**Courses Outcomes**

| **Course Code** | **Course Name** | **Course Outcome** |
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| CEC05 | Design and Analysis of Algorithms | 1.To be able to analyze a problem in terms of processing steps, time and space complexity.  2.To be able to design and implement the algorithms for any given application.  3.To be able to develop software applications using various programming languages in collaborative groups.  4.To apply the principles learnt in solving problems encountered in career or real life situations. |
| CEC06 | Database Management Systems | 1.At the end of the course students would be able to learn about various database models, tools for databases.  2.Students would be able to recognize and use contemporary logical design methods and develop sophisticated queries to extract information from large datasets.  3.Understand and evaluate the role of database management systems in information technology applications within organizations |
| CEC07 | Object Orientation | 1. To be able to visualize and analyse complex real-life problems in an object-oriented manner  2. To be able to code using any state-of-the-art object-oriented language like Java or python  3. To be able to appreciate the relevance of object-oriented paradigm in software engineering for reducing cost and effort involved in software development |
| CEC08 | Computer Architecture and Organization | 1. To understand the architecture of modern processors and organization of its components, and relationship between hardware and software in digital machines.  2. To design instructions and corresponding logic circuits for a simple CPU with its essential components such as ALU, a register file, memory and input-output.  3. To appreciate the evolving technology that governs the evolution of modern computers and continue to keep abreast of state-of-art in computing technology |
| CEC15 | Theory of Computation | 1. Acquire knowledge of Regular Languages, FA, CFG, Push Down Automata and Turing  recognizable languages  2. Be able to get a broad overview of the theoretical foundations of computer science  3. Be able to think analytically and intuitively for problem solving situations in related  areas of theory of computer science |
| CEC16 | High Performance Computing | 1. To understand the capabilities, limitations and performance of high-performance architectures and  their applications in solving challenging problems.  2. Develop the skills to decompose parallelizable problems effectively.  3. Write parallel algorithms and use parallel programming paradigms to implement them.  4. Appreciate the multidisciplinary approach for developing and utilizing high performance systems.  5. Getting the exposure to set up a small cluster and various concepts of computing. |
| CEC17 | Compiler Construction | 1.Fluency in describing the theory and practice of compilation, in particular, the lexical analyzer, syntax and semantic analysis, code generation and optimization phases of compilation  2.Ability to create lexical rules and grammars for a programming language  3.Ability to use flex or similar tools to create a lexical analyzer and Yacc/Bison tools to create a parser  4.Ability to design a compiler for a concise programming language  5.Ability to design simple domain-specific languages (DSLs) using compiler construction tools |
| CEC18 | Modeling and Simulation | 1.Understand and apply the techniques for probabilistic and statistical modeling.  2.Analyze and model real world problems and simulate their working using Markov  models, queuing models, Monte Carlo and event driven simulation.  3.Estimate the cost and benefits of computer simulation, generation of meaningful  results, decision making, and risks and be able to formulate judgments and  synthesize conclusions through research of a simulation topic. |
| CED16 | Artificial Intelligence | 1. Distinguish between a conventional system and an intelligent system  2. Explain Artificial Intelligence concept and its applications  3. Represent knowledge using various different techniques  4. Use the appropriate searching techniques in achieving desired goals  5. Apply Artificial Intelligent techniques in solving problems of a particular domain |
| CED38 | Soft Computing | 1. Understand the complexity of current information systems due their inherent uncertainty and imprecision.  2. Ability to use methodologies that can exploit the tolerance for imprecision to develop robust and cheap solutions for intelligent systems.  3. Develop skills to apply various components of soft computing such as fuzzy logic, evolutionary computing, probabilistic computing etc and their combination to implement the solutions. |
| CO401 | Compiler and Translator Design | 1.Fluency in describing the theory and practice of compilation, in particular, the lexical analyzer, syntax and semantic analysis, code generation and optimization phases of compilation  2. Ability to create lexical rules and grammars for a programming language  3.Ability to use flex or similar tools to create a lexical analyzer and Yacc/Bison tools to create a parser  4.Ability to design a compiler for a concise programming language  5.Ability to design simple domain-specific languages (DSLs) using compiler construction tools |
| CO403 | Microprocessor Applications | 1.To acquire insight into architectural details of microprocessors, assembly language  programming, and different bus structures and standards.  2. To understand and implement the interfacing of external devices to the processor.  3. To analyze the hardware/software tradeoffs involved in the design of microprocessor and microcontrollers based systems and apply this knowledge to create novel products and solutions for real time problems. |
| CO404 | Theory of Automata and Formal Language | 1. To acquire a thorough understanding of the state-of-the-art in modern network  architecture, protocols, networked systems and applications  2. To become proficient to develop software for modern networking devices  3. To have sufficient background knowledge to conduct networking research and  develop innovative ideas. |
| CO405 | Artificial Intelligence | 1. Distinguish between a conventional system and an intelligent system.  2. Explain Artificial Intelligence concept and its applications.  3. Represent knowledge using various different techniques.  4. Use the appropriate searching techniques in achieving desired goals.  5. Apply Artificial Intelligent techniques in solving problems of a particular domain. |
| CEC11 | Software Engineering | 1Understand that software development cannot be done in an adhoc fashion and has to follow a disciplined systematic approach for timely development of software within budget.  2.Learn various techniques used for software project management, software estimation and software testing. |
| CEC12 | Computer Graphics | 1. To understand the underlying mathematics for output primitives and to incorporate with programming in drawing those primitive.  2. To use graphics primitives in drawing real life objects and to learn how to incorporate characteristics such as shading and animation.  3. To work in collaboration to carry out graphic projects. |
| CEC13 | Computer Networking | 1. To acquire a thorough understanding of the state-of-the-art in modern network  architecture, protocols, networked systems and applications  2. To become proficient to develop software for modern networking devices  3. To have sufficient background knowledge to conduct networking research and  develop innovative ideas. |
| CEC14 | Operating Systems | 1. Understand how an operating system manages all the resources in a computer system efficiently.  2. Learn algorithms for CPU scheduling, deadlock handling, page replacement and disk scheduling used by an operating system.  3. Use shell commands to efficiently operate a computer system.  4. Learn and use system calls for process creation and termination, inter-process communication, process synchronization, memory management and file system management. |
| CEC20 | IT Law and Ethics | 1.An understanding of the law that governs the development and dissemination of  software.  2. An understanding of the law that governs the dissemination of digitized information.  3. An understanding of ethics related to the IT profession. |
| CED08 | Mobile Computing | 1. Understand the characteristics and limitations of mobile hardware devices including their user-interface modalities. 2. Interface a mobile computing system to hardware and networks. 3. Program applications on a mobile computing system and interact with servers and database systems. 4. Develop an awareness of professional and ethical issues, in particular those relating to security and privacy of user data and user behavior. |
| CED17 | Machine Learning | 1. To develop an understanding of the fundamentals of machine learning and statistical pattern recognition.  2. To gain an insight into the various components of machine learning such as supervised learning, unsupervised learning, learning theory, reinforcement learning and adaptive control.  3. To acquire skills that can be applied to various components of machine learning to applications like robotic control, data mining, autonomous navigation, bioinformatics, speech recognition, and text and web data processing. |
| CED34 | Cryptography | 1. To learn the mathematics, logic and science underlying the principles of cryptography.  2. To implement the cryptographic algorithms and use them in developing applications. |
| CED37 | Cloud Computing |  |
| CO411 | Computer Communication and Electronics Switching |  |
| CO412 | Software Engineering | 1. Understand that software development cannot be done in an adhoc fashion and has to follow a disciplined systematic approach for timely development of software within budget.  2. Learn various techniques used for software project management, software estimation and software testing. |
| CO413 | Expert Systems | 1. Ability to design expert system using AI tools.  2. Ability to design and develop expert system using Neural Networks.  3. Ability to design and develop expert system using Machine Learning.  4. Ability to design and develop expert system using Fuzzy Logic.  5. Ability to design and develop expert system using Deep Learning.  mechanisms. |
| CED02 | Big Data and Analytics |  |
| CED05 | Advanced Data Structures | 1. Understand and apply amortized analysis on data structures, including binary search trees, meargable heaps, and disjoint sets.  2. Understand the implementation and complexity analysis of fundamental algorithms such as RSA, primality testing, max flow, discrete Fourier transform.  3. Develop applications using concepts learnt such as of linear programming, string matching and game-theory |
| CED03 | Software Testing | 1.Learn the various concepts and methods that can be used to test software before it is delivered to the end user.  2. Learn about various challenges and difficulties faced during the process of software testing and approach for tackling them |
| CED20 | Advanced Databases | 1. To get acquainted with new models and optimization techniques in digital databases  2. To conduct research in the domain of databases and acquire the habit of keeping abreast of latest developments |
| CED32 | Human Computer Interfacing | 1.To be able to understand the importance of designing interactive products that are usable.  2.To be able to communicate effectively about requirements, design, and evaluation activities relating to interactive products.  3. Evaluate an interactive product using suitable techniques. |
| CED12 | Emerging Programming Paradigms | 1.To acquire knowledge of emerging paradigms like agile software development,  design patterns and component-based development.  2.To be able to apply the concepts for designing complex object-oriented solutions  in a collaborative environment  3. To imbibe the habit of continuous process of learning new and emerging  technologies in the field of programming languages |
| CED31 | Multimedia Applications | 1. Understanding range of concepts, techniques and tools for creating and editing interactive multimedia applications. 2. Identify both theoretical and practical aspects in designing multimedia systems. 3. Gain ability to develop multimedia applications using contemporary hardware and software technologies. |
| CED11 | Internet and Web technology | 1. Acquire knowledge of web protocols and develop understanding of concepts of Internet security.  2. Able to implement studied technologies in systematically developing a website with due regard to ethical and environmental issues.  3. Understand the significance of emerging web technologies for the advancement of society. |
| CED18 | Computer Vision |  |
| CED21 | Internet of Things | 1. Acquire knowledge of web protocols and develop understanding of concepts of Internet security.  2. Able to implement studied technologies in systematically developing a website with due regard to ethical and environmental issues.  3. Understand the significance of emerging web technologies for the advancement of society. |
| CED22 | Software Quality | 1.Understand the quantitative aspect of software quality.  2.Learn and apply prevalent software quality tools and techniques for measuring quality in traditional manufacturing set up.  3.Apply these tools and techniques in the software scenario.  4.Understand and learn the various quality management tools in the different stages of Software Development life cycle |
| CED23 | Requirements Engineering | 1.To appreciate the importance of Requirements Engineering in the Software development Life Cycle.  2. To model the real-life problem with the help of requirements engineering techniques.  3. To learn about representation of requirements through various requirements engineering techniques. |
| CECSC04 | Web Technology | 1. To understand the development and transition of the web.  2. To Learn creating the web pages and apply the styles 3. To learn the web programming for simple day to day work.  4. To learn fetching the object using latest technologies and using them to process information  5. To write a full-fledged web-based application and deploy it. |
| CECSC05 | Database Management Systems | 1. Understand fundamentals of database management systems. 2. Design database models and learn database languages to write queries to extract information from databases. 3. Identify database anomalies and improve the design of database management system 4. Understand transaction management and concurrency control. 5. Understand storage organization and database recovery. |
| CECSC06 | Design and Analysis of Algorithms | 1.To be able to analyze the asymptotic performance of algorithms.  2.To be able to write rigorous correctness proofs for algorithms.  3.Able to demonstrate a familiarity with major algorithms and data structures.  4.To be able to apply important algorithmic design paradigms and methods of analysis.  5.To be able to synthesize efficient algorithms in common engineering design situations. |
| CECSC07 | Computer Architecture and Organization | 1. To understand the architecture of modern processors and organization of its components, and relationship between hardware and software in digital machines.  2. To design instructions and corresponding logic circuits for a simple CPU with its essential components such as ALU, a register file, memory and input-output.  3. To appreciate the evolving technology that governs the evolution of modern computers and continue to keep abreast of state-of-art in computing technology |
| CED40 | Design and Architectural Patterns | 1. To appreciate the benefits of design and architectural patterns in object oriented software development  2. To learn the use of various design patterns and architectural patterns |
| CECSC09 | Operating Systems | 1. Understand the function, structure, history of an operating system and the design issues associated with an operating system.  2. Understand the concept of multithreading, process management concepts including scheduling, synchronization and deadlocks.  3. Learn the memory management concepts including virtual memory.  4. Comprehend file system interface and implementation and disk management.  5. Be familiar with protection and security mechanisms. |
| CECSC10 | Theory of Automata and Formal Languages | 1. Students will be able to demonstrate knowledge of basic mathematical models  of computation and relate them to the formal languages.  2. Acquire knowledge of Regular Languages, FA, CFG, Push Down Automata and  Turing recognizable languages  3. Be able to get a broad overview of the theoretical foundations of computer  science  4. Be able to think analytically and intuitively for problem solving situations in  related areas of theory of computer science  5. Students will understand the limitations of computers and learn examples of  unsolvable problems. |
| CECSC11 | Software Engineering | 1.To appreciate the fact that software development cannot be done in an adhoc fashion and has to follow a disciplined systematic approach for timely development of software within budget using suitable Process model and techniques  2.To learn various techniques for Requirements Elicitation and Specification in order to develop SRS for a problem domain  3. To learn Different techniques for software project management like Feasibility Analysis, Cost and Effort Estimation, Scheduling a project etc and Architecture Styles.  4.To learn to test a software using suitable verification and validation testing techniques.  5.To learn about different Software Quality frameworks, Software metrics, Software Reliability, Risk management, software maintenance etc. |
| CED07 | Information and Network Security | 1. Understand the principles, techniques and tools used for designing secure  information systems.  2. Design, implement and maintain secure computer networks.  3. Safely recover an information system or network from a security attack. |
| CED06 | Natural Language Processing |  |
| CED09 | Advanced Networks | 1. To acquire knowledge so as to become familiar with the state of the art in  modern day computer networks: network architecture, protocols and systems.  2. To gain knowledge of various analytical methods used in the design and  engineering of next-generation networks and use simulations to evaluate the  performance of various design concepts.  3. To understand the current directions in design of computer networks from  literature readings in order to perform high-quality research.  4. To learn about various threats and attacks on web application and adopt  ethical practices in using and designing web base application |
| CED14 | Advanced Algorithms | 1. Candidate will be able to understand paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice with asymptotic notations.  2. Able to use different computational models (e.g., divide-and-conquer, greedy approach, dynamic programming, back tracking, branch and bound) with their complexity measures like running time, disk space for solving real life complex problems for lifelong learning.  3. Understand the difference between the lower and upper bounds of various problems and their importance in deciding the optimality of an algorithm and relating these analyses to real life problems.  4. Able to understand solvable / unsolvable problems the classes P, NP and NP-complete. |
| CED39 | Distributed Computing | 1.Understand the concepts of distributed computing systems along with design and  implementation issues.  2.Acquire skills to analyze design and implement distributed algorithms |
| COCSC04 | Web Technology | 1. To understand the development and transition of the web.  2. To Learn creating the web pages and apply the styles 3. To learn the web programming for simple day to day work.  4. To learn fetching the object using latest technologies and using them to process information  5. To write a full-fledged web-based application and deploy it. |
| COCSC05 | Database Management Systems | 1.understand fundamentals of database management systems.  2.design database models and learn database languages to write queries to extract information from databases.  3.Identify database anomalies and improve the design of database management system  4.understand transaction management and concurrency control.  5.understand storage organization and database recovery. |
| CoCSC06 | Design and Analysis of Algorithms | 1.To be able to analyze the asymptotic performance of algorithms.  2.To be able to write rigorous correctness proofs for algorithms.  3.Able to demonstrate a familiarity with major algorithms and data structures.  4.To be able to apply important algorithmic design paradigms and methods of analysis.  5.To be able to synthesize efficient algorithms in common engineering design situations. |
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| COCSC14 | Principles of Compiler Construction | 1. Fluency in describing the theory and practice of compilation, in particular, the lexical analyzer, syntax and semantic analysis, code generation and optimization phases of compilation  2.Ability to create lexical rules and grammars for a programming language  3.Ability to use flex or similar tools to create a lexical analyzer and Yacc/Bison tools to create a parser  4.Ability to design a compiler for a concise programming language  5.Ability to design simple domain-specific languages (DSLs) using compiler construction tools |
| COCSC15 | Cloud Computing |  |
| COCSC16 | Data Mining | 1. To understand what Is Data Mining, what kinds of data can be mined, what kinds of patterns can be mined, and what kinds of applications are targeted. 2. To Apply machine learning, pattern recognition, statistics, visualization, algorithm, database technology and high-performance computing in data mining applications. 3. To identify what kinds of technologies are used for different application and evaluate the performance of different algorithms. 4. To apply algorithms for mining frequent patterns and association, classification, clustering, and outlier detection in real-life applications. |
| COCSC17 | Machine Learning | 1. To understand the characteristics of data-driven machine learning approach for solving problems 2. To develop and refine different ML models for specific applications, implement and evaluate them and finally apply them for the given task. 3. To conduct team projects and/or exploratory work in different domains, with emphasis on ethical means of acquiring and processing data 4. To develop and implement team projects that address some practical real-life problem 5. To update oneself with the latest developments in the evolving field of machine learning through websites and research papers |
| COCSE05 | Object Oriented Analysis and Design | 1. To appreciate the fact that software development cannot be done in an adhoc fashion and has to follow a disciplined systematic approach for timely development of software within budget using suitable Process model and techniques  2. To learn various techniques for Requirements Elicitation and Specification in order to develop SRS for a problem domain  3. To model a problem domain using Object oriented analysis and design using UML  4. To learn Different techniques for software project management like Feasibility Analysis, Cost and Effort Estimation, Scheduling a project  5. To learn about different Software Quality frameworks, OO metrics, Configuration Management etc. |
| COCSE06 | Cryptography Techniques | 1. Understand the function, structure, history of an operating system and the design issues associated with an operating system.  2. Understand the concept of multithreading, process management concepts including scheduling, synchronization and deadlocks.  3. Learn the memory management concepts including virtual memory.  4. Comprehend file system interface and implementation and disk management.  5. Be familiar with protection and security mechanisms. |
| COCSC09 | Operating Systems | 1. Understand the function, structure, history of an operating system and the design issues associated with an operating system.  2. Understand the concept of multithreading, process management concepts including scheduling, synchronization and deadlocks.  3. Learn the memory management concepts including virtual memory.  4. Comprehend file system interface and implementation and disk management.  5. Be familiar with protection and security mechanisms. |
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| COCSC11 | Software Engineering | 1.To appreciate the fact that software development cannot be done in an adhoc fashion and has to follow a disciplined systematic approach for timely development of software within budget using suitable Process model and techniques  2. To learn various techniques for Requirements Elicitation and Specification in order to develop SRS for a problem domain  3.To learn Different techniques for software project management like Feasibility Analysis, Cost and Effort Estimation, Scheduling a project etc and Architecture Styles.  4.To learn to test a software using suitable verification and validation testing techniques.  5.To learn about different Software Quality frameworks, Software metrics, Software Reliability, Risk management, software maintenance etc. |
| COCSC18 | High Performance Computing | 1. To understand the capabilities, limitations and performance of high-performance architectures and  their applications in solving challenging problems.  2. Develop the skills to decompose parallelizable problems effectively.  3. Write parallel algorithms and use parallel programming paradigms to implement them.  4. Appreciate the multidisciplinary approach for developing and utilizing high performance systems.  5. Getting the exposure to set up a small cluster and various concepts of computing. |
| COCSC19 | Computer Hardware/Software Workshop | 1. To get acquaintance with the concept of machine learning libraries, usages for different platforms  2. Getting Exposure to R programming and hands on project in R for Analytics  3. Exposure and usage of the analytics tools such as PowerBI etc  4. Understanding the distributed databases with Apache spark and implementation  5. Implement projects, based on the open-source libraries and get acquainted with the current trends in the industry. |
| COCSC20 | Internet of Things | 1. To understand the concepts of IoT and related protocol.  2. To learn to develop the sensor networks for collecting the data.  3. To create IoT solutions using sensors, actuators, and Devices.  4. To understand the upcoming advancement in the domain of IoT.  5. To deploy an IoT solution for the nearby society for improving their experiences. |
| COCSE26 | Computer Vision |  |
| COSCE27 | Natural Language Processing |  |