



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

**INDEX**

<b>Sr. No.</b>	<b>Title</b>	<b>Page No.</b>
<b>1.</b>	<b>List of Program Outcomes And Course Outcomes for all programs in the Institute.</b>	
	<a href="#">1.1 Bachelor of Electronics Engineering</a>	1-6
	<a href="#">1.2 Bachelor of Computer Engineering</a>	7-13
	<a href="#">1.3 Bachelor of Instrumentation Engineering</a>	14-20
	<a href="#">1.4 Bachelor of Electronics and telecommunication Engineering</a>	21-26
	<a href="#">1.5 Bachelor of Information Technology</a>	27-33
	<a href="#">1.6 Master of Electronics and Telecommunication Engineering</a>	34-35
	<a href="#">1.7 Master of Information Technology Engineering</a>	36-37
	<a href="#">1.8 Master of Instrumentation and Control Engineering</a>	38-40
	<a href="#">1.9 Master of Computer Applications</a>	41-45
	<a href="#">1.10 Bachelor of AI and Data Science</a>	46-49
<b>2.</b>	<b><a href="#">Dissemination of POs and PSOs</a></b>	50-62
<b>3.</b>	<b><a href="#">Syllabus</a></b>	63



Since 1962

# Vivekanand Education Society's Institute of Technology

(Affiliated to University of Mumbai, Approved by AICTE & Recognised by Govt. of Maharashtra)

**Dr. (Mrs.) J. M. Nair**

M. Tech., Ph.D. (IIT-B)  
Principal

Ref. No.: VESIT/ JMN/1325/2023-24

Date: 26/10/2023

## TO WHOM SO IT MAY CONCERN

I, Dr. (Mrs.) Jayalekshmi M Nair, Principal (HOI), Vivekanand Education Society's Institute of Technology, do hereby state that the documents uploaded on NAAC portal are duly signed by Principal (HOI).

The additional documents uploaded on Institute's website (<https://vesit.ves.ac.in/>) are also authentic and does not need any extra validation.

**Dr. (Mrs) Jayalekshmi M Nair**  
**Principal**

Vivekanand Education Society's Institute of Technology  
Hashu Advani Memorial Complex,  
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Chembur, Mumbai, Maharashtra 400074





## 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	<b>Engineering knowledge:</b> Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem Analysis:</b> identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> 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	<b>Conduct investigations of complex problems:</b> 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	<b>Modern tool usage:</b> 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	<b>The engineer and society:</b> 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	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.



<b>PO9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO10</b>	<b>Communication:</b> 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.
<b>PO11</b>	<b>Project management and finance:</b> 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.
<b>PO12</b>	<b>Life-long learning:</b> 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

<b>PSO</b>	<b>DESCRIPTION</b>
<b>PSO1</b>	Graduates will be able to apply the fundamentals of analog electronics and digital electronics systems.
<b>PSO2</b>	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)

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





**SEMESTER - III**

**COURSE NAME:Electrical Network Analysis & Synthesis(ELC304)**

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

**SEMESTER - IV**

**COURSE NAME:Microcontroller Applications(ELC403)**

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

**SEMESTER - IV**

**COURSE NAME:Principles of Communication Engineering(ELC404)**

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



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

**SEMESTER - VII**

**COURSE NAME:Power Electronics(ELX702)**

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

**SEMESTER - VII**

**COURSE NAME:NEURAL NETWORKS & FUZZY LOGIC(ELXDLO7031)**

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

**SEMESTER -VIII**

**COURSE NAME:Internet of Things(ELX 801)**

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



<b>CO4</b>	Design basic applications based on IoT using specific components.
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**SEMESTER - VIII**

**COURSE NAME: Analog and Mixed VLSI Design(ELX802)**

<b>CO</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Discuss trade offs involved in analog VLSI Circuits.
<b>CO2</b>	Analyze building blocks of CMOS analog VLSI circuits.
<b>CO3</b>	Design building blocks of CMOS analog VLSI circuits.
<b>CO4</b>	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	<b>Engineering knowledge:</b> Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem Analysis:</b> identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> 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	<b>Conduct investigations of complex problems:</b> 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	<b>Modern tool usage:</b> 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	<b>The engineer and society:</b> 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	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	<b>Communication:</b> 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.
<b>PO11</b>	<b>Project management and finance:</b> 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.
<b>PO12</b>	<b>Life-long learning:</b> 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

<b>PSO</b>	<b>DESCRIPTION</b>
<b>PSO1</b>	<b>Professional Skills</b> - The ability to develop programs for computer based systems of varying complexity and domains using standard practices.
<b>PSO2</b>	<b>Successful Career</b> - 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)

<b>CO</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Students will be able to implement Linear and Non-Linear data structures.
<b>CO2</b>	Students will be able to handle various operations like searching, insertion, deletion and traversals on various data structures.
<b>CO3</b>	Students will be able to explain various data structures, related terminologies and its types.
<b>CO4</b>	Students will be able to choose appropriate data structure and apply it to solve problems in various domains.
<b>CO5</b>	Students will be able to analyze and Implement appropriate searching techniques for a given problem.
<b>CO6</b>	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)**

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

**SEMESTER - IV**

**COURSE NAME:Database Management System(CSC403)**

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

**SEMESTER - IV**

**COURSE NAME:Operating System(CSC404)**

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





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

**SEMESTER - V**

**COURSE NAME:Computer Network (CSC 503)**

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

**SEMESTER - V**

**COURSE NAME:Multimedia System (CSDLO5011)**

<b>CO</b>	<b>DESCRIPTION</b>
<b>CO1</b>	To identify basics of multimedia and multimedia system architecture.
<b>CO2</b>	To understand different multimedia components.
<b>CO3</b>	To explain file formats for different multimedia components.
<b>CO4</b>	To analyze the different compression algorithms.
<b>CO5</b>	To describe various multimedia communication techniques.
<b>CO6</b>	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.
<b>CO3</b>	Analyse the strength and weakness of AI approaches to knowledge representation, reasoning and planning.
<b>CO4</b>	Construct supervised and unsupervised ANN for real world applications.
<b>CO5</b>	Design fuzzy controller system.
<b>CO6</b>	Apply Hybrid approach for expert system design.

**SEMESTER - VII**

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

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

**SEMESTER -VIII**

**COURSE NAME:Human Machine Interaction(CSC801)**

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



**SEMESTER - VIII**

**COURSE NAME: Distributed Computing(CSC802)**

<b>CO</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Demonstrate knowledge of the basic elements and concepts related to distributed system technologies.
<b>CO2</b>	Illustrate the middleware technologies that support distributed applications such as RPC, RMI and Object based middleware.
<b>CO3</b>	Analyze the various techniques used for clock synchronization and mutual exclusion.
<b>CO4</b>	Demonstrate the concepts of Resource and Process management and synchronization algorithms.
<b>CO5</b>	Demonstrate the concepts of Consistency and Replication Management.
<b>CO6</b>	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	<b>Engineering knowledge:</b> Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem Analysis:</b> identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> 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	<b>Conduct investigations of complex problems:</b> 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	<b>Modern tool usage:</b> 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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PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	<b>Communication:</b> 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.
<b>PO11</b>	<b>Project management and finance:</b> 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.
<b>PO12</b>	<b>Life-long learning:</b> 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

<b>PSO</b>	<b>DESCRIPTION</b>
<b>PSO1</b>	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.
<b>PSO2</b>	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.
<b>PSO3</b>	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)

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



<b>CO6</b>	Apply the techniques of speed and vibration measurement in different industries.
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**SEMESTER - III**

**COURSE NAME:Electrical Networks and Measurements(ISC305)**

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

**SEMESTER - IV**

**COURSE NAME:Transducer -II(ISC402)**

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

**SEMESTER - IV**

**COURSE NAME:Feedback Control System(ISC403)**

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

**SEMESTER - V**

**COURSE NAME:Control System Design(ISC503)**

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

**SEMESTER - V**

**COURSE NAME:Control System Components(ISC504)**

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



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

**SEMESTER - VI**

**COURSE NAME:Process Instrumentation System(ISC601)**

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

**SEMESTER - VI**

**COURSE NAME:Industrial Data Communication(ISC602)**

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



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

**SEMESTER - VIII**

**COURSE NAME:Instrument and System Design(ISC802)**

<b>CO</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Select, design and calibrate transducers
<b>CO2</b>	Select and size control valves and actuators.
<b>CO3</b>	Apply knowledge to size the control panels.
<b>CO4</b>	Apply knowledge to design electronic product and enclosure design.
<b>CO5</b>	Describe the terms used in Reliability engineering.
<b>CO6</b>	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**

<b>PO</b>	<b>DESCRIPTION</b>
<b>PO1</b>	<b>Engineering knowledge:</b> Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO2</b>	<b>Problem Analysis:</b> identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO3</b>	<b>Design/development of solutions:</b> 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.
<b>PO4</b>	<b>Conduct investigations of complex problems:</b> 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.
<b>PO5</b>	<b>Modern tool usage:</b> 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.
<b>PO6</b>	<b>The engineer and society:</b> 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.
<b>PO7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.



<b>PO10</b>	<b>Communication:</b> 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.
<b>PO11</b>	<b>Project management and finance:</b> 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.
<b>PO12</b>	<b>Life-long learning:</b> 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

<b>PSO</b>	<b>DESCRIPTION</b>
<b>PSO1</b>	Apply their electronics and communication fundamentals to develop prototypes using analysis, synthesis, programming skills and realization.
<b>PSO2</b>	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)

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

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

**SEMESTER - V**

**COURSE NAME: Data Compression & Encryption(ECCDLO5014)**

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

**SEMESTER - VI**

**COURSE NAME: Computer Communication Networks(ECC602)**

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



**SEMESTER - VI**

**COURSE NAME:Antenna & Radio Wave Propagation(ECC603)**

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

**SEMESTER - VII**

**COURSE NAME:Mobile Communication System(ECC702)**

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

**SEMESTER - VII**

**COURSE NAME:Optical Communication(ECC703)**

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



<b>CO3</b>	Calculate parameters for optical link budgeting and analyze the link.
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**SEMESTER -VIII**

**COURSE NAME:RF Design(ECC801)**

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

**SEMESTER - VIII**

**COURSE NAME:Satellite Communication(ECCDLO8043)**

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



## 1.5 Bachelor of Information Technology

**PROGRAMME NAME: Information Technology**

**PROGRAMME CODE: 318524610**

### PROGRAMME OUTCOMES

PO	DESCRIPTION
PO1	<b>Engineering knowledge:</b> Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem Analysis:</b> identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> 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	<b>Conduct investigations of complex problems:</b> 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	<b>Modern tool usage:</b> 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	<b>The engineer and society:</b> 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	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.



<b>PO9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO10</b>	<b>Communication:</b> 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.
<b>PO11</b>	<b>Project management and finance:</b> 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.
<b>PO12</b>	<b>Life-long learning:</b> 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**

<b>PSO</b>	<b>DESCRIPTION</b>
<b>PSO1</b>	Professional Skills - The ability to develop programs for computer based systems of varying complexity and domains using standard practices.
<b>PSO2</b>	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)**

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



<b>CO6</b>	Examine and justify different methods of stacks, queues, linked list, trees and graphs to various applications.
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**SEMESTER - III**

**COURSE NAME:Database Management System(ITC303)**

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

**SEMESTER - IV**

**COURSE NAME:Operating System(ITC403)**

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

**SEMESTER - IV**

**COURSE NAME:Automata Theory(ITC404)**

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

**SEMESTER - V**

**COURSE NAME:Advanced Data Management Technology(ITC503)**

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

**SEMESTER - V**

**COURSE NAME:Cryptography & Network Security(ITC504)**

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





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

**SEMESTER - VI**

**COURSE NAME:Software Engineering with Project Management(ITC601)**

<b>CO</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Define various software application domains and remember different process model used in software development.
<b>CO2</b>	Explain needs for software specifications also they can classify different types of software requirements and their gathering techniques.
<b>CO3</b>	Convert the requirements model into the design model and demonstrate use of software and user-interface design principles.
<b>CO4</b>	Distinguish among SCM and SQA and can classify different testing strategies and tactics and compare them.
<b>CO5</b>	Justify the role of SDLC in Software Project Development and they can evaluate the importance of Software Engineering in PLC.
<b>CO6</b>	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)**

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



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

**SEMESTER - VII**

**COURSE NAME:Infrastructure Security(ITC702)**

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

**SEMESTER - VII**

**COURSE NAME:Artificial Intelligence(ITC703)**

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



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

**SEMESTER -VIII**

**COURSE NAME:Big Data Analytics(ITC801)**

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

**SEMESTER - VIII**

**COURSE NAME:Internet of Everything(ITC802)**

<b>CO</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Apply the concepts of IOT.
<b>CO2</b>	Identify the different technologies.
<b>CO3</b>	Apply IOT to different applications.
<b>CO4</b>	Analysis and evaluate protocols used in IOT.
<b>CO5</b>	Design and develop smart cities in IOT.
<b>CO6</b>	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.



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

**SEMESTER - I**

**COURSE NAME:Next Generation Networks(ETDLO1011)**

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

**SEMESTER - II**

**COURSE NAME:Wireless Adhoc and Sensor Networks(ETC202)**

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

**SEMESTER - II**

**COURSE NAME:RF and Microwave Engineering(ETC203)**

<b>CO</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Characterize devices at higher frequencies.
<b>CO2</b>	Design and analyze RF circuits and components.
<b>CO3</b>	Design and analyze amplifiers, oscillators and mixers at microwave frequencies.
<b>CO4</b>	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.



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

**SEMESTER - I**

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

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

**SEMESTER - II**

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

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

**SEMESTER - II**

**COURSE NAME:High Performance Computing(ME-ITC202)**

<b>CO</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Determine the complexity of a given parallel algorithm.
<b>CO2</b>	Identify design Issues and limitations in Parallel Computing.
<b>CO3</b>	Design algorithms suited for Multicore processor and GPU systems using CUDA, MPI, OpenMP.
<b>CO4</b>	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)**

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

**SEMESTER - I**

**COURSE NAME:Robust Control(ISEC103)**

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

**SEMESTER - II**

**COURSE NAME:State Estimation and Stochastic Processes(ISEC202)**

<b>CO</b>	<b>DESCRIPTION</b>
<b>CO1</b>	The students should be able to understand the Stochastic Properties of random variables in terms of pdf.
<b>CO2</b>	Students should be able to understand the concept of stochastic processes.
<b>CO3</b>	Students should be able to understand the concept of least square estimation.
<b>CO4</b>	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)**

<b>CO</b>	<b>DESCRIPTION</b>
<b>CO1</b>	The students should be able to design the process and behavioral model of the process.
<b>CO2</b>	The students should be able to select appropriate control configuration to minimize interaction between different loops.
<b>CO3</b>	The students should be able to design PLC and DCS based systems.
<b>CO4</b>	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	<b>Computational Knowledge:</b> 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	<b>Problem Analysis:</b> Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
PO3	<b>Design /Development of Solutions:</b> 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	<b>Conduct investigations of complex Computing problems:</b> 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	<b>Modern Tool Usage:</b> Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
PO6	<b>Professional Ethics:</b> Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.
PO7	<b>Life-long Learning:</b> Recognize the need, and have the ability to engage in independent learning for continual development as a computing professional.
PO8	<b>Project management and finance:</b> 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.
<b>PO9</b>	<b>Communication Efficacy:</b> 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.
<b>PO10</b>	<b>Societal and Environmental Concern:</b> 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.
<b>PO11</b>	<b>Individual and Team Work:</b> Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
<b>PO12</b>	<b>Innovation and Entrepreneurship:</b> 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

<b>PSO</b>	<b>DESCRIPTION</b>
<b>PSO1</b>	The ability to develop and apply computer based applications of varying complexity and domains using standard practice.
<b>PSO2</b>	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)

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



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

**SEMESTER - I**

**COURSE NAME: Software Project Management(MCA14)**

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

**SEMESTER - II**

**COURSE NAME: Artificial Intelligence And Machine Learning(MCA22)**

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



performance.
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**SEMESTER - II**

**COURSE NAME:Information Security(MCA23)**

<b>CO</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Discuss the requirement of information security , private and public key algorithms and to examine the mathematics of cryptography.
<b>CO2</b>	Analyze authentication and integrity techniques available.
<b>CO3</b>	Interpret the importance of firewalls and intrusion detection systems and signatures.
<b>CO4</b>	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)**

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

**SEMESTER - III**

**COURSE NAME:Distributed System and Cloud Computing(MCA32)**

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



<b>CO4</b>	Analyze Cloud computing and cloud models.
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**SEMESTER - IV**

**COURSE NAME: Internship(MCAI41)**

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

**SEMESTER - IV**

**COURSE NAME: Research Paper (MCAR42)**

<b>CO</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Show data coherently, effectively and counter-hypothesis.
<b>CO2</b>	Apply experience in preparation of research material for publication or presentation.
<b>CO3</b>	Identify relevant previous work that supports their research.
<b>CO4</b>	Analyze data and synthesize research findings.
<b>CO5</b>	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	<b>Engineering knowledge:</b> Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem Analysis:</b> identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> 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	<b>Conduct investigations of complex problems:</b> 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	<b>Modern tool usage:</b> 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	<b>The engineer and society:</b> 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	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.





<b>PO9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO10</b>	<b>Communication:</b> 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.
<b>PO11</b>	<b>Project management and finance:</b> 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.
<b>PO12</b>	<b>Life-long learning:</b> 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

<b>PSO</b>	<b>DESCRIPTION</b>
<b>PSO1</b>	<b>Professional Skills:</b> Understand, analyze and develop essential proficiency in the areas related to artificial intelligence and data science like mathematics, computational methods and statistics.
<b>PSO2</b>	<b>Successful Career:</b> 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)

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



<b>CO5</b>	Students will be able to analyze and Implement appropriate searching techniques for a given problem.
<b>CO6</b>	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)**

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

**COURSE OUTCOMES**

**SEMESTER - IV**

**COURSE NAME: Analysis of Algorithms(CSC402)**

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

**COURSE OUTCOMES**

**SEMESTER - IV**



**COURSE NAME: Operating System Lab(CSL403)**

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



## 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**  
(Affiliated to University of Mumbai, Approved by AICTE & Recognized by Govt. of Maharashtra)

**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**  
(Affiliated to University of Mumbai, Approved by AICTE & Recognized by Govt. of Maharashtra)

**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.

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.

**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.
- 2. Problem Analysis** : Identify, formulate, review research literature, and analyze complex engineering problems reaching substantial conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. 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.
- 4. 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.
- 5. 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.
- 6. 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.
- 7. Environment and sustainable ability** : Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
- 8. Ethics** : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work** : Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
- 10. 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.
- 11. 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 multi-disciplinary environments.
- 12. 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.

**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 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 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**  
**DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING**

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

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**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.

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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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**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.

#### 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

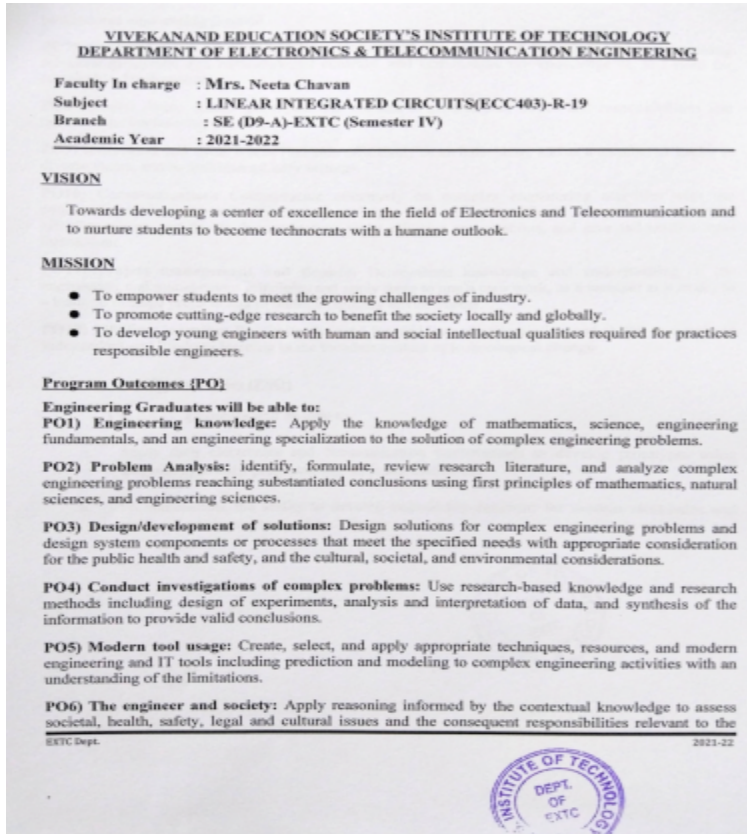
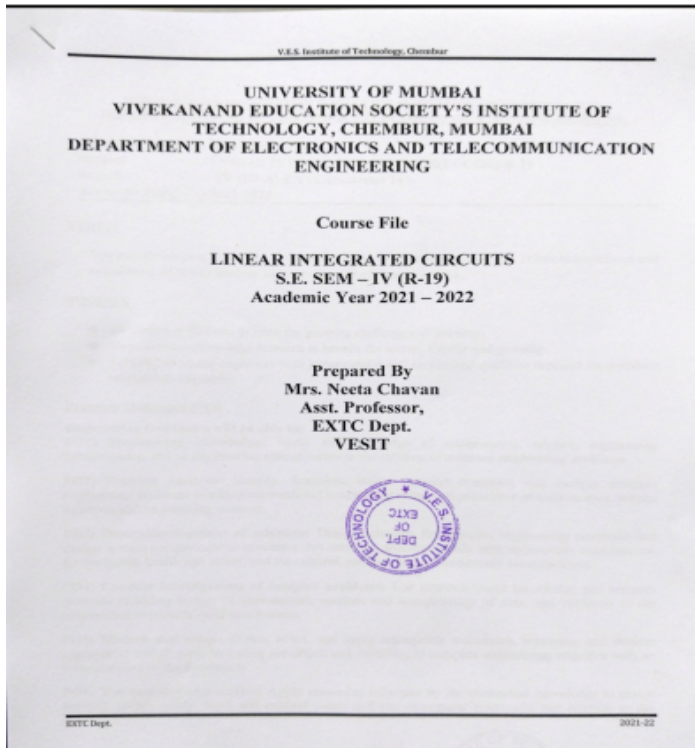
List of Suggested Experiments to be conducted from ANNFL (ECC604) in IPMV Laboratory (ECL 603): (Any 3 including mini project)

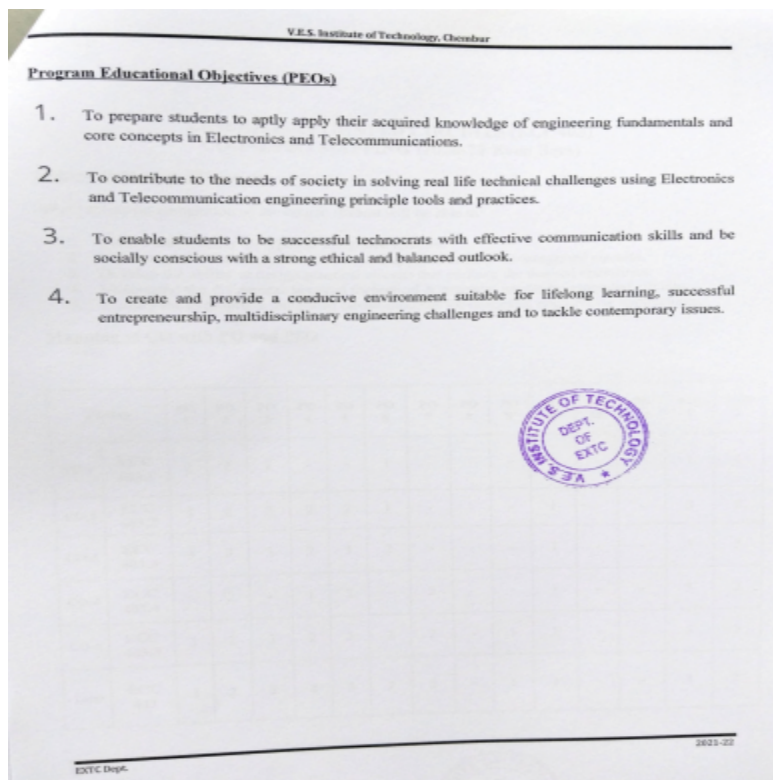
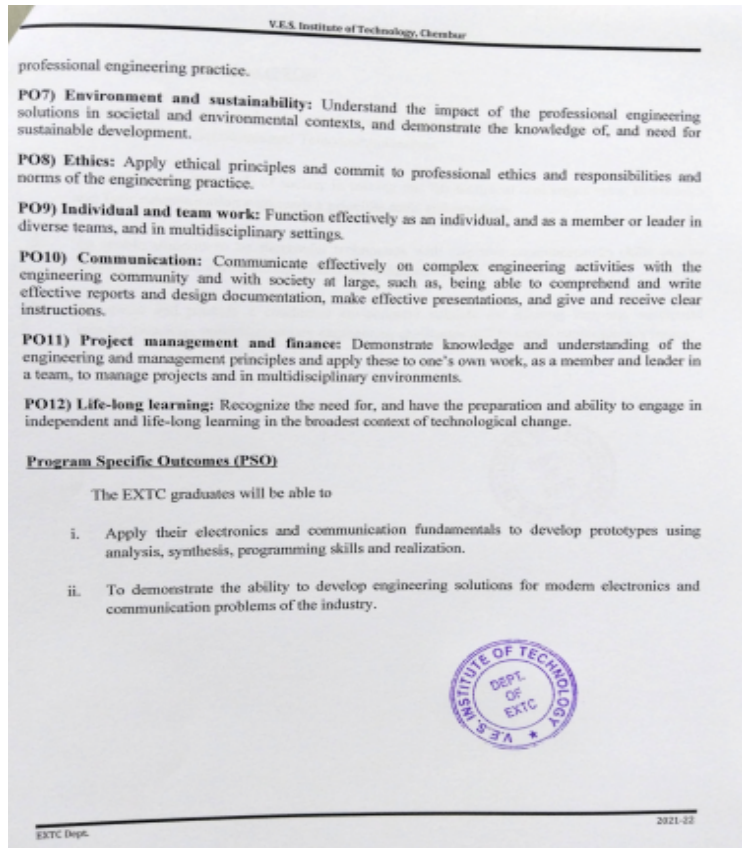
1. Classification of Non-linearly Separable Binary Pattern using Multilayer Perceptron Neural Network.
2. Pattern Clustering using K-means Algorithm.
3. Binary Pattern Restoration using Discrete Hopfield Neural Network.
4. Image Classification using Support Vector Machine.
5. Object Recognition using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





## POs in Course File:









V.E.S. Institute of Technology, Chembur

### 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

EETC 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

EETC 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	<b>Engineering knowledge:</b> Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem Analysis:</b> identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> 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	<b>Conduct investigations of complex problems:</b> 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	<b>Modern tool usage:</b> 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.



<b>PO6</b>	<b>The engineer and society:</b> 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.
<b>PO7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

<b>PO9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO10</b>	<b>Communication:</b> 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.
<b>PO11</b>	<b>Project management and finance:</b> 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.
<b>PO12</b>	<b>Life-long learning:</b> 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	PROGRAM ME CODE	PROGRAMME NAME	LINK
1	318537610	Bachelor of Electronics Engineering- Revised 19	<a href="#">View Document</a>
2	318537610	Bachelor of Electronics Engineering- Revised 16	<a href="#">View Document</a>
3	318524510	Bachelor of Computer Engineering- Revised 19	<a href="#">View Document</a>
4	318524510	Bachelor of Computer Engineering- Revised 16	<a href="#">View Document</a>
5	318546610	Bachelor of Instrumentation Engineering- Revised 19	<a href="#">View Document</a>
6	318546610	Bachelor of Instrumentation Engineering- Revised 16	<a href="#">View Document</a>
7	318537210	Bachelor of Electronics and Telecommunication Engineering- Revised 19	<a href="#">View Document</a>
8	318537210	Bachelor of Electronics and Telecommunication Engineering- Revised 16	<a href="#">View Document</a>
9	318524610	Bachelor of Information Technology Engineering- Revised 19	<a href="#">View Document</a>
10	318524610	Bachelor of Information Technology Engineering- Revised 16	<a href="#">View Document</a>
11	318537210	Master of Electronics and Telecommunication Engineering- Revised 16	<a href="#">View Document</a>
12	318524610	Master of Information Technology Engineering- Revised 16	<a href="#">View Document</a>



# Vivekanand Education Society's Institute of Technology

Approved by AICTE & Affiliated to University of Mumbai

13	318546410	Master of Instrumentation and Control Engineering-Revised 16	<a href="#">View Document</a>
14	318524110	Master in Computer Applications-Revised 20	<a href="#">View Document</a>
15	318599510	Bachelor of Artificial Intelligence and Data Science- Revised 19	<a href="#">View Document</a>