

# Course Outcomes (COs)

## Department of Information Science and Engineering

**Programme Name:** B.E.-Information Science & Engineering

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## 2022 Scheme(UG)

# Course Outcome for Information Science Engineering

## Course Outcomes of Second -Year Courses

<b>Course Name</b>	<b>Mathematics for Computer Science</b>
<b>Course Code</b>	<b>BCS301</b>
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.
<b>Course Name</b>	<b>Digital Design and Computer Organization</b>
<b>Course Code</b>	<b>BCS302</b>
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.
<b>Course Name</b>	<b>Operating Systems</b>
<b>Course Code</b>	<b>BCS303</b>
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.

<b>Course Name</b>	<b>Data Structures and Applications</b>
<b>Course Code</b>	<b>BCS304</b>
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

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

<b>Course Name</b>	<b>Object Oriented Programming with JAVA</b>
<b>Course Code</b>	<b>BCS306A</b>
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 Information Science Engineering

### Course Outcomes of Second-Year Courses

<b>Course Name</b>	<b>Transform Calculus, Fourier Series and Numerical Techniques</b>
<b>Course Code</b>	<b>21MAT31</b>
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.

<b>Course Name</b>	<b>Data Structures and Applications</b>
<b>Course Code</b>	<b>21CS32</b>
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

<b>Course Name</b>	<b>Analog and Digital Electronics</b>
<b>Course Code</b>	<b>21CS33</b>
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

<b>Course Name</b>	<b>Computer Organization and Architecture</b>
<b>Course Code</b>	<b>21CS34</b>
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.

<b>Course Name</b>	<b>Object Oriented Programming with JAVA Laboratory</b>
<b>Course Code</b>	<b>21CSL35</b>
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

<b>Course Name</b>	<b>Programming in C++</b>
<b>Course Code</b>	<b>21CS382</b>
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.

<b>Course Name</b>	<b>Mathematical Foundation for Computing, Probability and Statistics</b>
<b>Course Code</b>	<b>21MATCS41</b>
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.

<b>Course Name</b>	<b>Design and Analysis of Algorithms</b>
<b>Course Code</b>	<b>21CS42</b>
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

<b>Course Name</b>	<b>Microcontroller and Embedded Systems</b>
<b>Course Code</b>	<b>21CS43</b>
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

<b>Course Name</b>	<b>Operating System</b>
<b>Course Code</b>	<b>21CS44</b>
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.

<b>Course Name</b>	<b>Python Programming Laboratory</b>
<b>Course Code</b>	<b>21CSL46</b>
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

<b>Course Name</b>	<b>R Programming</b>
<b>Course Code</b>	<b>21CS483</b>
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

<b>Course Name</b>	<b>Automata Theory and compiler Design</b>
<b>Course Code</b>	<b>21CS51</b>
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.

<b>Course Name</b>	<b>Computer Networks</b>
<b>Course Code</b>	<b>21CS52</b>
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



<b>Course Name</b>	<b>Database Management Systems</b>
<b>Course Code</b>	<b>21CS53</b>
Course outcomes (COs): At the end of the course the student will be able to:	
21CS53.1	Identify, define and analyze database objects, enforce integrity constraints on a database using RDBMS
21CS53.2	Use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation
21CS53.3	Design and build simple database systems and relate the concept of transaction, concurrency control and recovery in database
21CS53.4	Develop application to interact with databases, using relational algebra expression from queries.

<b>Course Name</b>	<b>Artificial Intelligence and Machine Learning</b>
<b>Course Code</b>	<b>21CS54</b>
Course outcomes (COs): At the end of the course the student will be able to:	
21CS54.1	Explain the basic principles of AI and Machine learning towards problem solving
21CS54.2	Familiarize machine learning process, basics of decision tree and probability learning
21CS54.3	Apply Knowledge of machine learning algorithms on various dataset and compare results
21CS54.4	Apply decision tree learning and artificial neural networks.

<b>Course Name</b>	<b>Database Management Systems Laboratory with Mini Project</b>
<b>Course Code</b>	<b>21CSL55</b>
Course outcomes (COs): At the end of the course the student will be able to:	
21CSL55.1	Create, Update and query on the database.
21CSL55.2	Demonstrate the working of different concepts of DBMS
21CSL55.3	Design a database application with help ER diagram, schema diagram
21CSL55.4	Implement, analyze and evaluate the project developed for an application.

<b>Course Name</b>	<b>Software Engineering and Project Management</b>
<b>Course Code</b>	<b>21CS61</b>
Course outcomes (COs): At the end of the course, the student will be able to:	
21CS61.1	Understand software engineering activities and analyze the role of various process models.
21CS61.2	Explain object-oriented concepts, create class models, and recognize the importance of agile methodology and DevOps in software development.
21CS61.3	Illustrate the role of project planning and quality management in software development, and comprehend the importance of activity planning.
21CS61.4	Explain and apply different planning models for project scheduling and management while developing a comprehensive understanding of these concepts.

<b>Course Name</b>	<b>Full stack Development</b>
<b>Course Code</b>	<b>21CS62</b>
Course outcomes (COs): At the end of the course the student will be able to:	
21CS62.1	Understand Django's MVT architecture and apply it in web application development.
21CS62.2	Design and create models and forms for efficient web page development.
21CS62.3	Analyze and employ advanced Django features like template inheritance, generic views, and content rendering for comprehensive web application development.
21CS62.4	Apply jQuery-based AJAX integration to build responsive full-stack web applications, demonstrating critical thinking and problem-solving skills.

<b>Course Name</b>	<b>Software Testing</b>
<b>Course Code</b>	<b>21IS63</b>
Course outcomes (COs): At the end of the course the student will be able to:	
21IS63.1	Explain the importance of software testing and quality assurance in software development.
21IS63.2	Apply software testing concepts to select appropriate testing methods for various scenarios.
21IS63.3	Analyze how software testing contributes to the success of software development projects.
21IS63.4	Evaluate testing models and demonstrate the ability to derive test cases for different software applications.

<b>Course Name</b>	<b>Software Testing Laboratory</b>
<b>Course Code</b>	<b>21ISL66</b>
Course outcomes (COs): At the end of the course the student will be able to:	
21ISL66.1	Analyze requirements, identify problem areas, and create test cases for given scenarios.
21ISL66.2	Design solutions, implement them, and document the process, including flow graph creation.
21ISL66.3	Design, develop, debug the Project and create appropriate document for the software artifact.
21ISL66.4	Apply appropriate functional testing strategies, compare different techniques, and classify problems according to suitable testing models while considering test coverage metrics

## Course Outcomes of Fourth -Year Courses

<b>Course Name</b>	<b>Cryptography And Network Security</b>
<b>Course Code</b>	<b>21IS71</b>
Course outcomes (COs): At the end of the course the student will be able to:	
21IS71.1	Understand Cryptography, Network Security theories, algorithms and systems
21IS71.2	Apply various cryptography and network security operations to different applications while analyzing their effectiveness.
21IS71.3	Evaluate different methods for authentication and access control, considering their strengths and weaknesses.
21IS71.4	Evaluate key management techniques and build protection mechanisms to secure computer network

<b>Course Name</b>	<b>Cloud Computing</b>
<b>Course Code</b>	<b>21CS72</b>
Course outcomes (COs): At the end of the course the student will be able to:	
21CS72.1	Understand and analyze various cloud computing platforms and service provider.
21CS72.2	Illustrate various virtualization concepts
21CS72.3	Identify the architecture, infrastructure and delivery models of cloud computing.
21CS72.4	Explain the Security aspects of CLOUD.

# 2018 Scheme(UG)

## Course Outcome for Computer Science Engineering

### Course Outcomes of Second -Year Courses

<b>Course Name</b>	<b>Transform Calculus,Fourier Series &amp; Numerical Techniques</b>
<b>Course Code</b>	<b>18MAT31</b>
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.

<b>Course Name</b>	<b>Data Structures And Applications</b>
<b>Course Code</b>	<b>18CS32</b>
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.

<b>Course Name</b>	<b>ANALOG AND DIGITAL ELECTRONICS</b>
<b>Course Code</b>	<b>18CS33</b>
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.

<b>Course Name</b>	<b>COMPUTER ORGANIZATION</b>
<b>Course Code</b>	<b>18CS34</b>
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.

<b>Course Name</b>	<b>SOFTWARE ENGINEERING</b>
<b>Course Code</b>	<b>18CS35</b>
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.

<b>Course Name</b>	<b>Discrete Mathematical Structures</b>
<b>Course Code</b>	<b>18CS36</b>
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.

<b>Course Name</b>	<b>ANALOG AND DIGITAL ELECTRONICS LABORATORY</b>
<b>Course Code</b>	<b>18CSL37</b>
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.

<b>Course Name</b>	<b>DATA STRUCTURES LABORATORY</b>
<b>Course Code</b>	<b>18CSL38</b>
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.

<b>Course Name</b>	<b>COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS</b>
<b>Course Code</b>	<b>18MAT41</b>
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.

<b>Course Name</b>	<b>DESIGN AND ANALYSIS OF ALGORITHMS</b>
<b>Course Code</b>	<b>18CS42</b>
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.

<b>Course Name</b>	<b>OPERATING SYSTEMS</b>
<b>Course Code</b>	<b>18CS43</b>
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.

<b>Course Name</b>	<b>MICROCONTROLLER AND EMBEDDED SYSTEMS</b>
<b>Course Code</b>	<b>18CS44</b>
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.



<b>Course Name</b>	<b>OBJECT ORIENTED CONCEPTS</b>
<b>Course Code</b>	<b>18CS45</b>
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

<b>Course Name</b>	<b>DATA COMMUNICATION</b>
<b>Course Code</b>	<b>18CS46</b>
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.

<b>Course Name</b>	<b>DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY</b>
<b>Course Code</b>	<b>18CSL47</b>
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.

<b>Course Name</b>	<b>MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY</b>
<b>Course Code</b>	<b>18CSL48</b>
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

<b>Course Name</b>	<b>MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY</b>
<b>Course Code</b>	<b>18CS51</b>
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.

<b>Course Name</b>	<b>COMPUTER NETWORKS AND SECURITY</b>
<b>Course Code</b>	<b>18CS52</b>
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.

<b>Course Name</b>	<b>DATABASE MANAGEMENT SYSTEM</b>
<b>Course Code</b>	<b>18CS53</b>
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.

<b>Course Name</b>	<b>AUTOMATA THEORY AND COMPUTABILITY</b>
<b>Course Code</b>	<b>18CS54</b>
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

<b>Course Name</b>	<b>APPLICATION DEVELOPMENT USING PYTHON</b>
<b>Course Code</b>	<b>18CS55</b>
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

<b>Course Name</b>	<b>UNIX PROGRAMMING</b>
<b>Course Code</b>	<b>18CS56</b>
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.

<b>Course Name</b>	<b>COMPUTER NETWORK LABORATORY</b>
<b>Course Code</b>	<b>18CSL57</b>
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.

<b>Course Name</b>	<b>DBMS LABORATORY WITH MINI PROJECT</b>
<b>Course Code</b>	<b>18CSL58</b>
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

<b>Course Name</b>	<b>SYSTEM SOFTWARE AND COMPILERS</b>
<b>Course Code</b>	<b>18CS61</b>
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

<b>Course Name</b>	<b>COMUTER GRAPHICS AND VISUALIZATION</b>
<b>Course Code</b>	<b>18CS62</b>
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.

<b>Course Name</b>	<b>WEB TECHNOLOGY AND ITS APPLICATIONS</b>
<b>Course Code</b>	<b>18CS63</b>
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.

<b>Course Name</b>	<b>DATA MINING AND DATA WAREHOUSING</b>
<b>Course Code</b>	<b>18CS641</b>
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.

<b>Course Name</b>	<b>ADVANCED JAVA AND J2EE</b>
<b>Course Code</b>	<b>18CS644</b>
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

<b>Course Name</b>	<b>SYSTEM SOFTWARE LABORATORY</b>
<b>Course Code</b>	<b>18CSL66</b>
Course outcomes (COs): At the end of the course the student will be able to:	
18CSL66.1	Understand requirements for the given problem.
18CSL66.2	Solve the given problem in any programming language(C, C++, JAVA)
18CSL66.3	Build necessary test cases for any given problem.
18CSL66.4	Apply various testing techniques for the given problem, build basic documentation for the software artifact

<b>Course Name</b>	<b>SOFTWARE TESTING LABORATORY</b>
<b>Course Code</b>	<b>18CSL67</b>
Course outcomes (COs): At the end of the course the student will be able to:	
18ISL67.1	Understand requirements for the given problem.
18ISL67.2	Solve the given problem in any programming language(C, C++, JAVA)
18ISL67.3	Build necessary test cases for any given problem.
18ISL67.4	Apply various testing techniques for the given problem, build basic documentation for the software artifact

## Course Outcomes of Fourth-Year Courses

<b>Course Name</b>	<b>ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING</b>
<b>Course Code</b>	<b>18CS71</b>
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.

<b>Course Name</b>	<b>BIG DATA AND ANALYTICS</b>
<b>Course Code</b>	<b>18CS72</b>
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.

<b>Course Name</b>	<b>USER INTERFACE DESIGN</b>
<b>Course Code</b>	<b>18CS734</b>
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.



<b>Course Name</b>	<b>DIGITAL IMAGE PROCESSING</b>
<b>Course Code</b>	<b>18CS741</b>
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.

<b>Course Name</b>	<b>CRYPTOGRAPHY</b>
<b>Course Code</b>	<b>18CS744</b>
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

<b>Course Name</b>	<b>ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LABORATORY</b>
<b>Course Code</b>	<b>18CSL76</b>
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.

<b>Course Name</b>	<b>INTERNET OF THINGS</b>
<b>Course Code</b>	<b>18CS81</b>
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.

<b>Course Name</b>	<b>STORAGE AREA NETWORKS</b>
<b>Course Code</b>	<b>18CS822</b>
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.