

Course Outcomes (COs)

Department of Computer Science and Engineering

Programme Name: B.E.-Computer Science & Engineering

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2022 Scheme(UG)

Course Outcome for Computer Science Engineering

Course Outcomes of Second -Year Courses

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| Course Name | Mathematics for Computer Science |
| Course Code | BCS301 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| BCS301.1 | Illustrate the basic concepts of Probability distribution, Markov chain, Statistical inference and Design of experiments. |
| BCS301.2 | Apply suitable probability distribution models and design of experiments for the given scenario in Computer science & engineering. |
| BCS301.3 | Analyze & solve engineering problems using Statistical methodology and tools. |
| BCS301.4 | Interpret the overall knowledge gained to demonstrate the problems arising in practical situations. |
| Course Name | Digital Design and Computer Organization |
| Course Code | BCS302 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| BCS302.1 | Understand Digital Logic, Processor memory and inter device communication. |
| BCS302.2 | Analyze Digital circuits, internal Organization of Memory and understand Processor performance. |
| BCS302.3 | Design combinational circuits and sequential circuits using Verilog code and implement interconnection of processor and peripheral devices. |
| BCS302.4 | Optimize digital circuits using Mathematical and Verilog tools and evaluate Processor performance including Impact of cache/Pipelining. |
| Course Name | Operating Systems |
| Course Code | BCS303 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| BCS303.1 | Demonstrate the fundamentals of operating system and system services. |
| BCS303.2 | Apply suitable techniques for management of different resources. |
| BCS303.3 | Develop and implement various scheduling algorithms and system services. |
| BCS303.4 | Analyze I/O management and file system, concepts of protection and security. |

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| Course Name | Data Structures and Applications |
| Course Code | BCS304 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| BCS304.1 | Understand various Data Structures and their applications |
| BCS304.2 | Apply Fundamental Data Structures to Problem Solving |
| BCS304.3 | Utilize Linked Lists in Problem Solving |
| BCS304.4 | Develop solutions using Trees, Graphs, and Advanced Data Structures |

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| Course Name | Data Structures Lab |
| Course Code | BCSL305 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| BCSL305.1 | Analyze various linear and non-linear data structures |
| BCSL305.2 | Demonstrate the working nature of different types of data structures and their applications |
| BCSL305.3 | Use appropriate searching and sorting algorithms for the given scenario. |
| BCSL305.4 | Apply the appropriate data structure for solving real world problems |

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| Course Name | Object Oriented Programming with JAVA |
| Course Code | BCS306A |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| BCS306A.1 | Understand the basics of object-oriented programming using java |
| BCS306A.2 | Apply object-oriented concepts to write java programs |
| BCS306A.3 | Develop Java programs using Classes, Inheritance, interface and Exception handling concepts to solve real world problems |
| BCS306A.4 | Apply the concept of multithreading, autoboxing and enumerations in program development |

2021 Scheme(UG)

Course Outcome for Computer Science Engineering

Course Outcomes of Second-Year Courses

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| Course Name | Transform Calculus, Fourier Series and Numerical Techniques |
| Course Code | 21MAT31 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21MAT31.1 | Illustrate the concepts of– Laplace, Fourier & Z transformation, Fourier series , Numerical solutions of PDE & ODE and Calculus of variation . |
| 21MAT31.2 | Apply the above acquired knowledge to solve the problems in engineering. |
| 21MAT31.3 | Analyze the solutions of the real world problems using above techniques. |
| 21MAT31.4 | Interpret the overall knowledge gained to demonstrate the problems arising in practical situations. |

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| Course Name | Data Structures and Applications |
| Course Code | 21CS32 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS32.1 | Explore the fundamental concepts of data structures |
| 21CS32.2 | Apply suitable operations on data structures |
| 21CS32.3 | Design and Develop algorithms that make use of data structures |
| 21CS32.4 | Implement solution for solving problems using high level languages with suitable data structure algorithms |

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| Course Name | Analog and Digital Electronics |
| Course Code | 21CS33 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS33.1 | Explain the characteristics and applications of BJT,OP-Amp,555 timer and digital circuits |
| 21CS33.2 | Illustrate analog and digital circuits |
| 21CS33.3 | Design analog and digital circuits using simplifying techniques. |
| 21CS33.4 | Demonstrate and test analog and digital circuits |

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| Course Name | Computer Organization and Architecture |
| Course Code | 21CS34 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS34.1 | Explain the basic organization of a computer system. |
| 21CS34.2 | Experimenting the functioning of different sub systems, such as processor, input/output, and memory. |
| 21CS34.3 | Analyze the different arithmetic and logical units. |
| 21CS34.4 | Illustrate hardwired control and micro programme. |

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| Course Name | Object Oriented Programming with JAVA Laboratory |
| Course Code | 21CSL35 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CSL35.1 | Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP. |
| 21CSL35.2 | Demonstrate the ability to design and develop java programs, analyse, and interpret object-oriented data and document results |
| 21CSL35.3 | Apply object-oriented concepts using Java to develop programs |
| 21CSL35.4 | Develop user friendly applications using Console based I/O GUI/ File concepts |

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| Course Name | Programming in C++ |
| Course Code | 21CS382 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS382.1 | Understand the basics of object-oriented programming concepts and design a solution to a problem using class types, function operations. |
| 21CS382.2 | Apply the code reusability and extensibility functionalities using object oriented features. |
| 21CS382.3 | Analyze the file handling mechanisms and explore the Performance analysis of I/O Streams. |
| 21CS382.4 | Implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems. |

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| Course Name | Mathematical Foundation for Computing, Probability and Statistics |
| Course Code | 21MATCS41 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21MATCS41.1 | Illustrate the concepts of– Logic, Relations & Functions, Graph theory, Probability distributions and Statistical methods. |
| 21MATCS41.2 | Apply the above acquired knowledge to solve problems in Computer science & engineering. |
| 21MATCS41.3 | Analyze the solutions of the real world problems using above techniques. |
| 21MATCS41.4 | Interpret the overall knowledge gained to demonstrate the problems arising in practical situations. |

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| Course Name | Design and Analysis of Algorithms |
| Course Code | 21CS42 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS42.1 | Analyze the performance of the algorithms, state the efficiency using asymptotic notations and analyze mathematically the complexity of the algorithm |
| 21CS42.2 | Apply Master Theorem to compute time efficiency of recursive algorithms and compare efficiency of algorithms |
| 21CS42.3 | Solve various problems using appropriate design techniques and compare efficiency of algorithms |
| 21CS42.4 | Experiment with various design techniques to solve problems |

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| Course Name | Microcontroller and Embedded Systems |
| Course Code | 21CS43 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS43.1 | Describe the architectural features and instructions of ARM microcontroller. |
| 21CS43.2 | Apply the knowledge gained for Programming ARM for different applications |
| 21CS43.3 | Interface external devices with ARM microcontroller and interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system |
| 21CS43.4 | Develop the hardware /software co-design, firmware design approaches and demonstrate the need of real time operating system for embedded system application |

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| Course Name | Operating System |
| Course Code | 21CS44 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS44.1 | Demonstrate the structure and functions of the operating system and its needs |
| 21CS44.2 | Apply suitable techniques for management of different resources |
| 21CS44.3 | Analyze processes, threads, memory, storage and scheduling algorithms |
| 21CS44.4 | Analyze I/O management and file system, concepts of protection and security. |

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| Course Name | Python Programming Laboratory |
| Course Code | 21CSL46 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CSL46.1 | Explain programming features of python and other data structures lists, tuples and dictionaries. |
| 21CSL46.2 | Apply various features of python to solve problems |
| 21CSL46.3 | Interpret the concepts of Object-Oriented Programming as used in Python. |
| 21CSL46.4 | Explore the need for scraping websites and working with PDF, JSON and other file formats |

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| Course Name | R Programming |
| Course Code | 21CS483 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS483.1 | Understand the fundamentals of R programming |
| 21CS483.2 | Utilize R Data types, classes and functions for developing programs. |
| 21CS483.3 | Make use of different R Data Structures |
| 21CS483.4 | Apply critical programming concepts to process real world problem |

Course Outcomes of Third-Year Courses

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| Course Name | Automata Theory and compiler Design |
| Course Code | 21CS51 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS51.1 | Explain the core concepts of automata theory and theory of computation and the structure of compiler. |
| 21CS51.2 | Apply the concepts of automata theory and theory of computation to design the different phases of the compiler. |
| 21CS51.3 | Design regular and context free grammars for different classes of language and make use of these concepts in compiler design. |
| 21CS51.4 | Design computation models for problems in Automata theory and adaptation of such models in the field of compilers. |

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| Course Name | Computer Networks |
| Course Code | 21CS52 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS52.1 | Understand the basic needs of communication systems |
| 21CS52.2 | Interpret the communication challenges and its solutions |
| 21CS52.3 | Identify and organize the communication system network components |
| 21CS52.4 | Design communication networks for user requirement |

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| Course Name | Database Management Systems |
| Course Code | 21CS53 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS53.1 | Understand the fundamental concepts of databases, relational model, normalization, transaction and concurrency control technique |
| 21CS53.2 | Make the use of proficiency in relational algebra to efficiently query databases and unlock valuable insights using sql. |
| 21CS53.3 | Develop practical application skills, understand normalization algorithms, explore concurrency control, and grasp data model relationships. |
| 21CS53.4 | Expertly analyze SQL, transaction processing, constraint management, schedule classification, and database design theory. |

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| Course Name | Artificial Intelligence and Machine Learning |
| Course Code | 21CS54 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS54.1 | Appraise the theory of Artificial Intelligence and Machine Learning |
| 21CS54.2 | Illustrate the fundamentals of AI and apply them to problem solving. |
| 21CS54.3 | Demonstrate the applications of AI and ML |
| 21CS54.4 | Understand the working of Artificial Neural Networks and basic concepts of clustering Algorithms |

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| Course Name | Database Management Systems Laboratory with Mini Project |
| Course Code | 21CSL55 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CSL55.1 | Apply the database concepts, technology and create the relations by specifying primary and foreign keys. |
| 21CSL55.2 | Demonstrate the working of different concepts of DBMS |
| 21CSL55.3 | Design a Database application and retrieve the values with the help of queries using SQL. |
| 21CSL55.4 | Implement, analyze and evaluate the project developed for an application. |

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| Course Name | Research Methodology & Intellectual Property |
| Course Code | 21RMI56 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21RMI56.1 | To Understand the knowledge on basics of research and its types |
| 21RMI56.2 | To Identify the concept of Literature Review, Technical Reading, Attributions and Citations |
| 21RMI56.3 | Analyze the problem and conduct experimental design / Ethics in Engineering Research |
| 21RMI56.4 | Analyze the Copy Right Act ,Patent Act ,Cyber Law, Trademark of Intellectual Property Rights in engineering. And Design of Industrial , Geographical Indications |

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| Course Name | Software Engineering and Project Management |
| Course Code | 21CS61 |
| Course outcomes (COs): At the end of the course, the student will be able to: | |
| 21CS61.1 | Understand the Evolving Role of Software and Fundamentals of Software Engineering. |
| 21CS61.2 | Identify Various process Frameworks Used in Software Development and Their Significance in project management. |
| 21CS61.3 | Analyze Agile Development Method, Principles, Practices and Importance of DevOps. |
| 21CS61.4 | Apply Various Models to Plan, Schedule and Manage Software Development Activities to Enhance Software Quality of the project. |

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| Course Name | Fullstack Development |
| Course Code | 21CS62 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS62.1 | Gain a Solid Understanding of Web Development Fundamentals and Django Framework |
| 21CS62.2 | Design and Implement Models, Forms, and Views for Web Applications |
| 21CS62.3 | Apply Advanced Techniques in Django for Developing Full Stack Web Applications |
| 21CS62.4 | Utilize Django Framework Libraries, jQuery, and AJAX for Enhanced Web Content Handling |

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| Course Name | Computer Graphics and Fundamentals of Image Processing |
| Course Code | 21CS63 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS63.1 | Explain the basics of graphic systems, image processing, primitives and attributes used in open GL. |
| 21CS63.2 | Illustrate the concept of animation and GUI's |
| 21CS63.3 | Apply basic 2D/3D geometric transformation and processing operations using Open GL /CV API's. |
| 21CS63.4 | Utilize open CV to implement simple applications of image processing and image segmentation techniques. |

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| Course Name | Computer Graphics and Image Processing Laboratory |
| Course Code | 21CSL66 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CSL66.1 | Apply bresenhms line drawing algorithms to construct a line and experiment with basic geometric operations on 2D/3D objects. |
| 21CSL66.2 | Build an interactive program to demonstrate 2D/3D transformations and animation effects using OpenGL. |
| 21CSL66.3 | Utilize image processing operations on image using OpenCV tool. |
| 21CSL66.4 | Demonstrate the real world applications of image processing using OpenCV/ OpenGL tools for the development of mini project. |

Course Outcomes of Fourth -Year Courses

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| Course Name | Big Data Analytics |
| Course Code | 21CS71 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS71.1 | Understand fundamentals of Big Data and its analytics in the real world |
| 21CS71.2 | Illustrate the Big Data framework like Hadoop and NOSQL to efficiently store and process Big Data to generate analytics |
| 21CS71.3 | Apply the MapReduce programming model to process the big data along with Hadoop tools such as pig and Hive to generate analytics |
| 21CS71.4 | Make use of Machine learning algorithm for big data, web contents and Social Networks to provide analytics with relevant visualization tools. |

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| Course Name | Cloud Computing |
| Course Code | 21CS72 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 21CS72.1 | Understand and analyse the various cloud computing platforms and service providers. |
| 21CS72.2 | Illustrate various virtualization concepts and models of cloud computing. |
| 21CS72.3 | Identify the architecture, infrastructure and delivery platforms of cloud computing. |
| 21CS72.4 | Understand the security aspects and development of cloud applications. |

2018 Scheme(UG)

Course Outcome for Computer Science Engineering

Course Outcomes of Second -Year Courses

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| Course Name | Transform Calculus,Fourier Series & Numerical Techniques |
| Course Code | 18MAT31 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18MAT31.1 | Illustrate the concepts of– Laplace, Fourier & Z transformation, Fourier series, Numerical solutions of ODE and Calculus of variation . |
| 18MAT31.2 | Apply the above acquired knowledge to solve the problems in engineering. |
| 18MAT31.3 | Analyze the solutions of the real world problems using above techniques. |
| 18MAT31.4 | Interpret the overall knowledge gained to demonstrate the problems arising in practical situations. |

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|--|---|
| Course Name | Data Structures And Applications |
| Course Code | 18CS32 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS32.1 | Explore the fundamental concepts of data structures. |
| 18CS32.2 | Apply suitable operations on data structures. |
| 18CS32.3 | Develop algorithms that make use of data structures. |
| 18CS32.4 | Implement solution for solving problems using high level languages. |

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| Course Name | ANALOG AND DIGITAL ELECTRONICS |
| Course Code | 18CS33 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS33.1 | Recognize the application and working of Analog devices,Amplifiers and Converters.. |
| 18CS33.2 | Illustrate different method for Boolean expression minimization like Kmap method Quine-Mclusky Method Etc. |
| 18CS33.3 | Implementation of combinational circuit using different application. |
| 18CS33.4 | Construct components of sequential circuits and their applications using Kmap method. |

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| Course Name | COMPUTER ORGANIZATION |
| Course Code | 18CS34 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS34.1 | Explain the basic organization of a computer system. |
| 18CS34.2 | Demonstrate functioning of different sub systems, such as processor, input/output and memory. |
| 18CS34.3 | Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems. |
| 18CS34.4 | Design and analyze simple arithmetic and logic units. |

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| Course Name | SOFTWARE ENGINEERING |
| Course Code | 18CS35 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS35.1 | Outline software engineering principles and activities involved in building large software programs. Identify ethical and professional issues and explain why they are of concern to software engineers. |
| 18CS35.2 | Explain fundamentals of object-oriented concepts using UML. |
| 18CS35.3 | Apply the Knowledge of system models for design and development of software. |
| 18CS35.4 | Plan the software testing strategy and use various metrics for evolution process and apply the techniques, skills, modern engineering tools for project planning and identify software quality parameters using measurements and metrics. |

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| Course Name | Discrete Mathematical Structures |
| Course Code | 18CS36 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS36.1 | Illustrate the concepts of– Logic, principles of counting, Relations and Functions, Recurrence relation and Graph theory . |
| 18CS36.2 | Apply the above acquired knowledge to solve the problems in Computer science and engineering. |
| 18CS36.3 | Analyze the solutions of the real world problems using above suitable techniques. |
| 18CS36.4 | Interpret the overall knowledge gained to demonstrate the problems arising in practical situations. |

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| Course Name | ANALOG AND DIGITAL ELECTRONICS LABORATORY |
| Course Code | 18CSL37 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CSL37.1 | Demonstrate the working of various basic gates. |
| 18CSL37.2 | Design various analog circuit using different ICS and other components and test for the given appropriate inputs. |
| 18CSL37.3 | Implement combinational and sequential circuit using different ics, flip flops and registers. |
| 18CSL37.4 | Experiment various analog and digital circuits using appropriate simulation tool. |

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| Course Name | DATA STRUCTURES LABORATORY |
| Course Code | 18CSL38 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CSL38.1 | Identify various linear and non-linear data structures. |
| 18CSL38.2 | Implement various operations of linear and non-linear data structure. |
| 18CSL38.3 | Analyze various operations of linear and non-layered data structure. |
| 18CSL38.4 | Experiment with appropriate tools to edit compile and execute programs on data structures and document it. |

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| Course Name | COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS |
| Course Code | 18MAT41 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18MAT41.1 | Illustrate the concepts of– complex functions, transformation, Probability distributions and Statistical methods. |
| 18MAT41.2 | Apply the above acquired knowledge to solve the problems in engineering. |
| 18MAT41.3 | Analyze the solutions of the real world problems using above techniques. |
| 18MAT41.4 | Interpret the overall knowledge gained to demonstrate the problems arising in practical situations. |

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| Course Name | DESIGN AND ANALYSIS OF ALGORITHMS |
| Course Code | 18CS42 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS42.1 | Explain various computational problem solving techniques. |
| 18CS42.2 | Apply appropriate method to solve a given problem. |
| 18CS42.3 | Describe various methods of algorithm analysis. |
| 18CS42.4 | Estimate the performance of various algorithms. |

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| Course Name | OPERATING SYSTEMS |
| Course Code | 18CS43 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS43.1 | Demonstrate the structure and functions of the operating system and its needs. |
| 18CS43.2 | Apply suitable techniques for management of different resources. |
| 18CS43.3 | Analyze processes, threads, memory, storage and scheduling algorithms. |
| 18CS43.4 | Analyze I/O management and file system, concepts of protection and security. |

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| Course Name | MICROCONTROLLER AND EMBEDDED SYSTEMS |
| Course Code | 18CS44 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS44.1 | Understand the fundamentals and architecture of ARM based systems. |
| 18CS44.2 | Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system. |
| 18CS44.3 | Explain ARM instructions, embedded system design and need of object system for embedded system design. |
| 18CS44.4 | Write Assembly language programs embedded C program for suitable purposes. |

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| Course Name | OBJECT ORIENTED CONCEPTS |
| Course Code | 18CS45 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS45.1 | Understand the basics of object-oriented programming using C++ and JAVA. |
| 18CS45.2 | Apply object-oriented concepts to write C++/Java programs. |
| 18CS45.3 | Develop Java programs using Classes, Inheritance, interface, Exception handling and multi-threaded concepts to solve real world problems. |
| 18CS45.4 | Develop GUI applications using Swing components and Event handling mechanisms |

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| Course Name | DATA COMMUNICATION |
| Course Code | 18CS46 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS46.1 | Enables students to understand the operation of the components in a data communication network and the functional relationships of these components. |
| 18CS46.2 | Understand basics of data communication, networking, switching, internet and their importance. |
| 18CS46.3 | Analyze the services and features of various protocol layers in data networks. |
| 18CS46.4 | Analyze the different protocols and IEEE 802.xx standards. |

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| Course Name | DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY |
| Course Code | 18CSL47 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CSL47.1 | Design algorithms using appropriate design techniques such as brute-force, greedy, dynamic programming. |
| 18CSL47.2 | Implement a variety of algorithms such as sorting, graph related, combinatorial, etc., in a high level language using java. |
| 18CSL47.3 | Analyze and compare the performance of algorithms using language features using java. |
| 18CSL47.4 | Apply and implement learned algorithm design techniques and data structures to solve real-world problems. |

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| Course Name | MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY |
| Course Code | 18CSL48 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CSL48.1 | Recall ARM instruction set to develop programs. |
| 18CSL48.2 | Demonstrate the application development for arm microcontroller using Keil micro version-4. |
| 18CSL48.3 | Develop and test assembly level program using ARM 7TDMI/LPC2148 Keil Uvision 4 tool/compiler. |
| 18CSL48.4 | Make use of ARM embedded C programs to interface external devices. |

Course Outcomes of Third-Year Courses

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|--|---|
| Course Name | MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY |
| Course Code | 18CS51 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS51.1 | Possess knowledge on the basis concepts of management and organization functions. |
| 18CS51.2 | Illustrate the importance of directing and controlling, leadership styles, communication, coordination and controlling. |
| 18CS51.3 | Outline the role of entrepreneurs in economic development and identification of barriers, business opportunities. |
| 18CS51.4 | Make use of project report formats ERP, IPRS and institutional support in entrepreneurship. |

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| Course Name | COMPUTER NETWORKS AND SECURITY |
| Course Code | 18CS52 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS52.1 | Explain the principles of application layer protocols and services. |
| 18CS52.2 | Illustrate transport layer services and infer UDP and TCP protocols. |
| 18CS52.3 | Classify routers, IP and routing algorithms in network layer. |
| 18CS52.4 | Explain the network security overview, attacks and Cryptographic algorithms and infer multimedia networking and network management. |

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| Course Name | DATABASE MANAGEMENT SYSTEM |
| Course Code | 18CS53 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS53.1 | Outline the components of DBMS, Identify and define database objects to build ER diagram for database. |
| 18CS53.2 | Summaries relational model concepts, enforce integrity constraint on a database and Construct an Entity-Relationship (E-R) model from specifications along with the transformation of the conceptual model into corresponding logical data structures. |
| 18CS53.3 | Make use of Structured Query Language (SQL) for database manipulation and Develop simple application to interact with databases. |
| 18CS53.4 | Apply the normalization process for effective database design, demonstrate components of transaction processing, recovery strategies and choose different concurrency control mechanisms of DBMS. |

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| Course Name | AUTOMATA THEORY AND COMPUTABILITY |
| Course Code | 18CS54 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS54.1 | Explain the fundamental understanding of the core concepts in automata theory and Theory of Computation. |
| 18CS54.2 | Explain different types of automata, formal languages and classification of problems based on different models of computation |
| 18CS54.3 | Demonstrate and compare different types of automata and formal languages for computational model. |
| 18CS54.4 | Apply appropriate automata theory and families of automaton such as FSM, PDA, TM etc. for modeling and solving real time computing problems |

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| Course Name | APPLICATION DEVELOPMENT USING PYTHON |
| Course Code | 18CS55 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS55.1 | Explain programming constructs of Python |
| 18CS55.2 | Demonstrate proficiency of list, tuple, string, file, dictionary and pattern matching. |
| 18CS55.3 | Interpret the object-oriented concepts using Python |
| 18CS55.4 | Implement a solution for given problem using suitable Python programming language features |

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| Course Name | UNIX PROGRAMMING |
| Course Code | 18CS56 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS56.1 | Explain Unix architecture, file System and use of basic commands. |
| 18CS56.2 | Illustrate shell programming and to write shell scripts. |
| 18CS56.3 | Understand the concepts UNIX API's and process control, process accounting, user identification and different IPC mechanisms |
| 18CS56.4 | Understand signal handing mechanism, daemon characteristics, coding rules and error logging. |

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| Course Name | COMPUTER NETWORK LABORATORY |
| Course Code | 18CSL57 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CSL57.1 | Analyze and evaluate the performance of Ethernet LAN and wireless LAN through simulation |
| 18CSL57.2 | Analyze and evaluate the performance of GSM and CDMA model through simulation |
| 18CSL57.3 | Develop Java programs for CRC and RSA algorithm |
| 18CSL57.4 | Develop Java programs for Bellmann ford and leaky bucket algorithms, socket programming using TCP and UDP. |

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| Course Name | DBMS LABORATORY WITH MINI PROJECT |
| Course Code | 18CSL58 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CSL58.1 | Apply the database concepts, technology and create the relations by specifying primary and foreign keys |
| 18CSL58.2 | Construct a database by using data definition data manipulation and control languages |
| 18CSL58.3 | Design a database application entry to the values with the help of queries using sql |
| 18CSL58.4 | Implement, analyze and evaluate the project development for an application |

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| Course Name | SYSTEM SOFTWARE AND COMPILERS |
| Course Code | 18CS61 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS61.1 | Understand the system software concepts assemblers and loaders |
| 18CS61.2 | Develop top down, bottom-up parsers and shift reduce parsers and opcode generation |
| 18CS61.3 | Develop System programs using lex and yacc tools |
| 18CS61.4 | Generate ssd, sst intermediate code generation and machine code generation |

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| Course Name | COMUTER GRAPHICS AND VISUALIZATION |
| Course Code | 18CS62 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS62.1 | Design and implement algorithms for 2D graphics primitives and attributes. |
| 18CS62.2 | Illustrate Geometric transformations on both 2D and 3D objects. |
| 18CS62.3 | Apply concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination Models. |
| 18CS62.4 | Decide suitable hardware and software for developing graphics packages using OpenGL. |

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| Course Name | WEB TECHNOLOGY AND ITS APPLICATIONS |
| Course Code | 18CS63 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS63.1 | Understand the fundamental concepts of different types of web technologies. |
| 18CS63.2 | Apply basic skills to construct simple web pages using client and Server-Side technologies. |
| 18CS63.3 | Develop hands on experience using on HTML, CSS, JavaScript, PHP and jQuery, AJAX using different IDE. |
| 18CS63.4 | Implement real time application using markup languages, server-side programming and Web Services. |

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| Course Name | DATA MINING AND DATA WAREHOUSING |
| Course Code | 18CS641 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS641.1 | Explain the basic concepts of data Mining and data warehousing. ` |
| 18CS641.2 | Interpret different tools and techniques for data Mining and data warehousing. |
| 18CS641.3 | Illustrate different algorithms for data mining and architectural models for data warehousing. |
| 18CS641.4 | Apply appropriate data mining algorithms and techniques to solve Association, Classification and clustering Problems. |

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| Course Name | ADVANCED JAVA AND J2EE |
| Course Code | 18CS644 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS644.1 | Explain advanced Java concepts on such as collections, server side programming and data base programming. |
| 18CS644.2 | Demonstrate advanced Java concepts like Enumerations, Auto-boxing and Annotations, String handling, Collections, JSP, JDBC and Servlet. |
| 18CS644.3 | Make use of the Advanced Java programming features to develop Java applications. |
| 18CS644.4 | Develop program for suitable problem using collections, servlet, JSP and JDBC for development of Java web based applications |

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| Course Name | SYSTEM SOFTWARE LABORATORY |
| Course Code | 18CSL66 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CSL66.1 | Understand the Lexical Analysis phases of Compiler Design and implement programs on these phases using LEX tools and/or C/C++/Java |
| 18CSL66.2 | Understand Syntax Analysis phases of Compiler Design and implement programs on these phases using YACC tools and/or C/C++/Java |
| 18CSL66.3 | Learn different types of CPU scheduling algorithms used in the operating system |
| 18CSL66.4 | Implement memory management - page replacement and deadlock handling algorithms |

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| Course Name | COMPUTER GRAPHICS LABORATORY WITH MINI PROJECT |
| Course Code | 18CSL67 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CSL67.1 | Apply line drawing algorithms to construct a line for all types of slopes. |
| 18CSL67.2 | Apply transformation techniques & clipping algorithms on 2D and 3D graphical objects. |
| 18CSL67.3 | Develop an interactive 3D graphical model with illumination effects, perspective projections using corresponding OpenGL functions. |
| 18CSL67.4 | Demonstrate the concept of animation using curves. |

Course Outcomes of Fourth-Year Courses

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| Course Name | ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING |
| Course Code | 18CS71 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS71.1 | Explain the basic theory of Artificial intelligence and Machine Learning. |
| 18CS71.2 | Illustrate the use of different techniques and Algorithms of AI in problem solving. |
| 18CS71.3 | Apply appropriate ML techniques to learn concept learning, Decision tree, Artificial neural networks. |
| 18CS71.4 | Apply appropriate ML algorithms for Classification, Regression ,Reinforcement learning Problems. |

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| Course Name | BIG DATA AND ANALYTICS |
| Course Code | 18CS72 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS72.1 | Understand fundamentals of Big Data and its analytics in the real world. |
| 18CS72.2 | Illustrate the Big Data framework like Hadoop and NOSQL to efficiently store and process Big Data to generate analytics. |
| 18CS72.3 | Apply the MapReduce programming model to process the big data along with Hadoop tools such as pig and Hive to generate analytics. |
| 18CS72.4 | Make use of Machine learning algorithm for big data, web contents and Social Networks to provide analytics with relevant visualization tools. |

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| Course Name | USER INTERFACE DESIGN |
| Course Code | 18CS734 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS734.1 | Understand the importance and characteristics of user interface design. |
| 18CS734.2 | Understand user interface design process and business functions. |
| 18CS734.3 | Develop system menus, navigation schemes and window characteristics. |
| 18CS734.4 | Understand screen based controls and design the prototypes and test plans of user interface. |

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| Course Name | DIGITAL IMAGE PROCESSING |
| Course Code | 18CS741 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS741.1 | Explain the fundamental concepts of a digital image processing. |
| 18CS741.2 | Illustrate the basic Image Processing operations. |
| 18CS741.3 | Apply Image Processing algorithms in various domains using various transforms. |
| 18CS741.4 | Analyze different Image processing tools and techniques in different applications of Image segmentation, Enhancement and Compression. |

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| Course Name | CRYPTOGRAPHY |
| Course Code | 18CS744 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS744.1 | Understand cryptography basics, algorithms and mathematical background for cryptography. |
| 18CS744.2 | Analyze the important cryptographic algorithms. |
| 18CS744.3 | Explore key management issues and algorithms. |
| 18CS744.4 | Describe digital certificates , authentication protocols , email security and IP Security |

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| Course Name | ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LABORATORY |
| Course Code | 18CSL76 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CSL76.1 | Implement and demonstrate various AI search Algorithms. |
| 18CSL76.2 | Implement and Demonstrate ANN Model using Backpropagation Algorithm |
| 18CSL76.3 | Implement and Demonstrate ML classification, regression Algorithms. |
| 18CSL76.4 | Experiment with appropriate tools to edit, compile, and execute programs on AIML and document it. |

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| Course Name | INTERNET OF THINGS |
| Course Code | 18CS81 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS81.1 | Interpret the basic challenges posed by IOT and Impact of IOT on networking. |
| 18CS81.2 | Compare the deployment of different architectural models and technologies of smart objects to connect them to network. |
| 18CS81.3 | Explain the role of IOT protocols for efficient network communications, data analytics and Security in IOT |
| 18CS81.4 | Analyze different sensor technologies for sensing real world entities and identify the applications of IOT in industry. |

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| Course Name | STORAGE AREA NETWORKS |
| Course Code | 18CS822 |
| Course outcomes (COs): At the end of the course the student will be able to: | |
| 18CS822.1 | Identify key challenges in managing information and analyse different storage networking technologies and data protection implementation methods |
| 18CS822.2 | Use the components and implement the storage networking technologies. |
| 18CS822.3 | Describe the backup ,recovery and data protection topologies, information availability and business continuity. |
| 18CS822.4 | Illustrate storage infrastructure, management activities and analysing security risk in storage infrastructure. |