DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
ADICHUNCHANAGIRI INSTITUTE OF TECHNOLOGY

(Affiliated to VTU, Belagaum, Recognised by A.I.C.T.E., New Delhi, Accredited by N.B.A., New Delhi)

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Ref.No.AIT/CS/   / 20   Date :

Course Outcome/Program outcomes/Program Specific outcomes 2017-2022

Sem	Subject	Subject code	Course Outcome
1,2	Programming in C and Data Structures	17PCD13/17PCD23	• Achieve knowledge of design and development of C problem solving skills. • Understand the basic principles of programming in V language. • Design and develop modular programming skills. • Effective utilization of memory using pointer technology. • Understands the basic concepts of pointers and data structures.
	Computer Programming Laboratory	17CPL16/17CPL26	• Gaining knowledge on various parts of a computer. • Able to draw flowcharts and write algorithms. • Able design and development of C problem solving skills. • Able design and develop modular programming skills. • Able to trace and debug a program.
3	ENGINEERING MATHEMATICS	17MAT31	• After Studying this course, students will be able to Know the use of periodic signals and Fourier series to analyze circuits and system communications. • Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform. Employ appropriate numerical methods to solve algebraic and transcendental

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	Computer Programming Laboratory	17CPL16/17CPL26	• Gaining knowledge on various parts of a computer. • Able to draw flowcharts and write algorithms. • Able design and development of C problem solving skills. • Able design and develop modular programming skills. • Able to trace and debug a program.
3	ENGINEERING MATHEMATICS	17MAT31	• After Studying this course, students will be able to Know the use of periodic signals and Fourier series to analyze circuits and system communications. • Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform. Employ appropriate numerical methods to solve algebraic and transcendental equations. • Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems. • Determine the extremals of functionals and solve the simple problems of the calculus of variations.
	ANALOG AND DIGITAL ELECTRONICS	17CS32	• Explain the operation of JFETs and MOSFETs , Operational Amplifier circuits and their application • Explain Combinational Logic, Simplification Techniques using Karnaugh Maps, Quine McClusky technique. • Demonstrate Operation of Decoders, Encoders, Multiplexers, Adders and Subtractors, working of Latches, Flip-Flops, Designing Registers, Counters, A/D and D/A Converters • Design of Counters, Registers and A/D & D/A converters
	DATA STRUCTURES AND APPLICATIONS	17CS33	• Explain different types of data structures, operations and algorithms • Apply searching and sorting operations on files • Make use of stack, Queue, Lists, Trees and Graphs in problem solving.

			• problem solving. • Develop all data structures in a high-level language for problem solving
	COMPUTER ORGANIZATION	17CS34	• Explain the basic organization of a computer system. • Demonstrate functioning of different sub systems, such as processor, Input/output, and memory. • Illustrate hardwired control and micro programmed control. pipelining, embedded and other computingsystems. • Build simple arithmetic and logical units.
	UNIX AND SHELL PROGRAMMING	17CS35	• Explain UNIX system and use different commands. • Compile Shell scripts for certain functions on different subsystems. • Demonstrate use of editors and Perl script writing
	DISCRETE MATHEMATICAL STRUCTURES	17CS36	• Make use of propositional and predicate logic in knowledge representation and truth verification. • Demonstrate the application of discrete structures in different fields of computer science. • Solve problems using recurrence relations and generating functions. • Apply different mathematical proofs, techniques in proving theorems. • Compare graphs, trees and their applications.
	ANALOG AND DIGITAL ELECTRONICS LABORATORY	17CSL37	• Demonstrate various Electronic Devices like Cathode ray Oscilloscope, Signa generators, Digital Trainer Kit, Multimeters and components like Resistors, Capacitors,Op amp and Integrated Circuit. • Design and demonstrate various combinational logic circuits. • Design and demonstrate various types of counters and Registers using Flip-flops • Make use of simulation package to design circuits. • Infer the working and implementation of ALU.
	DATA STRUCTURES LABORATORY	17CSL38	• Analyze and Compare various linear and non-linear data structures • Demonstrate the working nature of different types of data structures and their applications • Develop, analyze and evaluate the searching and sorting algorithms • Choose the appropriate data structure for solving real world problems
4	ENGINEERING MATHEMATICS	17MAT41	• Solve first and second order ordinary differential equation arising in flow problems using single step and multistep numerical methods. • Illustrate problems of potential theory, quantum mechanics and heat conduction by employing notions and properties of Bessel"s functions and Legendre"s polynomials. • Explain the concepts of analytic functions, residues, poles of complex potentials and describe conformal

			and Bilinear transformation arising in field theory and signal processing. • Develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, information theory and design engineering. • Demonstrate testing of hypothesis of sampling distributions and illustrate examples of Markov chains related to discrete parameter stochastic process.
	OBJECT ORIENTED CONCEPTS	17CS42	• Explain the object-oriented concepts and JAVA. • Develop computer programs to solve real world problems in Java. • Develop simple GUI int erfaces for a computer program to interact with users, and to comprehend the event-based GUI handling principles using Applets and swings.
	DESIGN AND ANALYSIS OF ALGORITHMS	17CS43	• Describe computational solution to well known problems like searching, sorting etc. • Estimate the computational complexity of different algorithms. • Develop an algorithm using appropriate design strategies for problem solving.
	MICROPROCESSORS AND MICROCONTROLLERS	17CS44	• Differentiate between microprocessors and microcontrollers • Develop assembly language code to solve problems • Explain interfacing of various devices to x86 family and ARM processor • Demonstrate interrupt routines for interfacing devices
	SOFTWARE ENGINEERING	17CS45	• Design a software system, component, or process to meet desired needs within realistic constraints. • Assess professional and ethical responsibility • Function on multi-disciplinary teams • Make use of techniques, skills, and modern engineering tools necessary for engineering practice • Comprehend software systems or parts of software systems.
	DATA COMMUNICATION	17CS46	• Illustrate basic computer network technology. • Identify the different types of network topologies and protocols. • List and explain the layers of the OSI model and TCP/IP model. • Comprehend the different types of network devices and their functions within a network • Demonstrate subnetting and routing mechanisms.
	DESIGN AND ANALYSIS OF ALGORITHM LABORATORY	17CSL47	• Design algorithms using appropriate design techniques (brute-force, greedy, dynamic programming, etc.) • Develop variety of algorithms such as sorting, graph related, combinatorial, etc., in a high level language.

				- Analyze and compare the performance of algorithms using language features. - Apply and implement learned algorithm design techniques and data structuresto solve realworld problems.
	MICROPROCESSOR AND MICROCONTROLLER LABORATORY	17CSL48		- Summarize 80x86 instruction sets and comprehend the knowledge of how assembly language works. - Design and develop assembly programs using 80x86 assembly language instructions - Infer functioning of hardware devices and interfacing them to x86 family - Choose processors for various kinds of applications.
5	MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY	17CS51		- Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship - Utilize the resources available effectively through ERP - Make use of IPRs and institutional support in entrepreneurship
	COMPUTER NETWORKS	17CS52		- Explain principles of application layer protocols - Outline transport layer services and infer UDP and TCP protocols - Classify routers, IP and Routing Algorithms in network layer - Explain the Wireless and Mobile Networks covering IEEE 802.11 Standard - Define Multimedia Networking and Network Management
	DATABASE MANAGEMENT SYSTEM	17CS53		- Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS. - Use Structured Query Language (SQL) for database manipulation. - Design simple database systems - Design code for some application to interact with databases.
	AUTOMATA THEORY AND COMPUTABILITY	17CS54		- Tell the core concepts in automata theory and Theory of Computation - Explain how to translate between different models of Computation (e.g.,Deterministic and Non-deterministic and Software models). - Interpret Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers. - Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness. - Classify a problem with respect to different models of Computation.
	Introduction to Software Testing	17CS552		- Identify test cases for any given problem. - Compare the different testing techniques.

			- Classify the problems according to a suitable testing model. - Apply the appropriate technique for the design of flow graph. ⬜ Create appropriate document for the software artefact.
	Dot Net framework for application development;	17CS564	- Build applications on Visual Studio .NET platform by understanding the syntax and semantics of C# - Demonstrate Object Oriented Programming concepts in C# programming language - Design custom interfaces for applications and leverage the available built-in interfaces in building complex applications. - Illustrate the use of generics and collections in C# ⬜ Compose queries to query in-memory data and define own operator behaviour
	Computer Network Laboratory	17CSL57	- Analyze and Compare various networking protocols. - Demonstrate the working of different concepts of networking. ⬜ Implement and analyze networking protocols in NS2 / NS3
	DBMS Laboratory with mini project	17CSL58	- Use Structured Query Language (SQL) for database Creation and manipulation. - Demonstrate the working of different concepts of DBMS ⬜ Implement and test the project developed for an application.
6	Cryptography, Network Security and Cyber Law	17CS61	- Discuss the cryptography and its need to various applications - Design and Develop simple cryptography algorithms ⬜ Understand the cyber security and need cyber Law
	Computer Graphics and Visualization	17CS62	- Design and implement algorithms for 2D graphics primitives and attributes. - Illustrate Geometric transformations on both 2D and 3D objects. - Understand the concepts of clipping and visible surface detection in 2D and 3D - viewing, and Illumination Models. - Discussabout suitable hardware and software for developing graphics packages using OpenGL.
	System Software and Compiler Design	17CS63	- Illustrate system software such as assemblers, loaders, linkers and macroprocessors - Design and develop lexical analyzers, parsers and code generators - Discuss about lex and yacc tools for implementing different concepts of system software
	Operating Systems	17CS64	- Demonstrate need for OS and different types of OS - Discuss suitable techniques for management of different resources - Illustrate processor, memory, storage and file system commands

			• Explain the different concepts of OS in platform of usage through case studies
	Data Mining and Data Warehousing	17CS651	• Understands data mining problems and implement the data warehouse • Demonstrate the association rules for a given data pattern. • ▨ Discuss between classification and clustering solution.
	Python Application Programming	17CS664	• Understand Python syntax and semantics and be fluent in the use of Python flow • control and functions. • Demonstrate proficiency in handling Strings and File Systems. • Implement Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions. • Interpret the concepts of Object-Oriented Programming as used in Python. • Implement exemplary applications related to Network Programming, Web Services and Databases in Python.
	System Software and Operating System Laboratory	17CSL67	• Implement and demonstrate Lexer's and Parser's • Implement different algorithms required for management, scheduling, allocation and communication used in operating system.
	Computer Graphics Laboratory with mini project	17CSL68	• Apply the concepts of computer graphics • Implement computer graphics applications using OpenGL • ▨ Implement real world problems using OpenGL
7	Web Technology and its applications	17CS71	• Define HTML and CSS syntax and semantics to build web pages. • Understand the concepts of Construct , visually format tables and forms using HTML using CSS • Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically. • List the principles of object oriented development using PHP • Illustrate JavaScript frameworks like jQuery and Backbone which facilitates • developer to focus on core features.
	Advanced Computer Architectures	17CS72	• Understand the concepts of parallel computing and hardware technologies • Illustrate and contrast the parallel architectures • ▨ Recall parallel programming concepts
	Machine Learning	17CS73	• Recall the problems for machine learning. And select the either supervised, unsupervised or reinforcement learning. • Understand theory of probability and statistics related to machine learning • Illustrate concept learning, ANN, Bayes classifier, k

			nearest neighbor, Q,
	Cloud Computing and its Applications	17CS742	• Understand the concepts of cloud computing, virtualization and classify services of cloud computing • Illustrate architecture and programming in cloud • ▯ Define the platforms for development of cloud applications and List the application of cloud.
	Storage Area Networks	17CS754	• Identify key challenges in managing information and analyze different storage • networking technologies and virtualization • Explain components and the implementation of NAS • Describe CAS architecture and types of archives and forms of virtualization • Illustrate the storage infrastructure and management activities
	Machine Learning Laboratory	17CSL76	• Understand the implementation procedures for the machine learning algorithms. • Design Java/Python programs for various Learning algorithms. • Apply appropriate data sets to the Machine Learning algorithms. • Identify and apply Machine Learning algorithms to solve real world problems.
	Web Technology Laboratory with mini project	17CSL77	• Design and develop dynamic web pages with good aesthetic sense of designing and latest technical know-how's. • Understand the concepts of Web Application Terminologies, Internet Tools other web services. • Recall how to link and publish web sites
8	Internet of Things and Applications	17CS81	• Interpret the impact and challenges posed by IoT networks leading to new architectural models. • Compare and contrast the deployment of smart objects and the technologies to connect them to network. • Appraise the role of IoT protocols for efficient network communication. • Elaborate the need for Data Analytics and Security in IoT. • Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry
	Big Data Analytics	17CS82	• Explain the concepts of HDFS and MapReduce framework • Investigate Hadoop related tools for Big Data Analytics and perform basic Hadoop Administration • Recognize the role of Business Intelligence, Data warehousing and Visualization in decision making • Infer the importance of core data mining techniques for data analytics • Compare and contrast different Text Mining Techniques

	Network management	17CS833	• Analyze the issues and challenges pertaining to management of emerging network technologies such as wired/wireless networks and high-speed internets. • Apply network management standards to manage practical networks • Formulate possible approaches for managing OSI network model. • Infer SNMP for managing the network • Infer RMON for monitoring the behavior of the network • Identify the various components of network and formulate the scheme for the managing them
	Internship/ Professional Practice	17CS84	• Adapt easily to the industry environment • Take part in team work • Make use of modern tools • Decide upon project planning and financing. • Adapt ethical values. • Motivate for lifelong learning
	Project Work-II	17CSP85	• Identify a issue and derive problem related to society, environment, economics, energy and technology • Formulate and Analyze the problem and determine the scope of the solution chosen • Determine , dissect, and estimate the parameters, required in the solution. • Evaluate the solution by considering the standard data / Objective function and by using appropriate performance metrics. • Compile the report and take part in present / publishing the finding in a reputed conference / publications • 6. Attempt to obtain ownership of the solution / product developed.
	Seminar	7CSS86	• Survey the changes in the technologies relevant to the topic selected • Discuss the technology and interpret the impact on the society, environment and domain. • Compile report of the study and present to the audience, following the ethics.

2018

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1,2	C Programming for problem solving	18CPS13/18CPS 23	• Illustrate simple algorithms from the different domains such as mathematics, physics, etc. • Construct a programming solution to the given problem using C. • Identify and correct the syntax and logical errors in C programs. • Modularize the given problem using functions and structures.
	C programming Laboratory	18CPL17/18CPL 27	• Write algorithms, flowcharts and program for simple problems. • Correct syntax and logical errors to execute a program. • Write iterative and wherever possible recursive programs. • Demonstrate use of functions, arrays, strings, structures and pointers in problem solving.
3	Transform Calculus, Fourier Series And Numerical Techniques	18MAT31	• CO1: Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering. • CO2: Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory. • CO3: Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems. • CO4: Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods. • CO5:Determine the externals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis. •

	Data Structures and Applications	18CS32	• Use different types of data structures, operations and algorithms • Apply searching and sorting operations on files • Use stack, Queue, Lists, Trees and Graphs in problem solving • Implement all data structures in a high-level language for problem solving.
	Analog and Digital Electronics	18CS33	• Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp. • Explain the basic principles of A/D and D/A conversion circuits and develop the same. • Simplify digital circuits using Karnaugh Map , and Quine-McClusky Methods • Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types. • Develop simple HDL programs
	Computer Organization	18CS34	• Explain the basic organization of a computer system. • Demonstrate functioning of different sub systems, such as processor, Input/output,and memory. • Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems. • Design and analyse simple arithmetic and logical units.
	Software Engineering	18CS35	• Design a software system, component, or process to meet desired needs within realistic constraints. • Assess professional and ethical responsibility • Function on multi-disciplinary teams • Use the techniques, skills, and modern engineering tools necessary for engineering practice • Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems

	Discrete Mathematical Structures	18CS36	• Use propositional and predicate logic in knowledge representation and truth verification. • Demonstrate the application of discrete structures in different fields of computer science. • Solve problems using recurrence relations and generating functions. • Application of different mathematical proofs techniques in proving theorems in the courses. • Compare graphs, trees and their applications.
	Analog and Digital Electronics Laboratory	18CSL37	• Use appropriate design equations / methods to design the given circuit. • Examine and verify the design of both analog and digital circuits using simulators. • Make us of electronic components, ICs, instruments and tools for design and testing of circuits for the given the appropriate inputs. • Compile a laboratory journal which includes; aim tool/instruments/software/components used,design equations used and designs, schematics, program listing, procedure followed, relevant theory, results as graphs and tables, interpreting and concluding the findings.
	Data Structures Laboratory	18CSL38	• Analyze and Compare various linear and non-linear data structures • Code, debug and demonstrate the working nature of different types of data structures and their applications • Implement, analyze and evaluate the searching and sorting algorithms • Choose the appropriate data structure for solving real world problems

	CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW	18CPC39/49	• CO 1: Have constitutional knowledge and legal literacy. • CO 2: Understand Engineering and Professional ethics and responsibilities of Engineers. • CO 3: Understand the the cybercrimes and cyber laws for cyber safety measures.
4	Complex Analysis, Probability and Statistical Methods	18MAT41	• Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory. • Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing. • Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field. • Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data. • Construct joint probability distributions and demonstrate the validity of testing the hypothesis.
	Design and Analysis of Algorithms	18CS42	• Describe computational solution to well known problems like searching, sorting etc. • Estimate the computational complexity of different algorithms. • Devise an algorithm using appropriate design strategies for problem solving
	Operating Systems	18CS43	• Demonstrate need for OS and different types of OS • Apply suitable techniques for management of different resources • Use processor, memory, storage and file system commands • ⍰ Realize the different concepts of OS in platform of usage through case studies

Microcontroller and Embedded Systems	18SC44		• Describe the architectural features and instructions of ARM microcontroller • Apply the knowledge gained for Programming ARM for different applications. • Interface external devices and I/O with ARM microcontroller. • Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system. • Develop the hardware /software co-design and firmware design approaches. • Demonstrate the need of real time operating system for embedded system applications
Object Oriented Concepts	18CS45		• Explain the object-oriented concepts and JAVA. • Develop computer programs to solve real world problems in Java. • Develop simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles using swings.
Data Communication	18CS46		• Explain the various components of data communication. • Explain the fundamentals of digital communication and switching. • Compare and contrast data link layer protocols. • Summarize IEEE 802.xx standards
Design and Analysis of Algorithm Laboratory	18CSL47		• Design algorithms using appropriate design techniques (brute-force, greedy, dynamic programming, etc.) • Implement a variety of algorithms such assorting, graph related, combinatorial, etc., in a high level language. • Analyze and compare the performance of algorithms using language features. • Apply and implement learned algorithm design techniques and data structuresto solve real-world problems.

	Microcontroller and Embedded Systems Laboratory	18CSL48	• Develop and test program using ARM7TDMI/LPC2148 • Conduct the following experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler.
5	Management, Entrepreneurship for IT idustry	18CS51	• Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship • Utilize the resources available effectively through ERP • Make use of IPRs and institutional support in entrepreneurship
	Computer Networks and Security	18CS52	• Explain principles of application layer protocols • Recognize transport layer services and infer UDP and TCP protocols • Classify routers, IP and Routing Algorithms in network layer • Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard • Describe Multimedia Networking and Network Management
	Database Management System	18CS53	• Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS. • Use Structured Query Language (SQL) for database manipulation. • Design and build simple database systems • ⊠ Develop application to interact with databases.

	Automata theory and Computability	18CS54	• Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation • Learn how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models). • Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers. • Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness. • Classify a problem with respect to different models of Computation.
	Application Development using Python	18CS55	• Demonstrate proficiency in handling of loops and creation of functions. • Identify the methods to create and manipulate lists, tuples and dictionaries. • Discover the commonly used operations involving regular expressions and file system. • Interpret the concepts of Object-Oriented Programming as used in Python. • Determine the need for scraping websites and working with CSV, JSON and other file formats.
	Unix Programming	18CS56	• Explain Unix Architecture, File system and use of Basic Commands • Illustrate Shell Programming and to write Shell Scripts • Categorize, compare and make use of Unix System Calls • Build an application/service over a Unix system.
	Computer Network Laboratory	18CSL57	• Analyze and Compare various networking protocols. • Demonstrate the working of different concepts of networking. • Implement, analyze and evaluate networking protocols in NS2 / NS3 and JAVA programming language

	Subject	Code	Course Outcomes
	ENVIRONMENTAL STUDIES	18CIV59	• CO1: Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale, • CO2: Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment. • CO3: Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components. • CO4: Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
	DBMS Laboratory with mini project	18CSL58	• Create, Update and query on the database. • Demonstrate the working of different concepts of DBMS • Implement, analyze and evaluate the project developed for an application.
6	System Software and Compilers	18CS61	• Explain system software • Design and develop lexical analyzers, parsers and code generators • Utilize lex and yacc tools for implementing different concepts of system software
	Computer Graphics and Visualization	18CS62	• Design and implement algorithms for 2D graphics primitives and attributes. • Illustrate Geometric transformations on both 2D and 3D objects. • Apply concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination Models. • Decide suitable hardware and software for developing graphics packages using OpenGL.
	Web Technology and its applications	18CS63	• Adapt HTML and CSS syntax and semantics to build web pages. • Construct and visually format tables and forms using HTML and CSS • Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically. • Appraise the principles of object oriented development using PHP • Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features.

	Data Mining and Data Warehousing	18CS641	• Identify data mining problems and implement the data warehouse • Write association rules for a given data pattern. • Choose between classification and clustering solution.
	Sensors and Signal Conditioning	18EC652	• Appreciate various types of sensors • Describe the manufacturing process of sensors • Understand about the material properties required to make sensors • Use sensors specific to the end use application • Design syatem integrated with sensors
	System Software Laboratory	18CSL66	• Implement and demonstrate Lexer"s and Parser"s • Evaluate different algorithms required for management, scheduling, allocation and communication used in operating system.
	Computer Graphics Laboratory with mini project	18CSL67	• Apply the concepts of computer graphics • Implement computer graphics applications using OpenGL • Animate real world problems using OpenGL
	Mobile Application Development	18CSMP68	• Create, test and debug Android application by setting up Android development environment. • Implement adaptive, responsive user interfaces that work across a wide range of devices. • Infer long running tasks and background work in Android applications. • Demonstrate methods in storing, sharing and retrieving data in Android applications. • Infer the role of permissions and security for Android applications.
7	Artificial Intelligence and Machine Learning	18CS71	• Appaise the theory of Artificial intelligence and Machine Learning. • Illustrate the working of AI and ML Algorithms. • Demonstrate the applications of AI and ML.
	Big Data Analytics	18CS72	• Understand fundamentals of Big Data analytics. • Investigate Hadoop framework and Hadoop Distributed File system. • Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data. • Demonstrate the MapReduce programming model to process the big data along with Hadoop tools. • Use Machine Learning algorithms for real world big data. • Analyze web contents and Social Networks to provide analytics with relevant visualization tools.

	Advanced Computer Architecture	18CS733	• Explain the concepts of parallel computing and hardware technologies • Compare and contrast the parallel architectures • Illustrate parallel programming concepts
	Network management	18CS742	• Analyze the issues and challenges pertaining to management of emerging network technologies such as wired/wireless networks and high-speed internets. • Apply network management standards to manage practical networks • Formulate possible approaches for managing OSI network model. • Use on SNMP for managing the network • Use RMON for monitoring the behavior of the network • Identify the various components of network and formulate the scheme for the managing them
	Introduction to Big Data Analytics	18CS751	• Explain the importance of data and data analysis • Interpret the probabilistic models for data • Define hypothesis, uncertainty principle • Evaluate regression analysis
	Artificial Intelligence and Machine Learning Laboratory	18CSL76	• Implement and demonstrate AI and ML algorithms. • Evaluate different algorithms.
8	Internet of Things	18CS81	• Interpret the impact and challenges posed by IoT networks leading to new architectural models. • Compare and contrast the deployment of smart objects and the technologies to connect them to network. • Appraise the role of IoT protocols for efficient network communication. • Elaborate the need for Data Analytics and Security in IoT. • Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.
	Storage Area Networks	18CS822	• Identify key challenges in managing information and analyze different storage networking technologies and virtualization • Explain components and the implementation of NAS • Describe CAS architecture and types of archives and forms of virtualization • Illustrate the storage infrastructure and management activities

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1	PROBLEM-SOLVING THROUGH PROGRAMMING	21PSP23/13	1. Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts. 2. Apply programming constructs of C language to solve the real world problem 3. Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting 4. Explore user-defined data structures like structures, unions and pointers in implementing solutions 5. Design and Develop Solutions to problems using modular programming constructs using functions
	COMPUTER PROGRAMMING LABORATORY	21CPL27/17	1. Define the problem statement and identify the need for computer programming 2. Make use of C compiler, IDE for programming, identify and correct the syntax and syntactic errors in programming 3. Develop algorithm, flowchart and write programs to solve the given problem 4. Demonstrate use of functions, recursive functions, arrays, strings, structures and pointers in problem solving. 5. Document the inference and observations made from the implementation.

2021

Semester	Subject	Subject code	Co
3	Transform Calculus, Fourier Series and Numerical Techniques	21MAT31	CLO 1. To have an insight into solving ordinary differential equations by using Laplace transform techniques CLO 2. Learn to use the Fourier series to represent periodical physical phenomena in engineering analysis. CLO 3. To enable the students to study Fourier Transforms and concepts of infinite Fourier Sine and Cosine transforms and to learn the method of solving difference equations by the z-transform method. CLO 4. To develop the proficiency in solving ordinary and partial differential equations arising in engineering applications, using numerical methods
	Data Structures and its Applications	21CS32	• CO 1. Identify different data structures and their applications. • CO 2. Apply stack and queues in solving problems. • CO 3. Demonstrate applications of linked list. • CO 4. Explore the applications of trees and graphs to model and solve the real-world problem. • CO 5. Make use of Hashing techniques and resolve collisions during mapping of key value pairs • CO 6. Identify different data structures and their applications. • CO 7. Apply stack and queues in solving problems. • CO 8. Demonstrate applications of linked list. • CO 9. Explore the applications of trees and graphs to model and solve the real-world problem. • CO 10. Make use of Hashing techniques and resolve collisions during mapping of key value pairs
	Analog and	21CS33	CO 1. Design and analyze application of

	Digital Electronics		analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp. CO 2. Explain the basic principles of A/D and D/A conversion circuits and develop the same. CO 3. Simplify digital circuits using Karnaugh Map, and Quine-McClusky Methods CO 4. Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types. CO 5. Develop simple HDL programs
	Computer Organization and Architecture	21CS34	CO 1. Explain the organization and architecture of computer systems with machine instructions and programs CO 2. Analyze the input/output devices communicating with computer system CO 3. Demonstrate the functions of different types of memory devices CO 4. Apply different data types on simple arithmetic and logical unit CO 5. Analyze the functions of basic processing unit, Parallel processing and pipelining
	Object Oriented Programming with JAVA Laboratory	21CSL35	CO 1. Use Eclipse/NetBeans IDE to design, develop, debug Java Projects. CO 2. Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP. CO 3. Demonstrate the ability to design and develop java programs, analyze, and interpret objectoriented data and document results. CO 4. Apply the concepts of multiprogramming, exception/event handling, abstraction to develop robust programs. CO 5. Develop user friendly applications using File I/O and GUI concepts.
	Mastering Office	21CSL381	CO 1. Know the basics of computers and prepare documents, spreadsheets, make small presentations with audio, video and graphs and would be acquainted with internet. CO 2. Create, edit, save and print documents with list tables, header, footer, graphic, spellchecker, mail merge and grammar checker

			CO 3. Attain the knowledge about spreadsheet with formula, macros spell checker etc. CO 4. Demonstrate the ability to apply application software in an office environment. CO 5. Use Google Suite for office data management tasks
	Programming in C++	21CS382	CO 1. Able to understand and design the solution to a problem using object-oriented programming concepts. CO 2. Able to reuse the code with extensible Class types, User-defined operators and function Overloading. CO 3. Achieve code reusability and extensibility by means of Inheritance and Polymorphism CO 4. Identify and explore the Performance analysis of I/O Streams. CO 5. Implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems.
4	Mathematical Foundations for Computing	21CS41	CO 1. Apply the concepts of logic for effective computation and relating problems in the Engineering domain. CO 2. Analyze the concepts of functions and relations to various fields of Engineering. Comprehend the concepts of Graph Theory for various applications of Computational sciences. CO 3. Apply discrete and continuous probability distributions in analysing the probability models arising in the engineering field. CO 4. Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data. CO 5. Construct joint probability distributions and demonstrate the validity of testing the hypothesis.
	Design and Analysis of Algorithms	21CS42	CO 1. Analyze the performance of the algorithms, state the efficiency using asymptotic notations and analyze mathematically the complexity of the algorithm. CO 2. Apply divide and conquer approaches and decrease and conquer approaches in

			solving the problems analyze the same CO 3. Apply the appropriate algorithmic design technique like greedy method, transform and conquer approaches and compare the efficiency of algorithms to solve the given problem. CO 4. Apply and analyze dynamic programming approaches to solve some problems. and improve an algorithm time efficiency by sacrificing space. CO 5. Apply and analyze backtracking, branch and bound methods and to describe P, NP and NPComplete problems.
	Microcontroller and Embedded Systems	21CS43	CO 1. Explain C-Compilers and optimization CO 2. Describe the ARM microcontroller's architectural features and program module. CO 3. Apply the knowledge gained from programming on ARM to different applications. CO 4. Program the basic hardware components and their application selection method. CO 5. Demonstrate the need for a real-time operating system for embedded system applications.
	Operating Systems	21CS44	CO 1. Identify the structure of an operating system and its scheduling mechanism. CO 2. Demonstrate the allocation of resources for a process using scheduling algorithm. CO 3. Identify root causes of deadlock and provide the solution for deadlock elimination CO 4. Explore about the storage structures and learn about the Linux Operating system. CO 5. Analyze Storage Structures and Implement Customized Case study
	Python Programming Laboratory	21CSL46	CO 1. Demonstrate proficiency in handling of loops and creation of functions. CO 2. Identify the methods to create and manipulate lists, tuples and dictionaries. CO 3. Discover the commonly used operations involving regular expressions and file system. CO 4. Interpret the concepts of Object-Oriented Programming as used in Python. CO 5. Determine the need for scraping websites and working with PDF, JSON and other file formats.
	Web	21CSL481	CO 1. Describe the fundamentals of web

	Programming		and concept of HTML. CO 2. Use the concepts of HTML, XHTML to construct the web pages. CO 3. Interpret CSS for dynamic documents. CO 4. Evaluate different concepts of JavaScript & Construct dynamic documents. CO 5. Design a small project with JavaScript and XHTML.
	Unix Shell Programming	21CS482	CO 1. Know the basics of Unix concepts and commands. CO 2. Evaluate the UNIX file system. CO 3. Apply Changes in file system. CO 4. Understand scripts and programs. CO 5. Analyze Facility with UNIX system process
	R Programming	21CSL483	CO 1. To understand the fundamental syntax of R through readings, practice exercises, CO 2. To demonstrations, and writing R code. CO 3. To apply critical programming language concepts such as data types, iteration, CO 4. To understand control structures, functions, and Boolean operators by writing R programs and through examples CO 5. To import a variety of data formats into R using R-Studio CO 6. To prepare or tidy data for in preparation for analyze.
5	Automata Theory and compiler Design	21CS51	CO 1. Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation CO 2. Design and develop lexical analyzers, parsers and code generators CO 3. Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers. CO 4. Acquire fundamental understanding of the structure of a Compiler and Apply concepts automata theory and Theory of Computation to design Compilers CO 5. Design computations models for problems in Automata theory and adaptation of such model in the field of compilers

	Computer Networks	21CS52	CO 1. Learn the basic needs of communication system. CO 2. Interpret the communication challenges and its solution. CO 3. Identify and organize the communication system network components CO 4. Design communication networks for user requirements.
	Database Management Systems	21CS53	CO 1. Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS CO 2. Use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation. CO 3. Design and build simple database systems and relate the concept of transaction, concurrency control and recovery in database CO 4. Develop application to interact with databases, relational algebra expression. CO 5. Develop applications using tuple and domain relation expression from queries.
	Artificial Intelligence and Machine Learning	21CS54	CO 1. Apply the knowledge of searching and reasoning techniques for different applications. CO 2. Have a good understanding of machine leaning in relation to other fields and fundamental issues and challenges of machine learning. CO 3. Apply the knowledge of classification algorithms on various dataset and compare results CO 4. Model the neuron and Neural Network, and to analyze ANN learning and its applications. CO 5. Identifying the suitable clustering algorithm for different pattern
	Database Management Systems Laboratory with Mini Project	21CSL55	CO 1. Create, Update and query on the database. CO 2. Demonstrate the working of different concepts of DBMS CO 3. Implement, analyze and evaluate the project developed for an application.
	Angular JS and Node JS	21CSL581	CO 1. Describe the features of Angular JS. CO 2. Recognize the form validations and controls. CO 3. Implement Directives and Controllers. CO 4. Evaluate and create database for simple application. CO 5. Plan and build webservers with node

			using Node .JS.
	C# AND .NET FRAMEWORK	21CS582	CO 1. Able to explain how C# fits into the .NET platform. CO 2. Describe the utilization of variables and constants of C# CO 3. Use the implementation of object-oriented aspects in applications. CO 4. Analyze and Set up Environment of .NET Core. CO 5. Evaluate and create a simple project application.
6	Software Engineering and Project Management	21CS61	CO 1. Understand the activities involved in software engineering and analyze the role of various process models CO 2. Explain the basics of object-oriented concepts and build a suitable class model using modelling techniques CO 3. Describe various software testing methods and to understand the importance of agile methodology and DevOps CO 4. Illustrate the role of project planning and quality management in software development CO 5. Understand the importance of activity planning and different planning models
	Fullstack Development	21CS62	CO 1. Understand the working of MVT based full stack web development with Django. CO 2. Designing of Models and Forms for rapid development of web pages. CO 3. Analyze the role of Template Inheritance and Generic views for developing full stack web applications. CO 4. Apply the Django framework libraries to render nonHTML contents like CSV and PDF. CO 5. Perform jQuery based AJAX integration to Django Apps to build responsive full stack web applications,
	Computer Graphics and Fundamentals of Image Processing	21CS63	CO 1. Construct geometric objects using Computer Graphics principles and OpenGL APIs. CO 2. Use OpenGL APIs and related mathematics for 2D and 3D geometric Operations on the objects. CO 3. Design GUI with necessary techniques required to animate the created objects

			CO 4. Apply OpenCV for developing Image processing applications. CO 5. Apply Image segmentation techniques along with programming, using OpenCV, for developing simple applications.
	Computer Graphics and Image Processing Laboratory	21CSL66	CO 1: Use openGL /OpenCV for the development of mini Projects. CO 2: Analyze the necessity mathematics and design required to demonstrate basic geometric transformation techniques. CO 3: Demonstrate the ability to design and develop input interactive techniques. CO 4: Apply the concepts to Develop user friendly applications using Graphics and IP concepts.
	Agile Technology	21CS641	CO 1. Understand the fundamentals of agile technologies CO 2. Explain XP Lifecycle, XP Concepts and Adopting XP CO 3. Apply different techniques on Practicing XP, Collaborating and Releasing CO 4. Analyze the Values and Principles of Mastering Agility CO 5. Demonstrate the agility to deliver good values
	Advanced Computer Architecture	21CS643	CO 1. Explain the concepts of parallel computing CO 2. Explain and identify the hardware technologies CO 3. Compare and contrast the parallel architectures CO 4. Illustrate parallel programming concepts
	Advanced JAVA Programming	21CS642	CO 1. Understanding the fundamental concepts of Enumerations and Annotations CO 2. Apply the concepts of Generic classes in Java programs CO 3. Demonstrate the concepts of String operations in Java CO 4. Develop web based applications using Java servlets and JSP CO 5. Illustrate database interaction and transaction processing in Java
	Data science and Visualization	21CS644	CO 1. Understand the data in different forms CO 2. Apply different techniques to Explore Data Analysis and the Data Science Process CO 3. Analyze feature selection algorithms & design a recommender system. CO 4. Evaluate data visualization tools and libraries and plot graphs.

			CO 5. Develop different charts and include mathematical expressions.
7	Big Data Analytics	21CS71	CO 1. Demonstrate the fundamentals of Intelligent Agents CO 2. Illustrate the reasoning on Uncertain Knowledge CO 3. Explore the explanation-based learning in solving AI problems CO 4. Apply effectively ML algorithms to solve real world problems. CO 5. Apply Instant based techniques and derive effectively learning rules to real world problems.
	Cloud Computing	21CS72	CO 1. Understand and analyze various cloud computing platforms and service provider. CO 2. Illustrate various virtualization concepts. CO 3. Identify the architecture, infrastructure and delivery models of cloud computing. CO 4. Understand the Security aspects of CLOUD. CO 5. Define platforms for development of cloud applications
	Object oriented Modelling and Design	21CS731	CO 1. Describe the concepts of object-oriented and basic class modelling. CO 2. Draw class diagrams, sequence diagrams and interaction diagrams to solve problems. CO 3. Choose and apply a befitting design pattern for the given problem.
	Blockchain Technology	21CS734	CO 1. Describe the concepts of Distrbuted computing and its role in Blockchain CO 2. Describe the concepts of Cryptography and its role in Blockchain CO 3. List the benefits, drawbacks and applications of Blockchain CO 4. Appreciate the technologies involved in Bitcoin CO 5. Appreciate and demonstrate the Ethereum platform to develop blockchain application.
	Digital Image Processing	21CS732	CO 1. Understand the fundamentals of Digital Image Processing. CO 2. Apply different Image transformation techniques CO 3. Analyze various image restoration techniques CO 4. Understand colour image and morphological processing CO 5. Design image analysis and segmentation techniques
	Internet of Things	21CS735	CO 1. Understand the evolution of IoT, IoT

			networking components, and addressing strategies in IoT. CO 2. Analyze various sensing devices and actuator types. CO 3. Demonstrate the processing in IoT. CO 4. Apply different connectivity technologies. CO 5. Understand the communication technologies , protocols and interoperability in IoT.
	Cryptography and Network Security	21CS733	CO 1. Understand Cryptography, Network Security theories, algorithms and systems CO 2. Apply different Cryptography and Network Security operations on different applications CO 3. Analyze different methods for authentication and access control CO 4. Evaluate Public and Private key, Key management, distribution and certification CO 5. Design necessary techniques to build protection mechanisms to secure computer networks
	Robotic Process Automation Design and Development	21CS744	CO 1. To Understand the basic concepts of RPA CO 2. To Describe various components and platforms of RPA CO 3. To Describe the different types of variables, control flow and data manipulation techniques CO 4. To Understand various control techniques and OCR in RPA CO 5. To Describe various types and strategies to handle exceptions
	Multiagent Systems	21CS742	CO 1. Demonstrate the decision process with different constraints CO 2. Analyze games in different forms CO 3. Apply the cooperative learning in developing games CO 4. Analyze different negotiation strategies of Multi-Agent System CO 5. Design and develop solutions for voting problems
	NoSQL Data Base	21CS745	CO1. Demonstrate an understanding of the detailed architecture of Column Oriented NoSQL databases, Document databases, Graph databases. CO2. Use the concepts pertaining to all the types of databases. CO3. Analyze the structural Models of NoSQL. CO4. Develop various applications using NoSQL databases.
	Software	21CS741	CO 1. Design and implement codes with

	Architecture and Design Patterns		higher performance and lower complexity CO 2. Be aware of code qualities needed to keep code flexible CO 3. Experience core design principles and be able to assess the quality of a design with respect to these principles. CO 4. Capable of applying these principles in the design of object oriented systems. CO 5. Demonstrate an understanding of a range of design patterns. Be capable of comprehending a design presented using this vocabulary. CO 6. Be able to select and apply suitable patterns in specific contexts
	Deep Learning	21CS743	CO1: Understand the fundamental issues and challenges of deep learning data, model selection, model complexity etc., CO2: Describe various knowledge on deep learning and algorithms CO3: Apply CNN and RNN model for real time applications CO4: Identify various challenges involved in designing and implementing deep learning algorithms. CO5: Relate the deep learning algorithms for the given types of learning tasks in varied domain

PROGRAM OUTCOMES (PO's)

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change
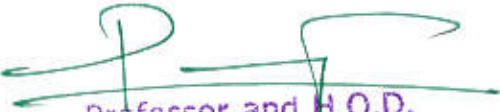
PROGRAM SPECIFIC OUTCOMES(PSO's)

PSO 1: Professional skills: The ability to understand &implement the computer programs in the areas of computer architecture, system software, Database Management systems, Web Design, Multimedia and networking.

PSO 2: Problem solving skills: The ability to solve real-world problems by suitable mathematical model with strong technological concepts in rapidly growing arena of computer technology.

PSO 3: Successful career and entrepreneurship: Knowledge in diverse areas of software engineering and management &entrepreneurship for IT Industry, conductive in cultivating skills for successful career development.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
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Ref.No.AIT/CS/   / 20

Date :

Batch Type : Generic Academics
Academic Year : 2021-22

Faculty : Mr Sangareddy B K

Department Name : Computer Science and Engineering (CS)
Semester : 7 - Section : B - CourseCode : 18CS742

Course	IA (IA)		UE		Direct Attainment		Feedback		Total Attainment	
	Attainment(out of 3)	Attainment(out of 100)	Attainment(out of 3)	Attainment(out of 100)	Attainment(out of 3)	Attainment(out of 100)	Attainment(out of 3)	Attainment(out of 100)	Attainment(out of 3)	Attainment(out of 100)
18CS742.1	2.98	99.22	3	100	2.99	99.53	3	100	2.99	99.63
18CS742.2	2.91	96.84	3	100	2.94	98.1	3	100	2.95	98.48
18CS742.3	2.95	98.17	3	100	2.97	98.9	3	100	2.97	99.12
18CS742.4	3	100	3	100	3	100	3	100	3	100
18CS742.5	3	100	3	100	3	100	3	100	3	100
18CS742.6	0	0	3	100	1.2	40	3	100	1.56	52

Feedback		Total Attainment	
Attainment(out of 3)	Attainment(out of 100)	Attainment(out of 3)	Attainment(out of 100)
3	100	2.99	99.63
3	100	2.95	98.48
3	100	2.97	99.12
3	100	3	100
3	100	3	100
3	100	1.56	52

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