

## M.E. / M. TECH (Two-Year) Degree Programme

### Semester- I            **ITITPC11 Program Core-I - Mathematics for Computing**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. To understand the basic notions of discrete and continuous probability
2. To understand the methods of statistical inference and the role that sampling distributions play in those methods.
3. To be able to perform correct and meaningful statistical analyses of simple to moderate complexity.

### Semester -I            **ITITPC12 Program Core-II –Advanced Data Structures**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Understand the implementation of symbol table using hashing techniques.
2. Develop and analyze algorithms for red-black trees, B-trees and Splay trees.
3. Develop algorithms for text processing applications.
4. Identify suitable data structures and develop algorithms for computational geometry problems.

### Semester -I            **ITITMC15 Research Methodology and IPR**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
6. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

### Semester-I            **ITITCP16 Laboratory I – Advanced Data Structures Lab**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Design and implement basic and advanced data structures extensively.
2. Design algorithms using graph structures.
3. Design and develop efficient algorithms with minimum complexity using design techniques.

### Semester-I            **ITITCP17 Laboratory II - Advanced Network Technology Lab**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Implement Client / Server communication.
2. Understand network simulators.
3. Understand multicast programming.

### Semester-II            **ITITPC 21 Program Core-III – Advanced Algorithms**

**Course Outcomes**

Upon Completion of the course, the students will be able to

1. Analyze the complexity/performance of different algorithms.
2. Determine the appropriate data structure for solving a particular set of problems.
3. Categorize the different problems in various classes according to their complexity.
4. Students should have an insight of recent activities in the field of the advanced data structure.

**Semester-II ITITPC 22 Program Core-IV – Big Data Analytics****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Identify the need for big data analytics for a domain.
2. Use Hadoop, Map Reduce Framework.
3. Apply big data analytics for a given problem.

**Semester-II ITITPC26 Laboratory III – Big Data and Hadoop Lab****Course Outcomes:**

Upon of completion of this course, students will be able to

1. Set up multi-node Hadoop Clusters.
2. Apply Map Reduce algorithms for various algorithms.
3. Design new algorithms that uses Map Reduce to apply on Unstructured and structured data.

**Semester-II ITITTS27 Industrial Training and Seminar / Mini Project****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Apply prior acquired knowledge in problem solving and to demonstrate the use, interpretation and application of an appropriate international Information Technology standard in a specific situation.
2. Analyze a given Information Technology problem and to identify and implement appropriate problem-solving methodology to propose a meaningful solution.
3. Present the solution acquired in the form of written and oral presentation.
4. Face the audience and to interact with them confidently.
5. Acquire the ability to work in the actual environment and to use the technical resources.

**Semester-III ITITPV33 Thesis Phase – I & Viva – Voce****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Conduct independent empirical research to evaluate and present their results responsibly and critically.
2. Present the conclusions with understandability using appropriate tables and graphs in the form of report.
3. Maintain the ethical standards of scientific research and to follow the basic principles in an academic community that requires constant learning and knowledge updation.

**Semester-IV ITITPV41 Thesis Phase – II & Viva – Voce****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Conduct independent empirical research to evaluate and present their results responsibly and critically.
2. Present the conclusions with understandability using appropriate tables and graphs in the form of report.

3. Maintain the ethical standards of scientific research and to follow the basic principles in an academic community that requires constant learning and knowledge updation.

## **PROGRAM ELECTIVES**

### **ITITPESCN Advanced Network Technology**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Gain an understanding of the principles of network engineering.
2. Knowledge of advanced network engineering concepts and techniques.
3. Explore the emerging technologies in network engineering.

### **ITITPESCN Integrated Software Engineering Methodology**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Learn UML models and tools.
2. Apply design patterns on various applications.
3. Understand the concepts and techniques to complete a small-scale analysis and design in mini projects.

### **ITITPESCN Soft Computing**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Identify and describe soft computing techniques and their roles in building intelligent machines
2. Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems.
3. Apply genetic algorithms to combinatorial optimization problems.
4. Evaluate and compare solutions by various soft computing approaches for a given problem.

### **ITITPESCN Mobile and Pervasive Computing**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Design a basic architecture for a pervasive computing environment.
2. Design and allocate the resources on the 3G-4G wireless networks.
3. Analyze the role of sensors in Wireless networks.
4. Work out the routing in mesh network.
5. Deploy the location and context information for application development.

### **ITITPESCN Optimization Techniques**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Formulate optimization problems.
2. Understand and apply the concept of optimality criteria for various types of optimization problems.
3. Solve various constrained and unconstrained problems in Single variable as well as multivariable.
4. Apply the methods of optimization in real life situation.

### **ITITPESCN Information Storage and Management**

#### **Course Outcomes:**

Upon completion of this course the students may be able to

1. Provide a variety of solutions for storing, managing, accessing, protecting, securing, sharing and optimizing information.
2. Evaluate storage architectures, including storage subsystems SAN, NAS, IPSAN, CAS.
3. Understand the business continuity, backup and recovery methods.

### **ITITPESCN Protocols and Architecture for Wireless Sensor Networks**

#### **Course Outcomes:**

Upon completion of this course students should be able to

1. Identify different issues in wireless ad hoc and sensor networks.
2. Analyze the protocols developed for ad hoc and sensor networks.
3. Identify and discuss the standards and applications of ad hoc and sensor networks.

### **ITITPESCN Semantic Web**

#### **Course Outcomes:**

Upon completion of the course, the students will be able to

1. Compare conventional web with semantic web.
2. Analyze and design semantic knowledge representation modes.
3. Construct ontology using different tools.
4. Use semantic web services with web applications.

### **ITITPESCN Advanced Databases**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Develop in-depth understanding of relational databases and skills to optimize database performance in practice.
2. Understand and critique on each type of databases.
3. Design faster algorithms in solving practical database problems.

### **ITITPESCN Optical Networks**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Learn the importance of the backbone infrastructure for our present and future communication needs.
2. Familiarize with the architectures and the protocol stack in use.
3. Understand the differences in the design of routing, switching and the resource allocation methods.

### **ITITPESCN Cluster Computing**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Learn the Cluster installation and configuration methods and tools.
2. Understand the Parallel programming models & paradigms.
3. Familiarize the job management system and cluster scheduling process.

### **ITITPESCN Cloud Computing Technologies**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Identify security aspects of each cloud model

2. Develop a risk-management strategy for moving to the Cloud
3. Implement a public cloud instance using a public cloud service provider
4. Apply trust-based security model to different layer.

#### **ITITPESCN Green Computing**

##### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Minimize negative impacts on the environment.
2. Develop skill in energy saving practices in their use of hardware.
3. Examine technology tools that can reduce paper waste and carbon footprint by user.

#### **ITITPESCN Quantum Computing**

##### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Knowledge of Vector spaces, Matrices, Quantum state, Density operator and Quantum Measurement theory.
2. Understand and explain the basic notions of Quantum Computing -including Quantum Bits and registers, Quantum Evolution, Quantum Circuits, Quantum Teleportation and the basic Quantum Algorithms known at the present time.
3. Identify the essential difference between the classical paradigm and the quantum paradigm of computation and appreciate why quantum computers can solve currently intractable problems.

#### **ITITPESCN Cryptography and Information Security**

##### **Course Outcomes:**

Upon Completion of the course, the students should be able to

1. Apply the basic security algorithms required by any computing system.
2. Predict the vulnerabilities across any computing system.
3. Design a security solution for any computing system.

#### **ITITPESCN Wireless Communication Techniques**

##### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Acquire knowledge in different modulation schemes and its error probability in wireless system.
2. Learn the fundamental limits on the capacity of wireless channels.
3. Understand the diversity concepts.

#### **ITITPESCN Internet Of Things**

##### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Identify and design the new models for market strategic interaction.
2. Design business intelligence and information security for WoB.
3. Analyze various protocols for IoT.
4. Design a middleware for IoT.

#### **ITITPESCN Cross – Informatics**

##### **Course Outcomes:**

Upon completion of the course, the students will be able to

1. Design and develop clinical and hospital management system on their own.
2. Work with different medical imaging techniques.

3. Apply the knowledge of bio informatics for biological databases. Learn hybrid representations and its Applications.

### **ITITPESCN Text Mining**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Understand the basic concepts of text mining in Information retrieval and extraction.
2. Apply probabilistic models for text mining.
3. Learn the current trends in text mining.

### **ITITPESCN Machine Learning Techniques**

#### **Course Outcomes:**

Upon completion of the course, the students will be able to

1. Extract features that can be used for a particular machine learning approach.
2. Compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.
3. Analyse various machine learning approaches and paradigms.

### **ITITPESCN Software Reliability Engineering**

#### **Course Outcomes:**

Upon completion of the course, the students will be able to

1. Understand the need for flexible models.
2. Understand the quality metrics producing models.
3. Understand Determination of Software Release Time.

### **ITITPESCN 3G and 4G Wireless Networks**

#### **Course Outcomes:**

Upon completion of the course, the students will be able to

1. Understand Wi MAX networks, protocol stack and standards.
2. Understand the emerging trends of smart phones.
3. Analyze latest standards like DLNA, NFC and femtocells.

### **ITITPESCN Advanced Image Processing**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Design an application that incorporates different concepts of Biometric Image processing.
2. Apply and explore new techniques in the areas of Biometric image enhancement, restoration, segmentation, compression, wavelet processing and image morphology.
3. Explore the possibility of Applying Biometric image processing concepts in various domains.

### **ITITPESCN Biometric Security**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Design biometric identification systems.
2. Implement biometric identification systems.
3. Evaluate large scale biometric identification systems.

### **ITITPESCN Distributed Systems Security**

**Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Understand the computer system security.
2. Understand the Security Appliances and Virtualization.
3. Understand the Services Security Policy.

**ITITPESCN Wireless Security****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Understand the complete knowledge of threats within wireless environments.
2. Understand the Wireless Device security issues.
3. Understand the basic specifications, Bluetooth security.

**ITITPESCN Audio Processing****Course Outcomes:**

Upon completion of the course, the students will be able to

1. Understand different characteristics of Speech.
2. Identify and analyze different speech analysis system.
3. Write algorithms for Recognition of speech.

**ITITPESCN Sensing Techniques and Sensors****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Explain sensor characteristics, physics of sensors, optical components of sensors.
2. Apply sensor interface electronics.
3. Choose and use appropriate motion-related sensors, light and radiation detectors, temperature sensors and chemical sensors.

**ITITPESCN Advanced Wireless and Mobile Networks****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Demonstrate advanced knowledge of networking and wireless networking and understand various types of wireless networks, standards, operations and use cases.
2. Be able to design WLAN, WPAN, WWAN, Cellular based upon underlying propagation and performance analysis.
3. Demonstrate knowledge of protocols used in wireless networks and learn simulating wireless networks.
4. Design wireless networks exploring trade-offs between wire line and wireless links.
5. Develop mobile applications to solve some of the real world problems.

**ITITPESCN Data Warehousing and Mining****Course Outcomes**

Upon Completion of the course, the students will be able to

1. Study different sequential pattern algorithms
2. Study the techniques to extract patterns from time series data and their application in real world.
3. Extend the graph mining algorithms to web mining
4. Identify the computing framework for Big Data

### **ITITPESCN Advanced Machine Learning**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Key concepts, tools and approaches for pattern recognition on complex data sets
2. Kernel methods for handling high dimensional and non-linear patterns
3. State-of-the-art algorithms such as Support Vector Machines and Bayesian networks
4. Solve real-world machine learning tasks: from data to inference
5. Theoretical concepts and the motivations behind different learning Frameworks

### **ITITPESCN Nature Inspired Metaheuristic Optimization Algorithms**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Identify and describe metaheuristic algorithms and their roles in solving optimization problems
2. Apply the metaheuristic algorithms in solving various engineering problems.
3. Apply genetic algorithms to combinatorial optimization problems.
4. Evaluate and compare solutions by various metaheuristic optimization approaches for a given problem.

### **ITITPESCN Digital Image and Video Processing**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Learn different techniques for image enhancement, video and image recovery
2. Understand techniques for image and video segmentation
3. Study techniques for image and video compression and object recognition

### **ITITPESCN Ethical Hacking And Network Defense**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Understand various ethical hacking and social engineering measures
2. Know about various hacking networks
3. Have an idea about the various vulnerabilities.

### **ITITPESCN Digital Forensics**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Understand relevant legislation and codes of ethics.
2. Analyze various processes, policies and procedures of computer forensics.
3. Understand E-discovery, guidelines and standards, E-evidence, tools and environment.
4. Gain knowledge on Email and network forensics.

### **ITITPESCN Computer Vision**

#### **Course Outcomes:**

Upon Completion of the course, the students will be able to

- a. Understand and master basic knowledge, theories and methods in computer vision.
- b. Identify, formulate and solve problems in computer vision.
- c. Analyze, evaluate and examine existing practical computer vision systems.
- d. Design and develop practical and innovative computer vision applications or systems.



## **OPEN ELECTIVES**

### **ITITOESCN Web Integrated Technologies**

#### **Course Outcomes:**

Upon Completion of the course, the students should be able to

1. Design and develop web applications using various models.
2. Develop web application using HTML and scripting technologies.
3. Develop web application with advanced features.

### **ITITOESCN Decision Management Systems**

#### **Course Outcomes:**

Upon Completion of the course, the students should be able to

1. Design and implement robust decision services.
2. Monitor ongoing decision-making.
3. Learn methods to improve decision making performance.

### **ITITOESCN Cyber Forensics**

#### **Course Outcomes:**

Upon Completion of the course, the students should be able to

1. Study the fundamentals of computer forensics.
2. Have an overview of techniques for Data Recovery and Evidence Collection.
3. Study various threats associated with security and information warfare.
4. Study the tools and tactics associated with cyber forensics.

### **ITITOESCN Data Science and Analytics**

#### **Course Outcomes:**

Upon the completion of the course the student should be able to

1. Work with big data platform and its analysis techniques.
2. Design efficient algorithms for mining the data from large volumes.
3. Apply hadoop architecture.

### **ITITOESCN Pattern Recognition**

#### **Course Outcomes:**

Upon completion of this course the student will be able to

1. Develop the necessary analytical skills and experiences on pattern recognition
2. Understand statistical models of pattern recognition.
3. Learns supervised unsupervised and reinforcement learning.

### **ITITOESCN Human Computer Interaction**

#### **Course Outcomes:**

Upon completion of the course, the students will be able to

1. Explain the capabilities of both humans and computers from the view point of human information processing.
2. Describe typical human computer interaction (HCI) models, styles and various historic HCI paradigms.
3. Apply an interactive design process and Universal design principles to design HCI systems.

### **ITITOESCN Mobile Application Development**

**Course Outcomes:**

Upon Completion of the course, the students will be able to

1. To learn the characteristics of mobile applications.
2. To understand the intricacies of UI required by mobile applications.
3. To study about the design aspects of mobile application.

**ITITOESCN Information Retrieval****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Understand the various applications of Information Retrieval such as Multimedia IR, Web Search.
2. Understand the concepts of digital libraries
3. Understand the collecting and integrating specialized information on the web.

**ITITOESCN Middleware for Communications****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Implement the middleware technologies.
2. Implement the communication protocols for distributed communications.
3. Implement the real-time systems.

**AUDIT COURSE – I & II****ITITACSCN Sanskrit For Technical Knowledge****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Understanding basic Sanskrit language
2. Ancient Sanskrit literature about science & technology can be understood
3. Being a logical language will help to develop logic in students.

**ITITACSCN Value Education****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Knowledge of self-development
2. Learn the importance of Human values
3. Developing the overall personality.

**ITITACSCN Constitution of India****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

**ITITACSCN Pedagogy Studies**

**Course Outcomes:**

Upon Completion of the course, the students will be able to

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

**ITITACSCN Stress Management by Yoga****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Develop healthy mind in a healthy body thus improving social health also
2. Improve efficiency.

**ITITACSCN Personality Development Through Life Enlightenment Skills****Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity
3. Study of Neetishatakam will help in developing versatile personality of students.