SHRI MADHWA VADIRAJA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(A Unit of ShriSodeVadiraja Mutt Education Trust (R). Udupi)

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Approved by AICTE. New Delhi & Recognized by Government of Karnataka.

Vishwothamanagar, Bantakal - 574 115. Udupi. Karnataka. India

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SMVITM

Course Outcome Statements of 2018 Scheme

The below table represents the 2018 Scheme Course Outcome Statements of the courses offered from 3rd semester to 8th semester of Computer Science and Engineering.

3rd Semester

18MAT31 : Transform Calculus, Fourier Series & Numerical Techniques	
CO Code	**CO Description**
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	Use Fourier transform and Z-transform in discrete/continuous function arising in wave and heat propagation, signals and systems.
CO4	Use single step and multistep numerical methods to solve first and second order ordinary differential equations arising in engineering problems .
CO5	Determine the externals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

18CS32 : Data Structures and Applicaons	
CO Code	**CO Description**
CO1	Demonstrate the knowledge of Non-Primitive Linear Data Structures –(Arrays , structures , union) to solve the Problems.
CO2	Apply Non-Primitive Linear Data Structures – (Stacks, Queues) to solve certain Problems.
CO3	Illustrate the various types of linked list structures with their applications including representations and operations.
CO4	Explain the types of trees in solving the problems.
CO5	Develop the programs using Graphs, Hash table and file operation to solve certain Problems.

18CS33 : Analog and Digital Electronics	
CO Code	**CO Description**
CO1	Examine the operations of various analog electronic circuits
CO2	Apply the concepts of Karnaugh Map and Quine-McClusky methods to simplify the digital electronics circuits.
CO3	Design combinational circuits using the digital logic gates.
CO4	Simulate the working of various flip flops and Asynchronous sequential circuits using VHDL
CO5	Design data processing circuits using registers and counters

18CS34 : Computer Organizaon

CO Code	CO Description
CO1	Explain the basic organization of a computer system.
CO2	Understand the basic operations of the input/output system along with interface circuit logic operation.
CO3	Organize the memory based on the memory hierarchy.
CO4	Apply the knowledge of arithmetic and logical operations for integer operands.
CO5	Illustrate hardwired control and microprogrammed control, pipelining and computing systems.

18CS35 : Software Engineering

CO Code	CO Description
CO1	Design a software system, component, or process to meet desired needs within realistic constraints.
CO2	Explain the professional & ethical responsibility and function on multi-disciplinary teams and the benefit of choosing the appropriate software process model for the development of software system.
CO3	Make use of techniques, skills, and modern engineering tools necessary for engineering practice
CO4	Apply the phases of software development and maintenance

18CS36 : Discrete Mathematical Structures

CO Code	CO Description
CO1	Use propositional and predicate logic in knowledge representation and truth verification.
CO2	Apply different combinatorial techniques for counting
CO3	Use different proof techniques to prove mathematical theorems and formulae
CO4	Demonstrate the properties and applications of functions and relations
CO5	Understand basics of graph theory and apply trees as tools in solving problems of sorting and coding

18CSL37 : Analog and Digital Electronics Lab

CO Code	CO Description
CO1	Design the analog circuits using Op-Amp and '555' timer IC.
CO2	Develop digital electronics circuits using basic gates and universal gates.
CO3	Analyse the working of synchronous and asynchronous counters.
CO4	Illustrate the working of analog and digital electronics circuits using appropriate simulation package.

18CSL38 : Data Structures Lab

CO Code	CO Description
CO1	Develop programs to understand the working of various data structures
CO2	Apply the data structures in solving various problems

18CPH39 : Constitution of India, Professional Ethics and Cyber Law

CO Code	CO Description
CO1	Have constitutional knowledge and legal literacy.

CO2	Understand engineering and professional ethics and responsibilities of engineers.
CO3	Understand the cyber crimes and cyber laws for cyber safety measures.

5th Semester

18CS51 : Management and Entrepreneurship for IT Industry

CO Code	CO Description
CO1	Explain characteristics of the functional areas (planning, organizing, staffing, directing and controlling) of management
CO2	Outline the importance of Entrepreneurship
CO3	Utilize the resources available effectively through ERP.
CO4	Make use of IPRs and institutional support in entrepreneurship

18CS52 : Computer Networks and Security

CO Code	CO Description
CO1	Recognize various application layer protocols including socket programming.
CO2	Describe the features of transport layer protocols.
CO3	Apply the routing algorithm for the network topology.
CO4	Compare various network security methods and algorithms used in the communication network.
CO5	Outline the various multimedia network applications.

18CS53 : Database Management System

CO Code	
CO1	Describe the basics of data and databases
CO2	Design basic elements of the conceptual schema of the database and Construct simple SQL Queries.
CO3	Design Advanced database application using Structured Query Language (SQL) and JDBC.
CO4	Describe database Algorithms and the Normalization process.
CO5	Describe the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols.

18CS54 : Automota Theory and Computability

CO Code	CO Description
CO1	Acquire fundamental concepts in automata theory and translate between different models of Computation (Deterministic and Non-deterministic Software models)
CO2	Explain the power and the limitations of regular languages.
CO3	Design Grammars and pushdown automata.
CO4	Construct turing machines for accepting or generating a certain language.
CO5	Classify a problem with respect to different models of Computation.

18CS55 : Application development using Python

CO Code	CO Description
CO1	Design a software system, component, or process to meet desired needs within realistic constraints.
CO2	Explain the professional & ethical responsibility and function on multi-disciplinary teams and the benefit of choosing the appropriate software process model for the development of software system.
CO3	Make use of techniques, skills, and modern engineering tools necessary for engineering practice
CO4	Apply the phases of software development and maintenance

18CS56 : Unix Programming

CO Code	CO Description
CO1	Explain Unix Architecture, File system and use of Basic Commands
CO2	Illustrate Shell Programming through Shell Scripts
CO3	Describe the use of UNIX processes and process control
CO4	Explain Inter Process Communication and shared Memory
CO5	nderstand the working of Signals and Daemon processes in UNIX

18CSL57 : Computer Networks Lab

CO Code	CO Description
CO1	Simulate networking problems using Ns2/Ns3
CO2	Independently implement various well-established networking algorithms at different layers of TCP/IP.

18CSL58 : DBMS Lab with Mini Project

CO Code	CO Description
CO1	create, insert and update the database using the DDL and DML SQL commands with different kinds of integrity constraints.
CO2	develop a DBMS project to demonstrate features such as Create View, Trigger and Stored Procedure along with suitable front end design

18CIV59 : Environmental Studies

CO Code	CO Description
CO1	Understand the principles of ecology and environmental issues that apply to air, land and water issues on 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 ecology knwoledge to illustrate and graph a problem and describe the relaities that managers face when dealing with complex issues.

7th Semester

18CS71 : Artificial Intelligence and Machine Learning

CO Code	CO Description
CO1	Explain the AI problems ,problem spaces and role of heuristic search techniques

CO2	Illustrate the knowledge representation rules with help of predicate logic and the concept learning tasks with the help of general-to-specific ordering.
CO3	Develop the decision tree learning with the help of ID3 algorithm and the concept of neural networks
CO4	Inspect Maximum Likelihood hypotheses, Naïve Bayes classifier, Bayesian Belief Networks and EM algorithm.
CO5	Demonstrate the use of Instance based learning as well as reinforcement learning.

18CS72 : Big Data Analytics

CO Code	CO Description
CO1	Describe the fundamentals of Big Data analytics.
CO2	Extrapolate Hadoop framework and Hadoop Distributed File system.
CO3	Explore the concepts of NoSQL using MongoDB and Cassandra for Big Data
CO4	Demonstrate the MapReduce programming model for the big data processing along with Hadoop tools
CO5	Explore Machine Learning algorithms for real world big data along with analytics of web contents and Social Networks with relevant visualization tools

18CS734 : User Interface Design

CO Code	CO Description
CO1	Comprehend the significance and characteristics of user interface design
CO2	Understand the user interface design process and business function
CO3	Describe system menus, navigation schemes and window characteristics
CO4	Explain the various screen based control and windows tests

18CS741 : Digital Image Processing

CO Code	CO Description
CO1	Describe the fundamentals of Digital Image processing and relationship between pixel - neighbours
CO2	Describe and apply various transform techniques for image filtering in spatial and frequency domains
CO3	Explain region based and threshold based Image Segmentation.
CO4	Differentiate Image Compression Techniques.

18ME751 : Energy and Environment

CO Code	CO Description
CO1	Understand energy scenario, energy sources and their utilization, methods of energy storage, energy management and economic analysis.
CO2	Carry out energy audits, visit treatment plants and solve existing problems
CO3	Show awarness about the environment and different ecosystems.
CO4	Understand environment pollution along with social issues and acts.

18CSL76 : Artificial Intelligence and Machine Learning lab

CO Code	CO Description
CO1	Implement and Demonstrate AI and ML program

CO2	Evaluate different algorithms

4th Semester

CO Code	CO Description
18MAT41 : Complex Analysis, Probability and Statistical Methods	
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.
18CS42 : Design and Analysis of Algorithms	
CO1	Illustrate the computational complexity of different algorithms
CO2	Develop computational solution to well-known problems like searching, sorting etc
CO3	Identify efficient solutions for given problems using Greedy method
CO4	Solve efficiencies of various algorithms by applying dynamic programming technique
CO5	Construct an algorithm using backtracking for problem solving
18CS43 : Operating System	
CO1	Understand the application of basic concept of Operating system and the concepts of memory management, storage management, processes management in Operating system design and implementation
CO2	describe the concepts of threading and scheduling and synchronization and designing scheduling algorithms.
CO3	apply the methods for detecting, handling, preventing and recovery from deadlock.
CO4	Apply the concepts of paging, page replacement and file handling in managing free space.
CO5	Analyze the protection of Secondary Storage Structure Linux Kernel case studies
18CS44 : Microcontroller and Embedded Systems	
CO1	Design ARM microcontroller based embedded systems by the study of the microcontroller hardware and software architecture
CO2	Develop ARM microcontroller based software application using Assembly language constructs
CO3	Apply the knowledge of Embedded Systems design in developing various application
CO4	Analyse various characteristics and quality attributes of embedded Systems.
CO5	Demonstrate the need of real time operating system for embedded system applications
18CS45 : Object Oriented Concepts	
CO1	Understand the basic programming constructs of C++ as well as Java and application of Object oriented principles in it.
CO2	Implement the concepts of Java classes, inheritance, exception handling, packages, and interfaces in problem-solving.

CO3	Develop the multithreaded Java programs and understand event handling mechanisms.
CO4	Develop simple GUI interfaces for a computer program and understand the event-based GUI handling principles using swings.

	18CS46 : Data Communication
CO1	Enumerate the layers of the OSI model and TCP/IP functions of each layer with basic computer network technology.
CO2	Learn various methods of Digital to analog conversion and vice-versa used in digital transmission and analog transmission respectively.
CO3	Understand bandwidth utilization techniques and circuit and packet switching networks along with methods to detect and correct errors for a given data.
CO4	Explain various DLC services, Data link layer protocols, Point to Point protocol, Media Access control protocols, Link-Layer Addressing, ARP IPv4 Addressing and subnetting.
CO5	Understand Wired and Wireless LAN and also Cellular telephony.

	18CSL47 : Design and Analysis of Algorithms Laboratory
CO1	Apply various algorithm design technique to solve real world problem.
CO2	Evaluate different algorithms

	18CSL48 : Microcontroller and Embedded Systems Laboratory
CO1	Apply various algorithm design technique to solve real world problems
CO2	Evaluate different algorithms

6th Semester

	18CS61 : System Software And Compilers
CO1	Explain system software such as assemblers, loaders and linkers
CO2	Design and develop lexical analyzers
CO3	Demonstrate the working of parsers.
CO4	Utilize lex and yacc tools for implementing different concepts of system software
CO5	Understand Syntax Directed Translation and code generation.

	18CS62 : Comuter Graphics And Visualization
CO1	Design and implement algorithms for 2D graphics primitives and attributes.
CO2	Illustrate Geometric transformations on both 2D and 3D objects.
CO3	Apply concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination Models.
CO4	Decide suitable hardware and software for developing graphics packages using OpenGL.

	18CS63 : Web Technology And Its Applications
CO1	Adapt HTML and CSS syntax and semantics to build web pages
CO2	Construct and visually format tables and forms using HTML and CSS
CO3	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.
CO4	Appraise the principles of object oriented development using PHP

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CO5	Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features

18CS641 : Data Mining And Data Warehousing

CO1	Understand the various data warehouse models.
CO2	Implement the data warehouse using various models and understand the data mining primitives.
CO3	Identify the association patterns among each objects in the given dataset.
CO4	Classify the given dataset by developing the appropriate classification model based on the given class attributes.
CO5	Develop a model using clustering algorithms to identify the similarity among the objects in the given dataset.

18CS645 : System Modelling And Simulation

CO1	Explain the system concept and apply functional modeling method to model the activities of a static system
CO2	Describe the behavior of a dynamic system and create an analogous model for a dynamic system
CO3	Simulate the operation of a dynamic system and make improvement according to the simulation results

18ME651 : Non Conventional Energy Sources

CO1	Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations.
CO2	Know the need of renewable energy resources, historical and latest developments.
CO3	Describe the use of solar energy and the various components used in the energy production with respect to applications like-heating, cooling, desalination, power generation, drying, cooking etc.
CO4	Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.
CO5	Understand the concept of Biomass energy resources and their classification, types of biogas Plantsapplications
CO6	Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations.
CO7	Acquire the knowledge of fuel cells, wave power, tidal power and geothermal principles and applications.

18CV653 : Occupational Health & Safety

CO1	To understand the history of safety policies and accident causation models
CO2	To study the importance of ergonomics at workplace
CO3	To study about fire and electrical safety at workplace
CO4	To understand the importance of health consideration at workplace and also study about various types of occupational diseases
CO5	To study the safety considerations in water treatment plant, RMC, and in various industries

18CSL66 : System Software Laboratory

CO1	Develop lex and yacc programs to implement various scenarios.
CO2	Build different algorithms required for management, scheduling, allocation and Communication used in operating systems.

18CSL67 : Computer Graphics Laboratory With Mini Project

CO1	Implement computer graphics algorithms using OpenGL.
CO2	Apply the concepts of computer graphics to design and create computer graphics applications using OpenGL.

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18CSL68 : Mobile Application Development	
CO1	Create, test and debug Android application by setting up Android development environment.
CO2	Develop a mini project to implementadaptive responsive user interfaces and methods in storing, sharing and retrieving data in Android Applications.

8th Semester

18CS81 : Internet Of Things And Applications	
CO1	Interpret the impact and challenges posed by IoT networks leading to new architectural models.
CO2	Compare and contrast the deployment of smart objects and the technologies to connect them to the network.
CO3	Appraise the role of IoT protocols for efficient network communication.
CO4	Elaborate the need for Data Analytics and Security in IoT.
CO5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry

18CS822 : Storage Area Networks	
CO1	Identify key challenges in managing information and anlayze different storage networking technologies, components evolutions and virtualization.
CO2	Describe data protection implementation methods and different levels.
CO3	Explain components and implementation of NAS
CO4	Describe the back up /recovery topologies, information availability and business continuity.
CO5	Describe local replication and remote replication technologies with their operation and identifying, analysing security risk in storage infrastructure.

18CS823 : NoSQL Database	
CO1	Explain the evolution and fundamentals of NoSQL Aggregate data models
CO2	Describe the various data Distribution models and their features
CO3	Demonstrate the working of MapReduce on multiple machines on a cluster along with various techniques.
CO4	Explore about the NoSQL data models such as Key-value databases,Document databases and graph Databases with suitable Use cases

18CSP83 : Project Work Phase II	
CO1	Recognize and define problems by understanding its background, set the objectives (time, cost and technical requirements) and deliverables of a project.
CO2	Develop the strategies and methodologies by thorough literature review to achieve the project objectives within a given set of constraints.
CO3	Select the most suitable method to achieve the objectives among the developed strategies and to design the project accordingly.
CO4	Conduct scientific and logical analyses using information and data generated and draw the conclusions.
CO5	Communicate effectively with stakeholders of the project and work independently to achieve the project objectives and produce the deliverables.
CO6	Prepare, present, and defend a clear, coherent and succinct project report in a technical platform

18CSS84 : Internship	
CO1	Identify the technological development in the respective domain through literature survey

CO2	Analyze the work performed by the experts in the field and draw conclusions
CO3	Prepare a clear, coherent and succinct seminar report
CO4	Defend the study with the stakeholders
18CSI85 : Seminar	
CO1	Identify the technological development in the respective domain and acquire new skills
CO2	Develop projects using the new technical skills and build a record of work experience.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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Course Outcome Statements of 2021 Scheme

The below table represents the 2021 Scheme Course Outcome Statements of the courses offered from 3rd semester to 5th semester of Computer Science and Engineering.

3rd Semester

21MAT31 : Transform Calculus, Fourier Series & Numerical Techniques	
CO Code	**CO Description**
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 behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
CO3	Use Fourier transform and Z-transform in discrete/continuous function arising in wave and heat propagation, signals and systems.
CO4	To solve mathematical models represented by intial or boundary value problems involving partial differential equations.
CO5	Use single step and multistep numerical methods to solve second order ordinary differential equations arising in engineering problems and to determine the externals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.
21CS32 :Data Structures and Applications	
CO Code	**CO Description**
CO1	Demonstrate the knowledge of Non-Primitive Linear Data Structures –(Arrays , structures , union) to solve the Problems
CO2	Apply stack and queues in solving problems
CO3	Illustrate the various types of linked list structures with their applications including representations and operations.
CO4	Explore the applications of trees to model and solve the real-world problem.
CO5	Make use of Graphs and Hashing techniques to solve certain problems.
21CS33 : Analog and Digital Electronics	
CO Code	**CO Description**
CO1	Examine the operations of various analog electronic circuits
CO2	Apply the concepts of Karnaugh Map and Quine-McClusky methods to simplify the digital electronics circuits.
CO3	Design combinational circuits using the digital logic gates.
CO4	Simulate the working of various flip flops and Asynchronous sequential circuits using VHDL

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CO5	Design data processing circuits using registers and counters

21CS34 : Computer Organization and Architecture

CO Code	CO Description
CO1	Explain the basic organization, machine instruction and basic programs of a computer system.
CO2	Demonstrate the different ways of communicating with input/output devices and introduction about Interrupt.
CO3	Describe the different types of memory devices and its function.
CO4	Apply the knowledge of arithmetic and logical operations for integer operands.
CO5	Demonstrate processing unit with parallel processing and pipeline architecture.

21CSL35 : Object Oriented Programming with JAVA Laboratory

CO Code	CO Description
CO1	Build Java applications by setting up Java Runtime Environment.
CO2	Develop Java programs in order to demonstrate object-oriented features like multi-threading, interfaces, exception handling, file I/O, and GUI concepts

21CSR36 : Social Connect & Responsibilities

CO Code	CO Description
CO1	Understand the importance of planting trees and the necessity of conserving forests and wildlife.
CO2	Describe the history and culture of the place visited for the purpose of conducting activity.
CO3	Understand the importance of organic farming and waste management.
CO4	Suggest the people in the society regarding various water conservation methods can be adopted to conserve water
CO5	Describe various traditional food grains, pulses, fruits, vegetables and food dishes of Dakshina Kannada.

21CIP37 : Constitution of India & Professional Ethics

CO Code	CO Description
CO1	Analyse the basic structure of Indian Constitution
CO2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution
CO3	Know about our Union Government, political structure & codes, procedures
CO4	Understand our State Executive & Elections system of India.
CO5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

21CS382 : Programming in C++

CO Code	CO Description
CO1	Design the solution to a problem by using object oriented programming concepts.
CO2	Demonstrate code reusability and extensibility by means of inheritance and polymorphism
CO3	Explore features of C++ such as IO streams, templates and exception handling so as to design solution to complex problems

21MATCS41 : Mathematical Foundations for Computing, Probability & Statistics

CO Code	CO Description
CO1	Apply the concepts of logic for effective computation and relating problems in the engineering domain
CO2	Analyze the concept of functions and relations to various fields of engineering. Comprehend the concepts of Graph theory for various applications of Computational sciences.
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

21CS42 : Design and Analysis of Algorithm

CO Code	CO Description
CO1	Understand the asymptotic performance of algorithms.
CO2	Apply divide and conquer approaches and decrease and conquer approaches in solving the problems analyze the same
CO3	Apply the appropriate algorithmic design technique like greedy method, transform and conquer approaches and compare the efficiency of algorithms to solve the given problem.
CO4	Analyze efficiencies of various algorithms by applying dynamic programming techniques
CO5	Design and apply backtracking technique for problem solving.

21CS43 : Microcontroller and Embedded Systems

CO Code	CO Description
CO1	Describe the ARM microcontroller's architectural features and program module.
CO2	Explain features of C-Compilers and ARM assembler and the methods to optimize the code.
CO3	Apply the knowledge gained from programming on ARM to different applications.
CO4	Program the basic hardware components and their application selection method.
CO5	Demonstrate the need for a real-time operating system for embedded system applications.

21CS44 : Operating Systems

CO Code	CO Description
CO1	Illustrate the structure, design, and implementation of an operating system and interprocess communication.
CO2	Apply scheduling algorithms for the processes, threads and demonstrate the process synchronization.
CO3	Build the solution for deadlock elimination by Identifying the root causes of deadlock .
CO4	Apply the concepts of paging, page replacement, and file handling in managing free space.
CO5	Illustrate Storage Structures and Summarize the Case Study on the Linux Operating system.

21BE45 : Biology for Engineers

CO Code	CO Description

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CO1	Elucidate the basic biological concepts via relevant industrial applications and case studies
CO2	Evaluate the principles of design and development, for exploring novel bioengineering projects
CO3	Corroborate the concepts of biomimetics for specific requirements.
CO4	Think critically about exploring innovative biobased solutions for socially relevant problems.

21CSL46 : Python Programming Laboratory

CO Code	CO Description
CO1	Experiment with python functions and data structures like list, tuples and dictionaries and also use regular expressions.
CO2	Build applications using object oriented programming and work with different file formats.

21UH49 : Universal Human Values

CO Code	CO Description
CO1	Understand the importance of value based education, right understanding, meaning of continuous happiness and differentiation between wealth and prosperity.
CO2	Understand the concepts like Co-existence of the Self and the Body, Difference between the Needs of the Self and the Body, Harmony in the Self and Harmony of the Self with the Body.
CO3	Understand the meaning of Harmony in the Family, Justice in Human-to-Human Relationship, Understanding Harmony in the Society and Vision for the Universal Human Order.
CO4	Understand the concepts like Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the four orders of Nature, Realizing Existence as Co-existence at all Levels, The holistic perception of harmony in Existence.
CO5	Understand the Natural Acceptance of Human Values, Definitiveness of Human Conduct, Humanistic Education, Humanistic Constitution and Universal Human Order.

21CS482 : Unix Shell Programming

CO Code	CO Description
CO1	Understand the basics of UNIX concepts and commands.
CO2	Understand the UNIX file system
CO3	Apply the changes in the file system.
CO4	Understand the scripts and programs
CO5	Understand the facility with UNIX system process.

5th Semester

Course Name:	Automata Theory and Compiler Design
Course Code:	21CS51
CO1	Apply the fundamental concepts in automata theory to design the finite automata. Also Explain the Compiler Design and phases of it.
CO2	Apply the Regular Expressions for Regular Languages and Develop Lexical analyzers with specification & Recognition of Tokens.
CO3	Model Context Free Grammars for different language classes and analyze the role of parsing techniques with top-down parsing.
CO4	Build push down Automata for different formal languages and design bottom-up parsing. Also Explain LR Parsing.

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CO5	Design Turing machine its variants, concepts of undecidability problems. And construct Syntax direct tree and illustrate code generation.

Course Name	**Computer Networks**
Course Code	**21CS52**
CO1	Acquire fundamental knowledge about communication system essentials and network hardware/software.
CO2	Decipher the challenges in communication and propose corresponding solutions
CO3	Recognize and structure the components of the communication system network using different set of algorithms
CO4	Discussion of different transport services with the help of transport layer protocols.
CO5	Learn and implement the application layer protocols of web, email and DNS

Course Name	**Database Management Systems**
Course Code	**21CS53**
CO1	Describe the basics of Databases, Database Architecture and Develop Conceptual design of Database.
CO2	Build the Relation model for the Database and Apply Structured Query Language (SQL) for Database Manipulation.
CO3	Develop advanced database applications using complex SQL and Database Connectivity (JDBC).
CO4	Apply the Database Normalization Algorithms and processes.
CO5	Demonstrate the transactions and concurrency control in databases and database recovery protocols.

Course Name:	**ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**
Course Code:	**21CS54**
CO1	Apply proficient searching and reasoning techniques for various applications to solve real world problems.
CO2	Demonstrate a thorough understanding of machine learning, its connections with other fields, and critically assess fundamental challenges within the discipline.
CO3	Implement classification algorithms on diverse datasets, comparing results to exhibit a deep understanding of underlying principles.
CO4	Develop and evaluate models of neurons and Neural Networks, analyzing the learning processes of Artificial Neural Networks (ANN) and its applications.
CO5	Identify and apply suitable clustering algorithms for different patterns, showcasing the ability to organize and analyze data effectively.

Course Name	**Database Management Systems Laboratory with Mini Project**
Course Code	**21CSL55**
CO1	Create, insert and update the database using the DDL and Apply DML and SQL commands with different kinds of integrity constraints.
CO2	Develop and Test a DBMS project along with suitable front-end design.

Course Name:	**RESEARCH METHODOLOGY & INTELLECTUAL PROPERTY RIGHTS**
Course Code:	**21RMI56**
CO1	To Understand the knowledge on basics of research and its types.
CO2	To Learn and apply the concept of Literature Review, Technical Reading, Attributions, Citations and Ethics in Research.

CO3	To Discuss the concepts of Intellectual Property Rights in engineering. Understanding the process involved in patenting.
CO4	To discuss and analyze the concepts of Copyrights and Trademarks in industry
CO5	To understand rights related to industrial design and geographical Indications. Analyse various case studies on Patents in India

Course Name:	**Enviornmental Studies**
Course Code:	**21CIV57**
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 a biotic components.
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.

Course Name:	**C# and .Net Framework**
Course Code:	**21CS582**
CO1	Develop programs involving basic features of C# programming language
CO2	Make use of exception handling features to safeguard program against runtime anomalies
CO3	Apply concepts of OOP in developing solutions to problems
CO4	Develop programs to illustrate handling of text files
CO5	Make use of modern tools to develop C# programs and applications

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SMVITM

Course Outcome Statements of 2022 Scheme

The below table represents the 2022 Scheme Course Outcome Statements of the courses offered for 3rd semester of Computer Science and Engineering.

Course Name	Mathematics forCompuer Science
Course Code	BCS301
CO1	Explain the basic concepts of probability, random variables, probability distribution
CO2	Apply suitable probability distribution models for the given scenario.
CO3	Apply the notion of a discrete-time Markov chain and n-step transition probabilities to solve the given problem
CO4	Use statistical methodology and tools in the engineering problem-solving process.
CO5	Compute the confidence intervals for the mean of the population.
CO6	Apply the ANOVA test related to engineering problems

Course Name	Digital Design and Computer Organization
Course Code	BCS302
CO1	Apply the K–Map techniques to simplify various Boolean expressions.
CO2	Design different types of combinational and sequential circuits along with Verilog programs.
CO3	Describe the fundamentals of machine instructions, addressing modes and Processor performance.
CO4	Explain the approaches involved in achieving communication between processor and I/O devices.
CO5	Analyze internal Organization of Memory and Impact of cache/Pipelining on Processor Performance.

Course Name	Operating Systems
Course Code	BCS303
CO1	Illustrate the structure, design, and implementation of an operating system and Operating system services.
CO2	Demonstarte interprocess communication and apply scheduling algorithms for the processes, threads
CO3	Demonstrate the process synchronization and build the solution for deadlock elimination by Identifying the root causes of deadlock .
CO4	Apply memory management techniques and virtual memory management and apply the concepts of paging, page replacement.
CO5	Apply File organization techniques and strategies and apply disk Scheduling algorithm.

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Course Name	Data Structures and Applications
Course Code	BCS304
CO1	Demonstrate the knowledge of Non-Primitive Linear Data Structures –(Arrays , structures , union) and primitive data structures like stacks to solve the Problems.
CO2	Use the concept of queue and linked list in problem solving
CO3	Illustrate the various types of linked list structures with their applications including representations and operations and binary tree representations.
CO4	Develop solutions using trees and graphs to model the real-world problem.
CO5	Illustrate the advanced Data Structures concepts such as Hashing Techniques and Optimal Binary Search Trees.

Course Name	Data Structures Lab
Course Code	BCSL305
CO1	Make use of C compiler, IDE for programming, experiment with different linear and non-linear data structture
CO2	Able to design and develop different programs for problem solving using concepts of data structure in C

Course Name	Object Oriented Programming with JAVA
Course Code	BCS306A
CO1	Demonstrate proficiency in writing simple programs involving branching and looping structures
CO2	Design a class involving data members and methods for the given scenario
CO3	Apply the concepts of inheritance and interfaces in solving real world problems
CO4	Use the concept of packages and exception handling in solving complex problem
CO5	Apply concepts of multithreading ,autoboxing and enumurations in program development

Course Name	Social Connect and Responsibility
Course Code	BSCK307
CO1	Communicate and connect to the surrounding.
CO2	Create a responsible connection with the society
CO3	Involve in the community in general in which they work
CO4	Notice the needs and problems of the community and involve them in problem –solving
CO5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems
CO6	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes

Course Name	Data Visulization with Python
Course Code	BCS358D
CO1	Demonstrate the use of Juypter and Goole Colab IDE to create Python Applications

CO2	Use Python programming constructs to develop programs for solving real-world problems
CO3	Use Matplotlib for drawing different Plots
CO4	Demonstrate working with Seaborn, Bokeh for visualization.
CO5	Use Plotly for drawing Time Series and Maps.

Course Name	National Service Scheme (NSS)
Course Code	21NS 83
CO1	Under stand the importance of his / her responsibilities towards society.
CO2	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.
CO3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
CO4	Implement government or self-driven projects effectively in the field.

Course Name	C# PROGRAMMING
Course Code	21CSL582
CO1	To learn basic features of C# programming
CO2	To understand C# support for OOP with programming example
CO3	To gain experience of modern tool usage (VS Code, Visual Studio or any other] in developing C# program