# Department of Computer Technology
## Course Objectives and Course Outcomes
**Session 2023-24**

| | Sr. No. | Course Code | Subject | Course Objectives | Course Outcomes- Upon successful completion of the course students will be able to: |
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| | | | **Semester III (2022 SoE)** | | |
| 3 | **1** | 22CT301 | Discrete Maths and Probability Theory | To use mathematically correct terminology and notation. | Analyze and express logic sentence in terms of predicates, quantifiers, and logical connectives. |
| | | | | To construct correct direct and indirect proofs. | Derive the solution for a given problem using deductive logic and prove the solution based on logical inference. |
| | | | | To use division into cases in a proof. | Classify algebraic structure for a given mathematical problem. |
| | | | | To apply logical reasoning to solve a variety of problems. | Perform combinatorial analysis to solve counting problems. |
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| | **2** | 22CT302 | Computer Architecture and Organisation | To understand Internal working of Computer System, its basic principles & execution of machine instructions | Apply the fundamental knowledge to understand the functionality of computer system for CPU, Control Unit, Memory, IO and Storage. |
| | | | | To describe basic processor design using Hardwired and micro programmed control unit | Analyze the execution of complete instruction, arithmetic and processor design. |
| | | | | To observe organization of main memory, cache memory. | Design of adders, ALU and Memory management unit, Organization of memory, memory hierarchy, other peripheral devices, and estimate the cost of computation. |
| | | | | To know Various ways in which I/O operations are performed. | |
| | **3** | 22CT303,22CT304 | Database Management Systems,Database Management Systems Lab | The database management system, | **Understand** database management system, through |
| | | | | The mathematical representation of the database operations. | **Apply** the knowledge of relational algebra and query language to perform the operations on database |
| | | | | The query language to maintain and extract the data from database. | **Apply** the knowledge of database concepts to perform the transaction and concurrency control |
| | | | | The database design, maintenance and operational issues | **Design** database using the entity relation diagrams and relational database aspects. |
| | **4** | 22CT305,22CT306 | Object Oriented Programming,Object Oriented Programming Lab | Understand the concept of object-oriented | Understand the concept of object-oriented |
| | | | | Have an appreciation of the object-oriented programming concepts like reusability of code, inheritance, abstraction, and polymorphism | Apply the knowledge of object-oriented programming to solve the given problem. |
| | | | | Gain an understanding of generic components and how to handle the I/O stream classes | Apply the advanced programming concepts of OOP to solve the given problem |
| | | | | Develop an understanding of MVC architecture and how to build the event driven solution of the problem | Design the event driven web based solution for the problem. |
| | **5** | 22CT307 | **Lab:** Python Programming | Various programming frameworks in Python | Select relevant framework for python programming. |
| | | | | Syntax of various data structures and their operation along with control statements in Python | Write python programs using various data structures and control statements. |
| | | | | Concepts of file handling, classes and objects | Demonstrate skills for effective usage of file handling and concepts of classes and objects. |
| | | | | Various packages inbuilt in Python along with their usages | Develop advanced applications using functionalities provided under various packages in Python. |
| | **6** | 22CT309 | **Lab:** Technical Writing | Understand how to apply technical information and knowledge in practical documents for a variety of professional audiences and public audiences. | Plan and write communications that solve technical problems or help readers make decisions about technical problems and solutions |
| | | | | Practice the unique qualities of professional writing style, including sentence conciseness, readability, clarity, accuracy, honesty, avoiding wordiness or ambiguity, previewing, using direct order organization, objectivity, unbiased analyzing, summarizing, coherence and transitional devices. | Prepare documents that are well-planned, researched, drafted, and designed |
| | | | | Collect, analyze, document, and report research clearly, concisely, logically, and ethically; understand the standards for legitimate interpretations of research data within scientific and technical communities. | Collect and report information thoroughly and accurately |
| | | | | Develop professional work habits, including those necessary for effective collaboration and cooperation with other students, instructors, and Service | Communicate ethically and with sensitivity to diverse audiences |

| | | | Semester IV (2022 SoE) | | |
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| | **7** | 22CT403, 22CT404 | Operating Systems,Operating Systems Lab | To provide knowledge about the services rendered by operating systems. | Describe the different services provided by Operating System at different level. |
| | | | | To understand the concept of different operating system algorithms for problem solving. | Apply knowledge of different operating system algorithms to solve a given problem. |
| | | | | To understand the different methods of evaluation of operating system algorithms. | Analyze various approaches used to improve system performance. |
| | | | | To understand various file-system design and implementation issues. | Differentiate various disk scheduling algorithms based on their performances. |
| | **8** | 22CT408,22CT409 | Computer Networks,Computer Networks Lab | The architecture and principles of today's computer networks | Understand design issues of layers and network reference model |
| | | | | The protocols and their functionalities | Solve the given problems related to networking domain. |
| | | | | The requirements for the future Internet and its impact on the computer network architecture. | Analyze different networking protocol at various layers |
| | | | | | Evaluate the performance of network using different tools |
| | **9** | 22CT405 | Theoritical Foundations of Computer Science | To introduce students to the mathematical foundations of computation including automata theory, regular languages. | **Construct** automata, regular expression for any pattern. |
| | | | | To understand of different types of grammars and the properties of Context Free Grammar | **Construct** context free grammar for various languages. |
| | | | | To study the concepts of Push Down Automata and Turing machine. | **Construct** push down automata and Turing Machine for a language. |
| | | | | To understand decidable and un-decidable problems. | **Evaluate and justify** whether a problem is decidable or not. |
| | **10** | 22CT406,22CT407 | Mathematical Foundations for Data Analysis,Mathematical Foundations for Data Analysis Lab | Basis of statistics and linear algebra. | **Apply** different visualization, summarizing techniques and linear algebra to given data for its interpretation. |
| | | | | Concepts of probability, probability distribution and random variables | **Solve** given problem using the probability theory, random variables and apply the concept to Bayes Theorem |
| | | | | Concepts of sampling, sampling distribution, estimation and regression analysis | **Perform** sampling distribution to estimate the given data and predict the analysis using regression. |
| | | | | To find expected values and test the goodness of fit. | **Formulate** and **test** a hypothesis, using critical values to draw conclusions and determining probability of making errors in hypothesis tests. |
| | | | | To define steps of testing of hypothesis. | |
| | | | | To differentiate between parametric and non-parametric tests | |
| | **11** | 22CT410 | Lab: Web Technology | Working of internet technology. | Understand various internet technologies |
| | | | | Designing dynamic webpages. | Design the web pages using HTML and CSS |
| | | | | The structure of XML. | Implement the XML technology to store the data |
| | | | | The advance technique for designing the interactive web page | Develop the interactive web pages using JavaScript |

| | | | Semester V (SoE 2020 SOE) | | |
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| | **12** | GE2312 | Fundamentals of Economics | It introduced the concept of economics and provides knowledge about consumer's rational behaviour. | Recognizes consumer's behavior and pricing |
| | | | | This introduced various factors of production and its role in production process, gives idea about short run and long run production constraint, types of cost and depreciation. | Extrapolates an operations in market with productions constrain. |
| | | | | It provide knowledge to the students about various market structure, demand and revenue curves in it, How price and output determine in various forms of market and how price discriminate for consumer to consumer. | Describes the national income accounting and public finance. |
| | | | | It gives knowledge about various national products, its counting with respect to various factors and factors causes to economic growth and development. | Interprets international trade and institutions. |
| | | | | Provide knowledge of functioning of money, financial institution and various sources of public finance/revenue and its types. | |
| | | | | To provide knowledge about international economics, foreign trade and its agreement, export, foreign exchange and the various international financial institution. | |
| | **13** | CT2301, CT2302 | Computer Networks,Computer Networks Lab | The importance of layering architecture and classify different types of networks | Understand design issues of layers and network reference model |
| | | | | different protocols at various layers. | Solve the given problems related to networking domain. |
| | | | | modern networking tools. | Analyze different networking protocol at various layers |
| | | | | | Evaluate the performance of network using different tools |
| 5 | **14** | CT2303 | Theoretical Foundations of Computer Science | The mathematical foundations of computation including automata theory, regular languages. | Construct automata, regular expression for any pattern. |
| | | | | Different types of grammars and the properties of Context Free Grammar | Construct context free grammar for various languages. |
| | | | | The concepts of Push Down Automata and Turing machine. | Construct push down automata and Turing Machine for a language. |
| | | | | Decidable and un-decidable problems. | Evaluate and justify whether a problem is decidable or not. |
| | **15** | CT2313 | PE1:Machine Learning Using Tensorflow, Machine Learning Using Tensorflow Lab | The basic theory underlying machine learning and different types of machine learning techniques. | Demonstrate the foundational concepts of machine learning, including supervised and unsupervised learning, classification, regression, clustering,evaluation metrics, and machine learning tools |
| | | | | How to build, train, and deploy machine learning models using TensorFlow's high-level APIs. | Demonstrate the fundamental concepts of Neural Network to be used in deep learning. |
| | | | | Various evaluation techniques are used to assess the performance of machine learning models. They will explore metrics like accuracy, precision, recall, and F1 score, and learn how to use techniques like cross-validation and train-test splits for model validation. | Apply machine learning algorithms to real-world problems using real-world datasets using open source TensorFlow's high-level APIs and provide an appropriate interpretation. |
| | | | | | Evaluate the implementation and performance of different machine techniques and neural networks using different methods of |
| | **16** | CT2315, CT2316 | Advanced Web Technology,Advanced Web Technology Lab | Role of different protocols in Web access. | Describe various concepts related to web site development. |
| | | | | Different latest technical concepts related to web page development. | Apply the concepts used for web page designing. |
| | | | | How to use different libraries and frameworks for web page development. | Create web pages and web sites. |
| | **17** | CT2317, CT2318 | PE1: Introduction to Geographical Information System, Introduction to Geographical Information System Lab | Fundamental concepts of GIS and applications of GIS. | Understand various fundamental concepts of GIS and new trends in GIS. |
| | | | | Coordinate Systems, Map Projections metadata, spatial data, spatial analysis, and new trends in GIS. | Understand the concepts of coordinate systems, map projections and spatial data formats for creation of geodatabase. |
| | | | | About map creation. | Understand the procedure of map creation and analysis of spatial data using GIS. |
| | | | | | Apply knowledge of GIS and conduct experiments using GIS tools to create maps and make an effective report to communicate. |
| | | | | | Analyse and investigate various GIS problems and develop a solution using the GIS tool and submit a report in a team. |

| | | | Semester VI (SoE 2020 SOE) | | |
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| | **18** | CT2351, CT2352 | Design & Analysis of Algorithms, Design & Analysis of Algorithms Lab | To introduce different asymptotic notations. | Compare different types of asymptotic notations and find the time complexity in terms of asymptotic notations |
| | | | | To understand mathematical principles of algorithm analysis | Solve recurrences using various techniques. |
| | | | | To understand various algorithm design strategies like divide and conquer strategy, greedy strategy, dynamic programming strategy and backtracking strategy. | Implement divide and conquer strategy, greedy strategy, dynamic programming algorithms and backtracking strategy |
| | | | | To comprehend various complexity classes like P, NP, NP-complete and NP-Hard. | Identify and differentiate between various types of complexity classes. |
| | **19** | CT2353, CT2354 | Language Processor,Language Processor Lab | To study the structure of Compiler and FLEX tool for generating lexical analyzer | Design lexical analyzer using FLEX tool |
| | | | | To explore top down, Bottom up parsing approaches and YACC tool for generating syntax analyzer | Implement syntax analyzer using YACC tool |
| | | | | To understand Syntax Directed Translation Scheme | Create a syntax-directed definition and an annotated parse tree |
| | | | | To introduce Symbol Table Management and Error Detection and Recovery with respect to all phases of compilation | Demonstrate the use of a symbol table throughout compilation |
| | | | | To understand Code optimization and Code generation techniques | Apply various code optimizing transformations and code generation techniques |
| | **20** | CT2355, CT2356 | Software Engineering, Software Engineering Lab | software engineering best practices and different strategies applicable for software development, software requirement and its design activity. | Study software engineering best practices and different strategies applicable for software development, software requirement and its design activity. |
| | | | | explore the various testing types and its strategies | Explore the various testing types and its strategies. |
| | | | | configuration management, version control and change control process of Software development | Understand configuration management, version control and change control process of Software development |
| | | | | project management, planning, scheduling, risk management, project and process metrics | Understand project management, planning, scheduling, risk management, project and process metrics. |
| | | | | overview of open source Software Engineering tool viz. Subversion and understand some concepts such as Re-engineering and Reverse engineering | Get an overview of open source Software Engineering tool viz. Subversion and understand some concepts such as Re-engineering and Reverse engineering |
| | **21** | CT2361, CT2352 | PE II: Digital Image Processing, Digital Image Processing Lab | To Explore image enhancement techniques in spatial domain and frequency domain | Describe Basic relationships between pixels |
| | | | | To Understand the fundamental concept of image compression | Compare various image enhancement techniques in spatial domain and frequency domain |
| | | | | To Study various similarity based, and dissimilarity-based image segmentation approaches | Illustrate different image compression techniques to understand the advantage of image compression |
| | | | | To Understand the basic concepts of image representation and description | Demonstrate the applications of similarity based and dissimilarity-based approaches for image segmentation |
| | | | | | Interpret various representation techniques |
| | **22** | CT2367, CT2368 | PE II: INLP,Lab INLP | To understand basic aspects of Natural languages used in processing of text | Describe linguistic phenomena with formal grammars |
| | | | | To get acquainted with the basic concepts and algorithmic description of the main levels of language levels: morphology, syntax, semantics, and pragmatics | Illustrate and test algorithms for NLP problems |
| | | | | To Learn the mathematical and linguistic foundations | Examine NLP applications |
| | | | | To appreciate underlying approaches for the various areas in NLP | Devise real world NLP applications using NLP techniques |

| | | | Semester VII (SoE 2020) | | |
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| 7 | **23** | CT2401, CT2402 | Artificial Intelligence,Lab: Artificial Intelligence | To understand fundamental concepts in Artificial Intelligence, its applications, techniques, related fields, and different types of AI agents | **Understand** the fundamentals of AI to identify performance measures for a given intelligent agent |
| | | | | To describe different searching algorithms in AI (uninformed, informed, heuristic, constraint satisfaction) | **Apply** searching techniques for problem-solving and planning |
| | | | | To understand fundamental knowledge of different knowledge representation approaches | **Apply** different knowledge representation techniques on given facts |
| | | | | To comprehend AI planning and scheduling operations. | **Solve** AI problems using the techniques of uncertainty |
| | **24** | CT2403 | Network Security | Understand the security threats aimed at computer network and describe various security mechanisms and services to counter them. | Identify threats to network security, associated attacks and countermeasures against attack. |
| | | | | Study cryptographic mathematics to solve network security problems. | Use appropriate mathematical techniques in cryptography |
| | | | | Study of various cryptographic algorithms. | Apply various algorithms/ mechanisms to formulate appropriate solution. |
| | | | | Understand different security protocols at various layers of network model. | Use of different security protocols at various networking layers. |
| | **25** | CT2411 | PE III: Neural Network and Fuzzy Logic | Understand the fundamentals of biological neural network and artificial neural network | Understand the fundamentals of Artificial Neural Network and Fuzzy Logic |
| | | | | Understand the architecture of feed forward and feed backward neural networks and related learning rules | Apply the concepts of Artificial Neural Network and Fuzzy Logic for the given scenario |
| | | | | Understand the operations and properties of classical crisp set and fuzzy set theory with arithmetic operations | Design single layer and multilayer neural networks for the given problem definition |
| | | | | Understand defuzzification methods used in fuzzy controller system | |
| | **26** | CT2412 | PE III: ADHOC Wireless Network | Understand the various design issues and challenges in the layered architecture of Ad hoc wireless networks | **Understand** the issues and challenges in design of wireless ad hoc networks. |
| | | | | Study security aspect of communication in ad hoc network | **Analyze** proposed protocols at MAC and routing layers of ad hoc networks. |
| | | | | Understand Quality of Service and energy management techniques in Ad-hoc network | **Analyze** attacks pertaining to network layer. |
| | | | | | **Evaluate** the energy management schemes and Quality of service solution in ad hoc networks |
| | **27** | | PE III: Business Intelligence | The different concepts of business intelligence. | **Understand** the basic concepts of Business Intelligence, digital data types, multidimensional modelling and its applications in different technology domain. |
| | | | | The process to design the Multidimensional data model. | **Apply** the ETL process to absorb the data in MDDM. |
| | | | | The business processes assessment concepts and its representation using reports. | **Analyze** the data to identify digital data types and multidimensional schema. |
| | | | | The BI applications in different technology domains. | **Design** the MDDM and reports using the business concepts. |
| | **28** | CT2425 | PE IV: Machine Learning,Lab Machine Learning | The concepts of machine learning and the relative strengths and weaknesses of different machine learning methods. | Understand the fundamental principles of machine learning and design methods |
| | | | | The concept of different type of machines learning and how to apply a learning algorithms to sample | Apply various machine learning algorithms on a given problem and interpret the results. |
| | | | | The different methods of evaluation of machine learning algorithms | Evaluate the performance of various machine learning algorithms on different datasets of a domain |
| | | | | Different ensembling methods and new techniques. | Implement various machine learning algorithms on a given dataset using modern tools and write a report. |
| | | | | | Formulate machine learning problems through investigation and analysis of data to design a solution. |
| | **29** | | PE IV: JAVA Full Stack,JAVA Full Stack Lab | The concepts related to advance Java features, database connectivity | Understand all the components and processes of Java Full stack web development and application deployment on cloud |
| | | | | The techniques to create the user interface for application | Apply the concepts related to OOP, advance Java features and database connectivity |
| | | | | The deployment of application on cloud | Apply the techniques to create the user interface for application. |
| | | | | The different tools to develop the complete software | Apply the different tools to develop the software solution |

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| **30** | | PE IV: .NET Full Stack,.NET Full Stack Lab | C# concepts using .NET Framework. | Understand the concepts of C#, LINQ, ASP, MVC Controller using .NET Framework along with Coding Principle, DevOps, Docker. |
| | | | LINQ, SQL Sever, DataBase Object concepts for .NET Framework. | Apply the concepts of C#, LINQ, ASP, MVC Controller using .NET Framework for application development. |
| | | | Role of MVC to manage the relationship between the user interface and underlying data. | Implement the concepts of C#, LINQ, ASP, MVC Controller using .NET Framework. |
| | | | ASP.NET for building modern web apps and services that run on macOS, Linux, Windows, and Docker. | Design various applications using .NET framework. |
| **31** | CT2435 | PE V:Cloud Computing | The basic concepts of distributed systems and cloud computing. | **Understand** the techniques, tools, skills in a secured cloud environment. |
| | | | The concepts, characteristics, delivery models and benefits of cloud computing. | **Apply** distributed computational model and understand the need for cloud computing. |
| | | | Some important cloud computing driven commercial systems and applications. | **Analyze** the need for virtualization in a cloud environment and apply it in compute, memory and storage levels. |
| | | | Frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research. | **Design** a cloud-based system, process, component, or program to meet desired needs. |
| **32** | | PE V: Data Mining | The concepts related to data preparation, data modeling, and knowledge extraction | **Understand** the concepts related to data preparation, data modeling, and knowledge extraction |
| | | | The techniques for data pre-processing and modeling for knowledge extraction | **Apply** the techniques for data pre-processing and modeling for knowledge extraction |
| | | | The Supervised and unsupervised data mining concepts for knowledge extraction | **Apply** the supervised and unsupervised data mining techniques for knowledge extraction |
| | | | | **Analyze** the data to apply appropriate data modeling and mining technique. |
| **33** | | PE V:Embedded Systems | Concept of the Embedded Systems surrounding them | **Understand** the concept of Embedded System design process and different Applications of Embedded system. |
| | | | Types of processors & architectures used and design concepts used in Embedded System | **Understand** the use of software development tools and debugging technologies. |
| | | | Concepts of Real Time Operating System, Mobile Operating System | **Understand** real- time operating systems from embedded and other operating systems |
| | | | Different types of instruction sets for developing Embedded System | **Understand** the architectural support of ARM processor, function of memory management, instruction set of ARM controller. |
| **34** | CT2409 | Mini Project | Develop their own ideas | Identify real life technical problem, conduct literature survey, and find limitations in existing solutions to address societal and industrial concerns. |
| | | | Interact with outside world | Analyze the problem and identify suitable tools and technologies for finding solution to the problem. |
| | | | Work in a group in a collaborative and productive manner | Communicate proposed solution effectively with proper presentation methods. |

| | | | Semester VIII (SoE 2020) | | |
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| 8 | **35** | CT2451 | Major Project | To apply knowledge of mathematics, science and engineering in a global, economic, environmental and societal context and engage in life-long learning.model | Acquire the domain knowledge and analyze the implemented model |
| | | | | To design a model, a system or components considering environmental, economic, social, political, ethical and sustainability and analyze and interpret the data. | Design and develop the solution using appropriate tools and techniques for betterment of society and industry |
| | | | | To work on multidisciplinary teams, tackle engineering problems, understand professional and ethical responsibility and communicate effectively. | Communicate the work done through paper presentation or participation in competition as a team. |
| | | | | To apply knowledge of contemporary issues and use the techniques, skills, and modern engineering tools necessary for engineering practices. | |
| | | | | To analyze and design RCC & steel structures, draw and prepare cost estimates of civil engineering structures. | |
| | **36** | CT2452 | Extra curricular Activity Evaluation | To expose to culture and tradition. | An ability to work initially as well as part of team to achieve set goals. |
| | | | | To provide opportunity for student to perform and present their hidden talent, still and art. | Develop his hobbies and interests |
| | | | | To nurture hobbies. | Communicate and work in team |
| | | | | To organize co-curricular activities to make competitive spirit, cooperation, leadership, diligence, punctuality, team spirits. | Develop the sense of responsibility |
| | | | | To develop creative talent, self-confidence, sense of achievement. | |
| | | | | To be able to design process on environmental, social, political, ethical, health and safety. | |