control algorithms.
CO5	Students will be able to explore protocols at the application layer.
CO6	Students will be able to understand the customer requirements and Apply a Methodology to Network Design and software defined networks.

COURSE OUTCOMES
SEMESTER - V
COURSE NAME:Data Warehousing and Mining(CSC504)

CO	DESCRIPTION
CO1	Students will be able to organize strategic data in an enterprise and build a data Warehouse.
CO2	Students will be able to analyze data using OLAP operations so as to take strategic decisions and Demonstrate an understanding of the importance of data mining.
CO3	Students will be able to organize and Prepare the data needed for data mining using pre preprocessing techniques.
CO4	Students will be able to implement the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets.
CO5	Students will be able to define and apply metrics to measure the performance of various data mining algorithms.
CO6	Students will be able to understand Concepts related to Web mining.

COURSE OUTCOMES
SEMESTER - VI
COURSE NAME:Machine Learning(CSC604)

CO	DESCRIPTION
CO1	Students will be able to comprehend the basics of Machine Learning.
CO2	Students will be able to build Mathematical foundation for machine learning.
CO3	Students will be able to understand various Machine learning models.
CO4	Students will be able to select suitable Machine learning models for a given problem.
CO5	Students will be able to build Neural Network based models.
CO6	Students will be able to apply Dimensionality Reduction techniques.

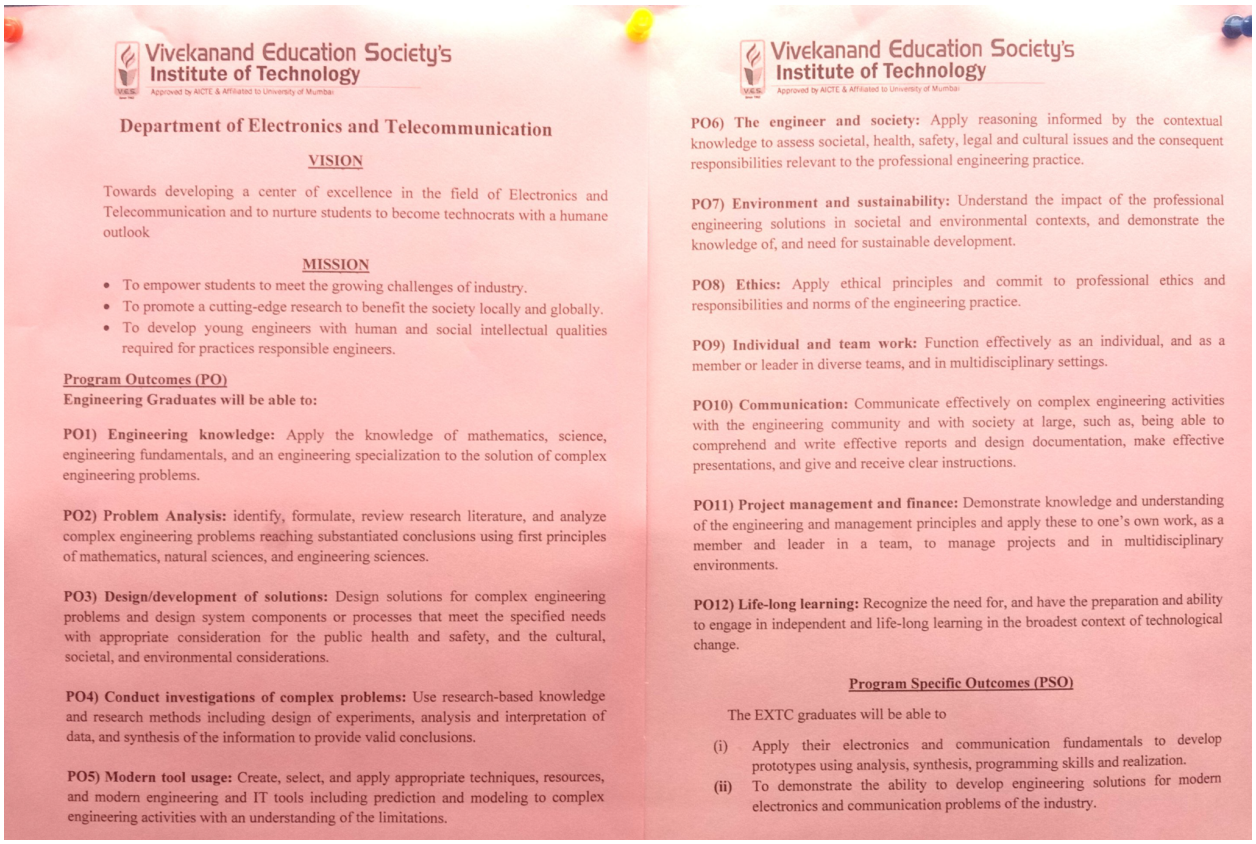
COURSE OUTCOMES
SEMESTER - VI
COURSE NAME:Distributed Computing(CSDLO6012)

CO	DESCRIPTION
CO1	Students will be able to demonstrate knowledge of the basic elements and concepts related to distributed system technologies.

CO2	Students will be able to illustrate the middleware technologies that support distributed applications such as RPC, RMI and Object based middleware.
CO3	Students will be able to analyze the various techniques used for clock synchronization and mutual exclusion
CO4	Students will be able to demonstrate the concepts of Resource and Process management and synchronization algorithms.
CO5	Students will be able to demonstrate the concepts of Consistency and Replication Management.
CO6	Students will be able to apply the knowledge of Distributed File System to analyze various file systems like NFS, AFS and the experience in building large-scale distributed applications.

2. DISSEMINATION OF POs AND PSOs

PO, PSO displayed in Departmental Library :



Vivekanand Education Society's
Institute of Technology
Approved by AICTE & Affiliated to University of Mumbai

Department of Electronics and Telecommunication

VISION

Towards developing a center of excellence in the field of Electronics and Telecommunication and to nurture students to become technocrats with a humane outlook

MISSION

- To empower students to meet the growing challenges of industry.
- To promote a cutting-edge research to benefit the society locally and globally.
- To develop young engineers with human and social intellectual qualities required for practices responsible engineers.

Program Outcomes (PO)

Engineering Graduates will be able to:

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.

Vivekanand Education Society's
Institute of Technology
Approved by AICTE & Affiliated to University of Mumbai

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) Ethics: 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.

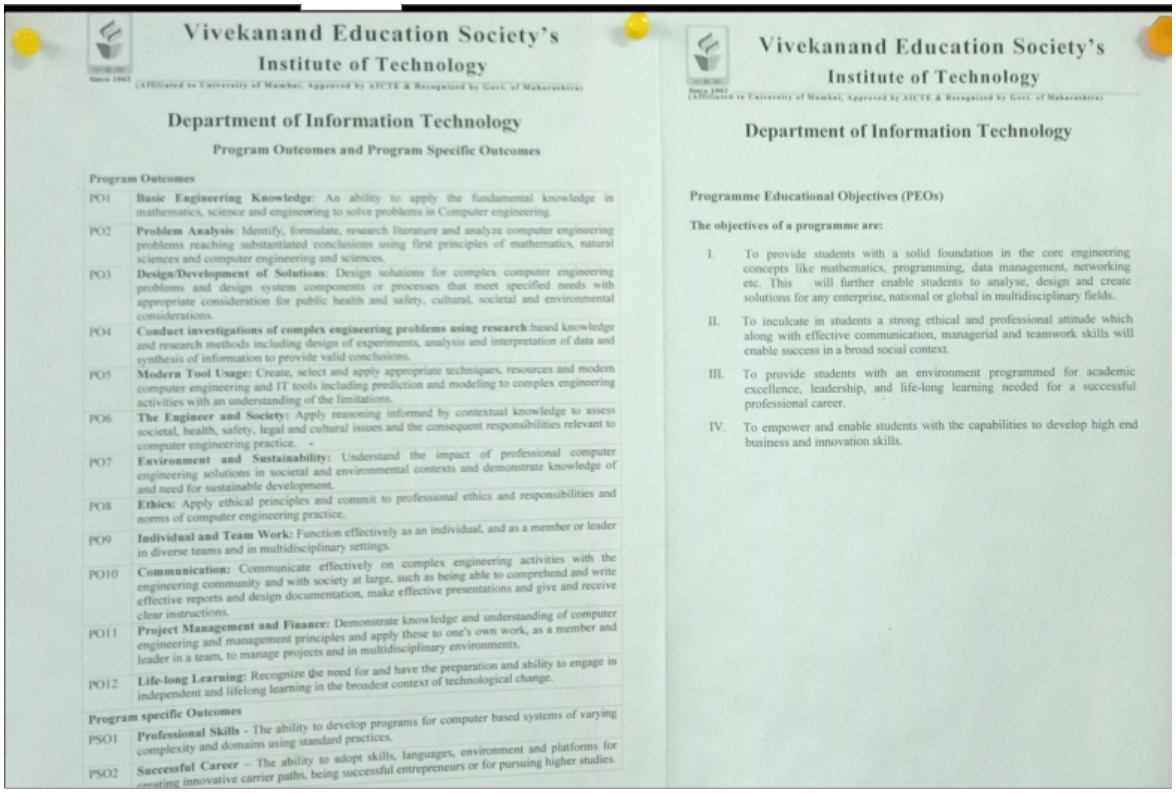
Program Specific Outcomes (PSO)

The EXTC graduates will be able to

(i) Apply their electronics and communication fundamentals to develop prototypes using analysis, synthesis, programming skills and realization.

(ii) To demonstrate the ability to develop engineering solutions for modern electronics and communication problems of the industry.

PO, PSO displayed in Laboratory :



Vivekanand Education Society's
Institute of Technology

Department of Information Technology

Program Outcomes and Program Specific Outcomes

Program Outcomes

PO1 **Basic Engineering Knowledge**: An ability to apply the fundamental knowledge in mathematics, science and engineering to solve problems in Computer engineering.

PO2 **Problem Analysis**: Identify, formulate, research literature and analyze computer engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and computer engineering and sciences.

PO3 **Design/Development of Solutions**: Design solutions for complex computer engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

PO4 **Conduct investigations of complex engineering problems using research** based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

PO5 **Modern Tool Usage:** Create, select and apply appropriate techniques, resources and modern computer 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 contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to computer engineering practice.

PO7 **Environment and Sustainability:** Understand the impact of professional computer engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

PO8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of computer 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 computer 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 lifelong learning in the broadest context of technological change.

Program specific Outcomes

PSO1 **Professional Skills** - The ability to develop programs for computer based systems of varying complexity and domains using standard practices.

PSO2 **Successful Career** – The ability to adopt skills, languages, environment and platforms for creating innovative carrier paths, being successful entrepreneurs or for pursuing higher studies.

Vivekanand Education Society's
Institute of Technology

Department of Information Technology

Programme Educational Objectives (PEOs)

The objectives of a programme are:

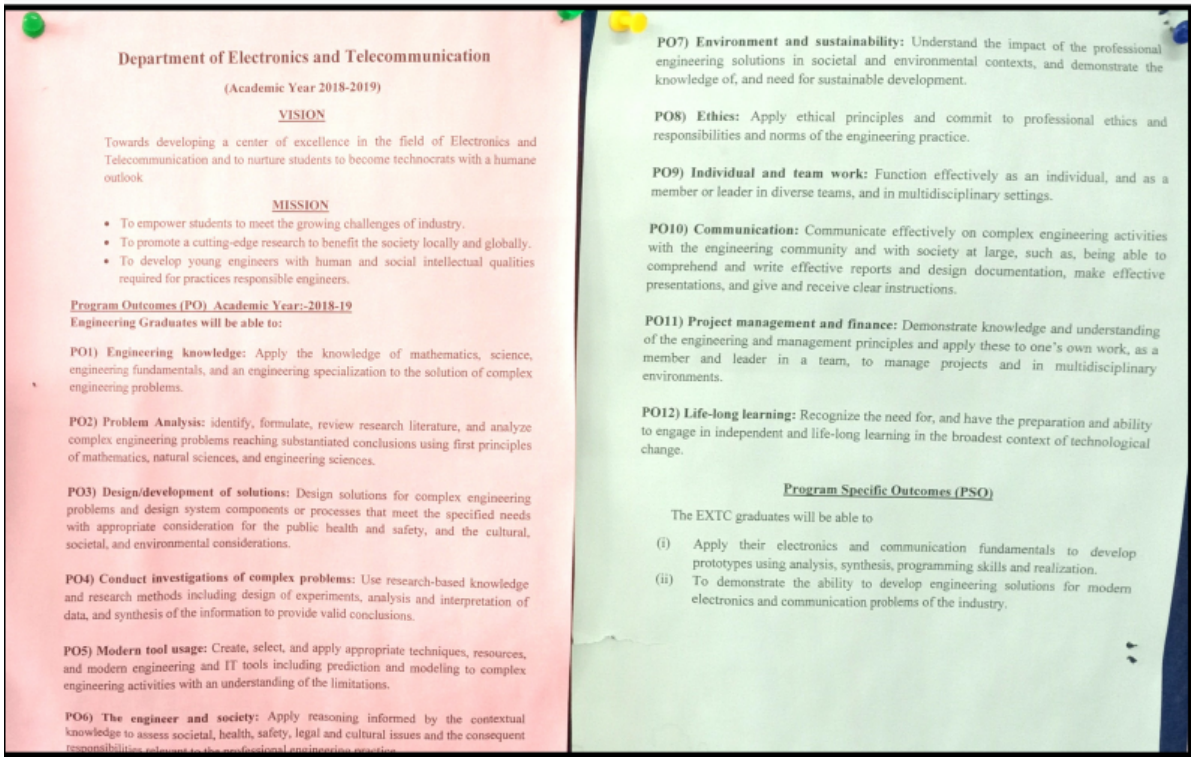
I. To provide students with a solid foundation in the core engineering concepts like mathematics, programming, data management, networking etc. This will further enable students to analyse, design and create solutions for any enterprise, national or global in multidisciplinary fields.

II. To inculcate in students a strong ethical and professional attitude which along with effective communication, managerial and teamwork skills will enable success in a broad social context.

III. To provide students with an environment programmed for academic excellence, leadership, and life-long learning needed for a successful professional career.

IV. To empower and enable students with the capabilities to develop high end business and innovation skills.

POs displayed on Notice board:



Department of Electronics and Telecommunication

(Academic Year 2018-2019)

VISION

Towards developing a center of excellence in the field of Electronics and Telecommunication and to nurture students to become technocrats with a humane outlook

MISSION

- To empower students to meet the growing challenges of industry.
- To promote a cutting-edge research to benefit the society locally and globally.
- To develop young engineers with human and social intellectual qualities required for practices responsible engineers.

Program Outcomes (PO) Academic Year:-2018-19
Engineering Graduates will be able to:

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.

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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.

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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.

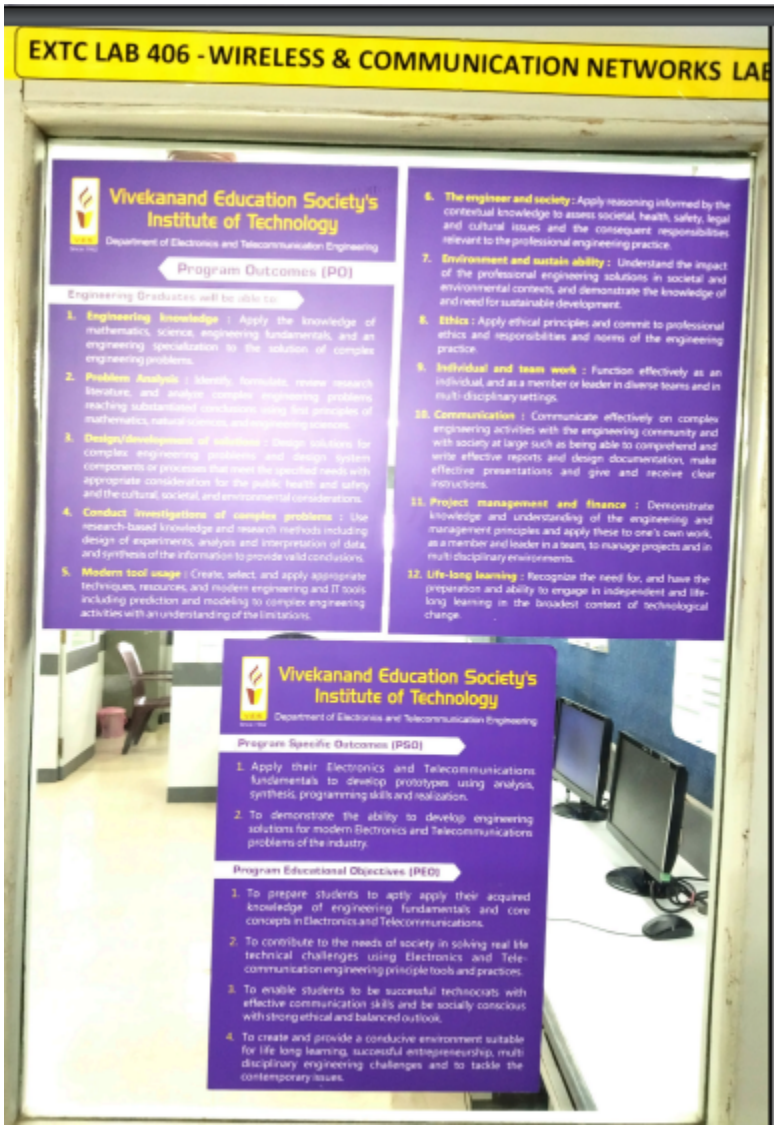
PO12) **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO)

The EXTC graduates will be able to

(i) Apply their electronics and communication fundamentals to develop prototypes using analysis, synthesis, programming skills and realization.

(ii) To demonstrate the ability to develop engineering solutions for modern electronics and communication problems of the industry.


EXTC LAB 406 - WIRELESS & COMMUNICATION NETWORKS LAB
Vivekanand Education Society's
Institute of Technology
Department of Electronics and Telecommunication Engineering
Program Outcomes (PO)
Engineering Graduates will be able to:
1. Engineering knowledge : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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Vivekanand Education Society's
Institute of Technology
Department of Electronics and Telecommunication Engineering
Program Specific Outcomes (PSO)
1. Apply their Electronics and Telecommunications fundamentals to develop prototypes using analysis, synthesis, programming skills and realization.
2. To demonstrate the ability to develop engineering solutions for modern Electronics and Telecommunications problems of the industry.
Program Educational Objectives (PEO)
1. To prepare students to aptly apply their acquired knowledge of engineering fundamentals and core concepts in Electronics and Telecommunications.
2. To contribute to the needs of society in solving real life technical challenges using Electronics and Tele-communication engineering principle tools and practices.
3. To enable students to be successful technocrats with effective communication skills and be socially conscious with strong ethical and balanced outlook.
4. To create and provide a conducive environment suitable for life long learning, successful entrepreneurship, multi disciplinary engineering challenges and to tackle the contemporary issues.

POs in Lab journal:

VIVEKANAND EDUCATION SOCIETY'S INSTITUTE OF TECHNOLOGY

Hashu Advani Memorial Complex, Collector's Colony, R C Marg, Chembur, Mumbai-400074

Department of Electronics and Telecommunication Engineering

CERTIFICATE

Certified that Dhruvi K. Panchal of Class D 14 has satisfactorily completed a course of the necessary experiments/ assignments in Image Processing & machine vision under my supervision in V.E.S. Institute of Technology in year 2022-23

Lab Assistant

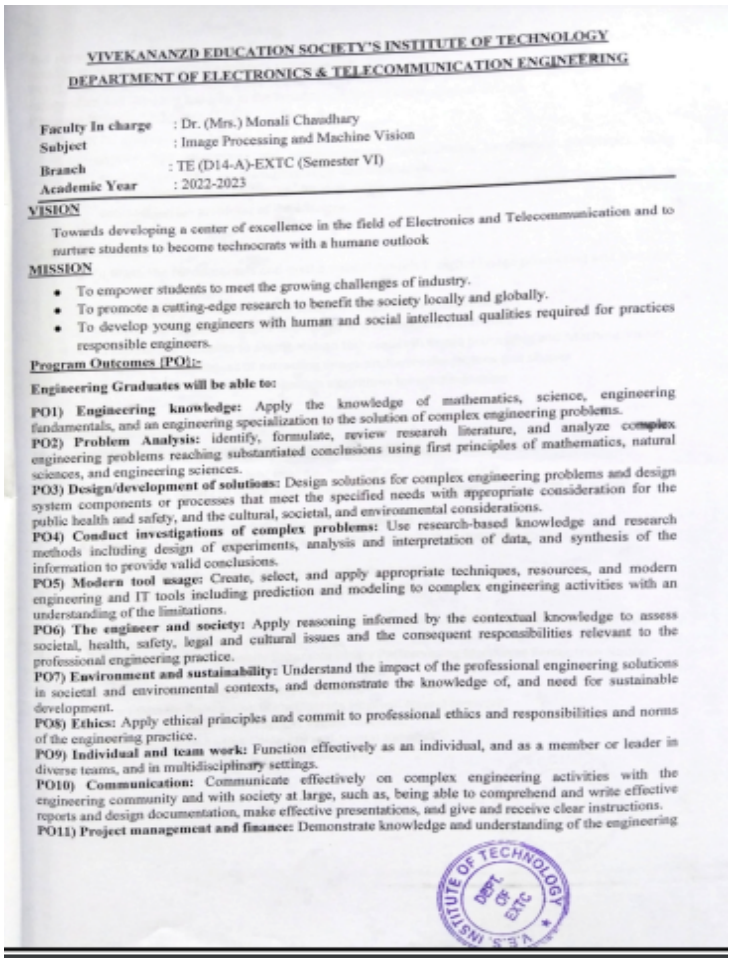
Subject Teacher

Principal

Head of Department

EXAMINED

VES INSTITUTE OF TECHNOLOGY DEPT. OF EXTC



VIVEKANANZD EDUCATION SOCIETY'S INSTITUTE OF TECHNOLOGY
DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING

Faculty In charge : Dr. (Mrs.) Monali Chaudhary
Subject : Image Processing and Machine Vision
Branch : TE (D14-A)-EXTC (Semester VI)
Academic Year : 2022-2023

VISION

Towards developing a center of excellence in the field of Electronics and Telecommunication and to nurture students to become technocrats with a humane outlook

MISSION

- To empower students to meet the growing challenges of industry.
- To promote a cutting-edge research to benefit the society locally and globally.
- To develop young engineers with human and social intellectual qualities required for practices responsible engineers.

Program Outcomes (PO):-

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Program Specific Outcomes (PSO)

The EXTC graduates will be able to

i. Apply their electronics and communication fundamentals to develop prototypes using analysis, synthesis, programming skills and realization.
ii. To demonstrate the ability to develop engineering solutions for modern electronics and communication problems of the industry.

Course Objective:-

1. To teach the fundamentals and mathematical models in digital image processing and Machine Vision
2. To teach quality enhancement of image through filtering operations
3. To teach the students image morphology and restoration techniques
4. To expose the students to segmentation techniques in image processing and Machine Vision
5. To teach the techniques of extracting image attributes like regions and shapes
6. To learn classification and recognition algorithms for machine vision

Course Outcome [CO]:-

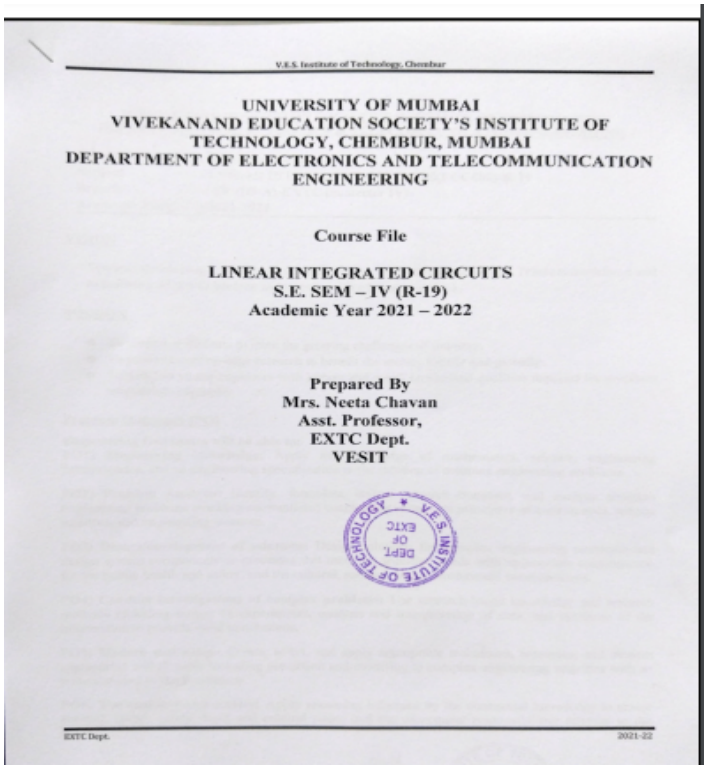
After successful completion of the course student will be able to

1. Understand fundamentals of image processing and machine vision
2. Enhance the quality of image using spatial and frequency domain techniques for image enhancement
3. Learn image morphology and restoration techniques
4. Learn image segmentation techniques based on principle of discontinuity and similarity using various algorithms
5. Represent boundaries and shapes using standard techniques.
6. Classify the object using different classification methods

List of Suggested Experiments to be conducted from ANNFL (ECC604) in IPMV Laboratory (ECL 603): (Any 3 including mini project))

1. Classification of Non-linearly Separable Binary Pattern using Multilayer Perceptron Neural Network.
2. Pattern Clustering using K-means Algorithm.
3. Binary Pattern Restoration using Discrete Hopfield Neural Network.
4. Image Classification using Support Vector Machine.
5. Object Recognition using Convolutional Neural Network.
6. Design Fuzzy Controller for Washing Machine

POs in Course File:



V.E.S. Institute of Technology, Chembur

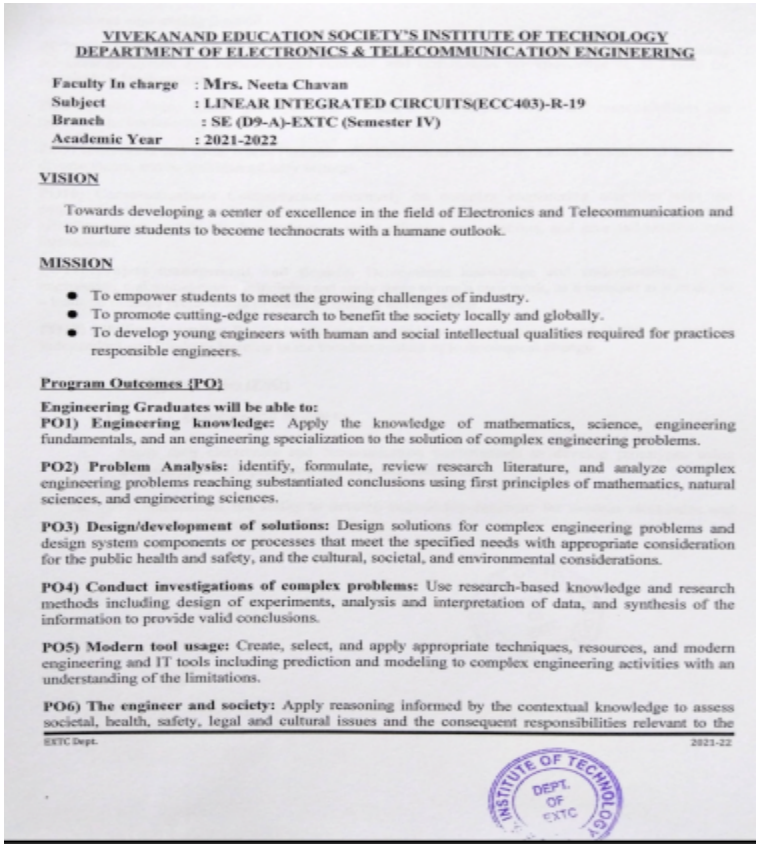
UNIVERSITY OF MUMBAI
VIVEKANAND EDUCATION SOCIETY'S INSTITUTE OF TECHNOLOGY, CHEMBUR, MUMBAI
DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course File

LINEAR INTEGRATED CIRCUITS
S.E. SEM – IV (R-19)
Academic Year 2021 – 2022

Prepared By
Mrs. Neeta Chavan
Asst. Professor,
EXTC Dept.
VESIT

EXTC Dept. 2021-22



VIVEKANAND EDUCATION SOCIETY'S INSTITUTE OF TECHNOLOGY
DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING

Faculty In charge : Mrs. Neeta Chavan
Subject : LINEAR INTEGRATED CIRCUITS(ECC403)-R-19
Branch : SE (D9-A)-EXTC (Semester IV)
Academic Year : 2021-2022

VISION

Towards developing a center of excellence in the field of Electronics and Telecommunication and to nurture students to become technocrats with a humane outlook.

MISSION

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- To promote cutting-edge research to benefit the society locally and globally.
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Program Outcomes (PO)

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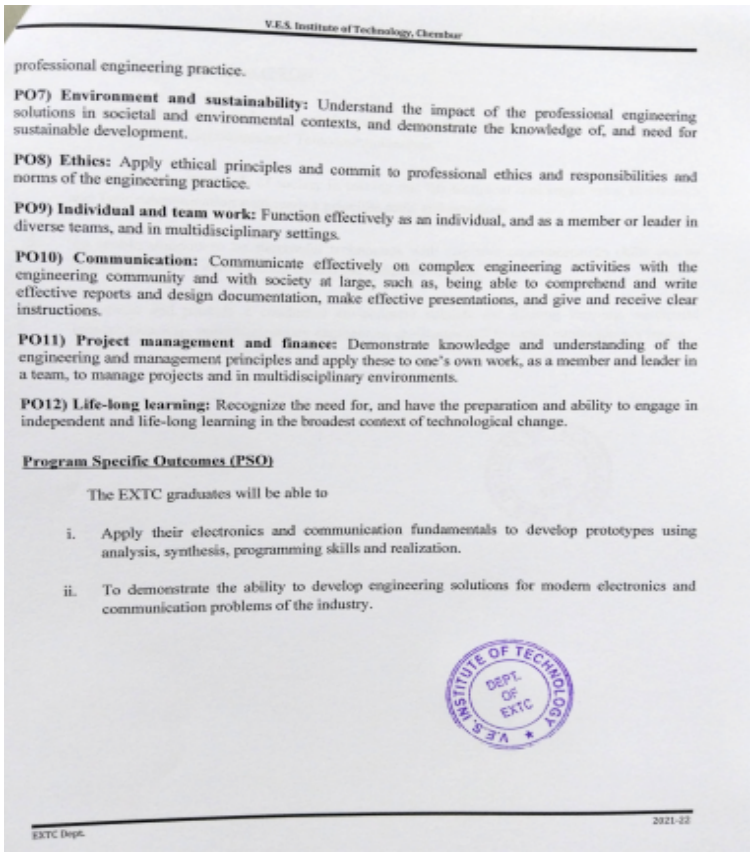
EXTC Dept. 2021-22



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.

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Program Specific Outcomes (PSO)

The EXTC graduates will be able to

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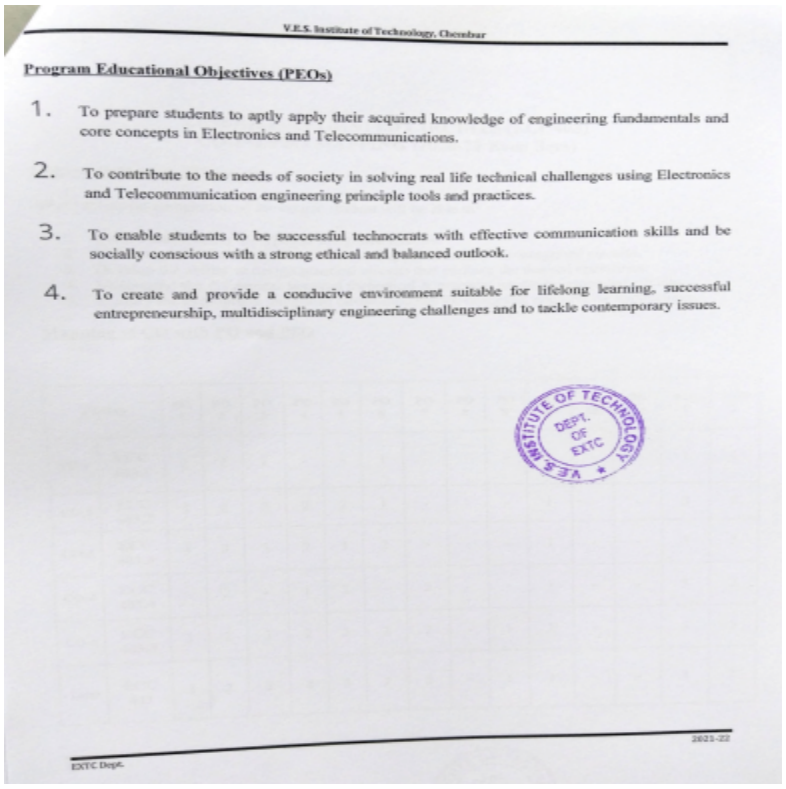
ii. To demonstrate the ability to develop engineering solutions for modern electronics and communication problems of the industry.

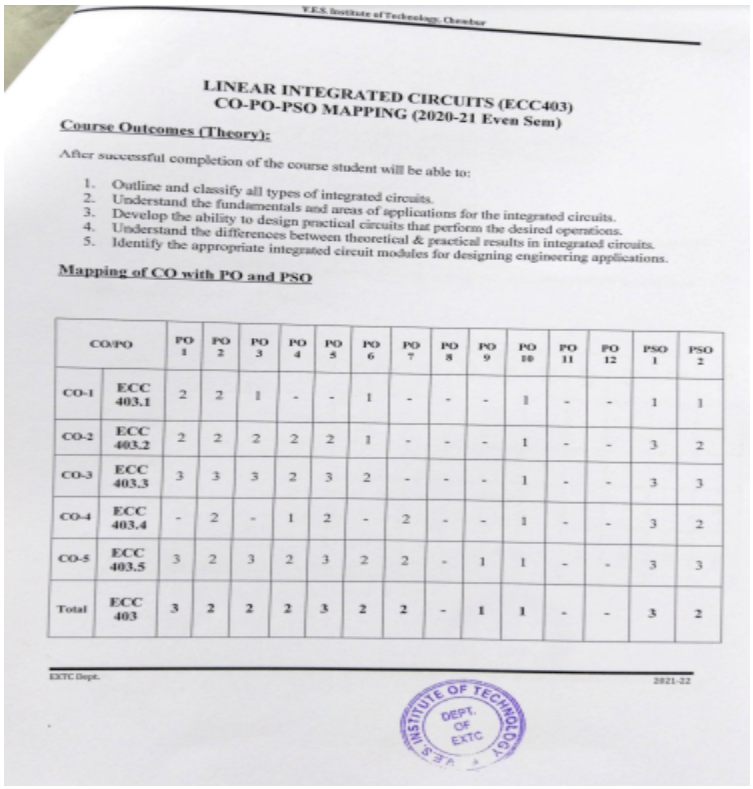
V.E.S. INSTITUTE OF TECHNOLOGY DEPT. OF EXTC



Program Educational Objectives (PEOs)

1. To prepare students to aptly apply their acquired knowledge of engineering fundamentals and core concepts in Electronics and Telecommunications.
2. To contribute to the needs of society in solving real life technical challenges using Electronics and Telecommunication engineering principle tools and practices.
3. To enable students to be successful technocrats with effective communication skills and be socially conscious with a strong ethical and balanced outlook.
4. To create and provide a conducive environment suitable for lifelong learning, successful entrepreneurship, multidisciplinary engineering challenges and to tackle contemporary issues.

V.E.S. INSTITUTE OF TECHNOLOGY DEPT. OF EXTC



V.E.S. Institute of Technology, Chembur

LINEAR INTEGRATED CIRCUITS (ECC403)
CO-PO-PSO MAPPING (2020-21 Even Sem)

Course Outcomes (Theory):

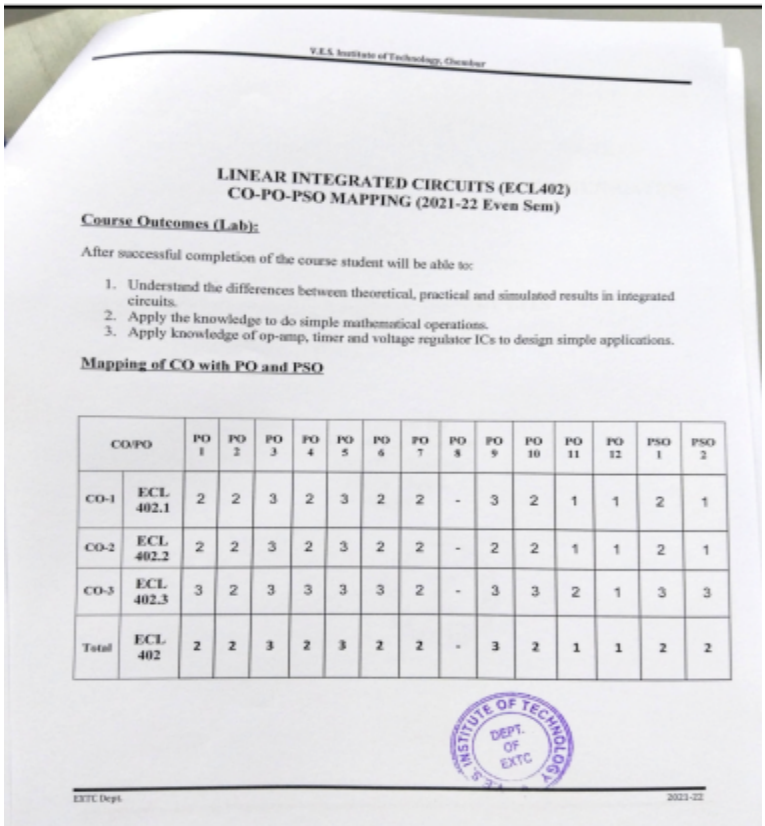
After successful completion of the course student will be able to:

1. Outline and classify all types of integrated circuits.
2. Understand the fundamentals and areas of applications for the integrated circuits.
3. Develop the ability to design practical circuits that perform the desired operations.
4. Understand the differences between theoretical & practical results in integrated circuits.
5. Identify the appropriate integrated circuit modules for designing engineering applications.

Mapping of CO with PO and PSO

CO/PO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO-1	ECC 403.1	2	2	1	-	-	1	-	-	-	1	-	-	1	1
CO-2	ECC 403.2	2	2	2	2	2	1	-	-	-	1	-	-	3	2
CO-3	ECC 403.3	3	3	3	2	3	2	-	-	-	1	-	-	3	3
CO-4	ECC 403.4	-	2	-	1	2	-	2	-	-	1	-	-	3	2
CO-5	ECC 403.5	3	2	3	2	3	2	2	-	1	1	-	-	3	3
Total	ECC 403	3	2	2	2	3	2	2	-	1	1	-	-	3	2

EXTC Dept. 2021-22



V.E.S. Institute of Technology, Chembur

LINEAR INTEGRATED CIRCUITS (ECL402)
CO-PO-PSO MAPPING (2021-22 Even Sem)

Course Outcomes (Lab):

After successful completion of the course student will be able to:

1. Understand the differences between theoretical, practical and simulated results in integrated circuits.
2. Apply the knowledge to do simple mathematical operations.
3. Apply knowledge of op-amp, timer and voltage regulator ICs to design simple applications.

Mapping of CO with PO and PSO

CO/PO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO-1	ECL 402.1	2	2	3	2	3	2	2	-	3	2	1	1	2	1
CO-2	ECL 402.2	2	2	3	2	3	2	2	-	2	2	1	1	2	1
CO-3	ECL 402.3	3	2	3	3	3	3	2	-	3	3	2	1	3	3
Total	ECL 402	2	2	3	2	3	2	2	-	3	2	1	1	2	2

EXTC Dept. 2021-22

POs in introductory lectures:

ECL304 - Skill Lab: C++ and Java Programming

D9 A 21-22(Odd Sem)

PROGRAMME OUTCOMES

PO	DESCRIPTION
PO1	**Engineering knowledge**: Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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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	**Ethics**: 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.

PROGRAMME SPECIFIC OUTCOMES

	DESCRIPTION
PSO1	Apply their electronics and communication fundamentals to develop prototypes using analysis, synthesis, programming skills and realization.
PSO2	To demonstrate the ability to develop engineering solutions for modern electronics and communication problems of the industry.

Programme Educational Objectives (PEOs)

1. To prepare students to aptly apply their acquired knowledge of engineering fundamentals and core concepts in Electronics and Telecommunications.
2. To contribute to the needs of society in solving real life technical challenges using Electronics and Telecommunication engineering principle tools and practices.
3. To enable students to be successful technocrats with effective communication skills and be socially conscious with a strong ethical and balanced outlook.
4. To create and provide a conducive environment suitable for lifelong learning, successful entrepreneurship, multidisciplinary engineering challenges and to tackle contemporary issues.

Course Pre-requisites:

1. FEL204 - C-Programming

Course Objectives:

1. Describe the principles of Object Oriented Programming (OOP).
2. To understand object-oriented concepts such as data abstraction, encapsulation, inheritance and polymorphism.
3. Utilize the object-oriented paradigm in program design.
4. To lay a foundation for advanced programming.
5. Develop programming insight using OOP constructs.

Course Outcomes:

After successful completion of the course student will be able to:

1. Describe the basic principles of OOP.
2. Design and apply OOP principles for effective programming.
3. Develop programming applications using OOP language.
4. Implement different programming applications using packaging.
5. Analyze the strength of OOP.
6. Percept the Utility and applicability of OOP.

3. SYLLABUS FOR ALL PROGRAMS

S.NO	PROGRAMME CODE	PROGRAMME NAME	LINK
1	318537610	Bachelor of Electronics Engineering- Revised 19	View Document
2	318537610	Bachelor of Electronics Engineering- Revised 16	View Document
3	318524510	Bachelor of Computer Engineering- Revised 19	View Document
4	318524510	Bachelor of Computer Engineering- Revised 16	View Document
5	318546610	Bachelor of Instrumentation Engineering- Revised 19	View Document
6	318546610	Bachelor of Instrumentation Engineering- Revised 16	View Document
7	318537210	Bachelor of Electronics and TelecommunicationEngineering- Revised 19	View Document
8	318537210	Bachelor of Electronics and Telecommunication Engineering- Revised 16	View Document
9	318524610	Bachelor of Information Technology Engineering- Revised 19	View Document
10	318524610	Bachelor of Information Technology Engineering- Revised 16	View Document
11	318537210	Master of Electronics and Telecommunication Engineering- Revised 16	View Document
12	318524610	Master of Information Technology Engineering- Revised 16	View Document

13	318546410	Master of Instrumentation and Control Engineering-Revised 16	View Document
14	318524110	Master in Computer Applications-Revised 20	View Document
15	318599510	Bachelor of Artificial Intelligence and Data Science- Revised 19	View Document