



# ACHARYA INSTITUTE OF TECHNOLOGY

Affiliated to Visvesvaraya Technological University, Belagavi,  
Approved by AICTE, New Delhi, Recognized by Govt. of Karnataka and  
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## DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

### 2022 SCHEME

Course Name	Course Code	CO. No.	Course Outcomes
MATHEMATICS FOR COMPUTER SCIENCE	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 and apply the ANOVA test related to engineering problems.
DIGITAL DESIGN & COMPUTER ORGANIZATION	BCS302	CO1	Apply the various Boolean algebraic and 2,3 & 4 variable K-MAP simplification techniques to simplify the Boolean algebraic equations specified.
		CO2	Implement various simple combinational and sequential circuits for the given specification by applying the design procedure.
		CO3	Illustrate the organization of input/output systems, CPU, memory, basic processing style of a computer and performance of computer system.
		CO4	Analyze memory accessing and interrupt handling functionalities of a computer system.
		CO5	Illustrate the complete operation process of instruction execution and pipelining functionalities of a computer system.
		CO6	Develop Verilog HDL simulation code to implement various combinational and sequential circuits for given specification and simulate using MODELSIM.
		CO7	Develop Verilog HDL simulation code to implement simple circuits using structural, data flow and behavioral model.
OPERATING SYSTEMS	BCS302	CO1	Illustrate the fundamentals of operating system, its various types, services and its importance in computer system.
		CO2	Apply the theory and implementation of Inter process communication, multi threading programming and process scheduling.
		CO3	Apply the deadlock avoidance, recovery and



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			prevention algorithms and also analyze the various process synchronization techniques.
		CO4	Implement the various memory management and virtual memory management techniques.
		CO5	Elucidate the various concepts of file system, secondary storage strategies and information protection mechanisms.
		CO6	Implement process system calls, CPU and disk scheduling algorithms and inter process communication problems using C program.
		CO7	Apply the Bankers algorithms for deadlock avoidance, various memory allocation techniques, file organization and allocation techniques using C program.
DATA STRUCTURES AND APPLICATIONS	BCS304	CO1	Demonstrate the concepts of dynamic arrays and stack
		CO2	Develop programs on Queue operations and singly linked list applications.
		CO3	Develop programs based on the concepts of doubly linked list and binary trees
		CO4	Explain the concepts of BST, Graphs operations
		CO5	Illustrate the concepts of hashing, priority queues, efficient binary search trees
DATA STRUCTURES LAB	BCSL305	CO1	Demonstrate the working of different types of linear data structures and its applications
		CO2	Apply non-linear data structures and hashing techniques to provide solution for a given problem.
OBJECT ORIENTED PROGRAMMING WITH JAVA	BCS306A	CO1	Describe the syntax and semantics of basic building blocks in JAVA
		CO2	Apply the concepts of class and methods to develop a program to solve real world problems
		CO3	Implement the concept inheritance and interfaces in handling complex problem.
		CO4	Discuss concepts of Packages, Exceptions and Error handling Techniques in Java.
		CO5	Apply the concepts Multithreaded Programming, Enumerations, Type Wrappers and Autoboxing in solving problems.
		CO6	Write and execute java programs using object-oriented concepts.
		CO7	Write Java program to illustrate the creation of packages, interfaces error handling techniques and threading.
OBJECT ORIENTED PROGRAMMING WITH C++	BCS306B	CO1	Illustrate the fundamentals of object oriented programming , C++ program structure.
		CO2	Reuse the code with extensible Class types, User-defined operators and function overloading



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		CO3	Achieve code reusability and extensibility by means of Inheritance and Polymorphism
		CO4	Identify and explore the Performance analysis of I/O Streams and Implement the features of C++ including templates, exceptions and file handling.
DATA VISUALIZATION WITH PYTHON	BCS358D	CO1	1. Demonstrate the use of IDLE or PyCharm IDE to create Python Applications and apply the Python programming constructs to develop programs for solving given problems
		CO2	2. Apply Matplot, Plotly library for drawing different Plots, Time Series , Maps and also demonstrate the visualization using Seaborn, Bokeh.
PROJECT MANAGEMENT WITH GIT	BCS358C	CO1	1. Demonstrate the commands related to GIT repository ,managing branches , collaboration and remote repository, GIT tags ,release,history and advanced GIT operations to manage a project
ANALYSIS & DESIGN OF ALGORITHMS	BCS401	CO1	1. Illustrate time complexity of the algorithms mathematically using asymptotic notations and various classes (P,NP and NP Complete) of problems
		CO2	2. Apply divide & conquer approaches and decrease & conquer approaches to solve computational problems
		CO3	3. Analyze the different issues encountered by embedded C-compilers and suggest optimized solutions.
		CO4	4. Illustrate the features and functionalities of interrupt handling, exception handling and different firmware of ARM processor
		CO5	5. Analyze the different features, functionalities and efficiencies of cache memory in ARM controllers.
		CO6	6. Implement ALP programs to realize basic operations in the ARM processors using Keil.
		CO7	7. Develop embedded C programs to simulate basic operations in the ARM processors and demonstrate interrupts and exceptions using Keil.
DATABASE MANAGEMENT SYSTEMS	BCS403	CO1	1. Discuss the fundamental concepts of databases and data modeling techniques for structured data.
		CO2	2. Explain the relational algebra techniques to translate database conceptual designs into logical designs.
		CO3	3. Apply normalization algorithms on various database applications to reduce redundancy and complexity
		CO4	4. Write advanced SQL queries and transaction support for complex data retrieval in RDBMS.
		CO5	5. Discuss the fundamentals of NoSQL databases, big data storage systems and concurrency control



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			techniques for unstructured data.
		CO6	6. Design simple database systems and write SQL queries to interact with databases.
		CO7	7. Create NoSQL Database to perform basic CRUD operations
ANALYSIS & DESIGN OF ALGORITHMS LAB	BCSL404	CO1	1. Demonstrate the working of Brute force, Divide and Conquer design approaches to provide solution for a given problem
		CO2	2. Demonstrate the working of Dynamic programming, Greedy technique and Backtracking design approaches to solve the given problems.
DISCRETE MATHEMATICAL STRUCTURES	BCS405A	CO1	1. Apply concepts of logical reasoning and mathematical proof techniques in proving theorems and statements.
		CO2	2. Apply the knowledge of mathematical induction and principles of Counting to solve computer science related problems.
		CO3	3. Apply the basic concepts of relations, functions and partially ordered sets to solve real time problems
		CO4	4. Solve problems related recurrence relations, generating functions and mutual inclusion and exclusion
		CO4	5. Illustrate the fundamental principles of Algebraic structures with the problems related to computer science & engineering.
USER INTERFACE/ USER EXPERIENCE	BCS456C	CO1	1.Explain the user experience design requirements.
		CO2	2.Compare design thinking concepts and mental models to UX design.
		CO3	3Apply design production techniques to set, measure, and achieve UX goals and metrics to optimize user experiences
		CO4	4.Apply prototyping techniques with software engineering in UI/UX to enhance collaboration and streamline development
		CO5	5.Apply UX guidelines in design processes to create user-centered products that adhere to industry standards and best practices
BIOLOGY FOR COMPUTER ENGINEERS	BBOC407	CO1	1. Define the cell components and its types , stem cells
		CO2	2. Categorize Interdisciplinary applications of biomolecules by exploiting its molecular properties
		CO3	3. Compare the working human organs to known equipments/machineries
		CO4	4. Relate various technologies on the principles of biomechanics
		CO5	5. Assess the design of bioengineering used in solution of contemporary problems.



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UNIVERSAL HUMAN VALUES COURSE	BUHK408	CO1	1. Identify need for value education
		CO2	2. Outline required things to maintain harmony with human being
		CO3	3. Recognize required things to maintain harmony with family and society
		CO4	4. Identify required things to maintain harmony with nature
		CO5	5: Exhibit professional ethics in real life.

## 2021 SCHEME

Course Name	Course Code	CO. No.	Course Outcomes
BASIC ELECTRONIC S & COMMUNICA TION ENGINEERIN G	21ELN14	CO1	Describe The Concepts Of Electronic Circuits Encompassing Power Supplies, Amplifiers And Oscillators
		CO2	Present The Basics Of Digital Logic Engineering Including Data Representation, Circuits And The Microcontroller System With Associated Sensors And Actuators.
		CO3	Discuss The Characteristics And Technological Advances Of Embedded Systems.
		CO4	Relate To The Fundamentals Of Communication Engineering Spanning From The Frequency Spectrum To The Various Circuits Involved Including Antennas
		CO5	Explain The Different Modes Of Communications From Wired To Wireless And The Computing Involved.
		CO6	Use Of Open Source Simulator To Verify The Concepts Of Electronics And Communication Circuits
TRANSFORM CALCULUS, FOURIER SERIES & NUMERICAL TECHNIQUES (COMMON TO ALL)	21MAT31	CO1	Understand The Concepts Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations
		CO2	Demonstrate Various Physical Phenomena Using The Concepts Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations
		CO3	Apply The Knowledge Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations In Modeling Various Physical And Engineering Phenomena.
		CO4	Relate The Concepts Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations To Their Respective Branches.



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DIGITAL SYSTEM DESIGN USING VERILOG	IPCC 21EC32	CO1	Apply K-Map And Quine-Mccluskey Minimization Technique Simplify Noolean Functions
		CO2	Analyse And Design For Combinational Circuits
		CO3	Analyse The Concept Of Flip Flops And Design The Synchronous Sequential Circuits Using Flip Flops
		CO4	Write Combinational Circuits And Sequential Circuits Using Verilog Descriptions
BASIC SIGNAL PROCESSING	IPCC 21EC33	CO1	Understand The Fundamentals Of Linear Algebra, Signals And Systems
		CO2	Perform Linear And Non-Linear Operations On Signals And Systems To Identify Its Properties In Time And Z-Domain.
		CO3	Solve N-Dimension Vector Spaces Using Matrix Representation.
		CO4	Verify Mathematical Operations Performed With Matrices, Signal And System Properties In Time And Z-Domain
ANALOG ELECTRONIC CIRCUITS	PCC 21EC34	CO1	Explain The Biasing Of Transistors, Working Of Oscillator, Functioning Of Linear Ics And Basics Of Power Electronics
		CO2	Analyze Amplifiers With And Without Feedback.
		CO3	Analyze Power Amplifiers And Linear IC Based Circuits
		CO4	Design Of Linear IC Based Circuits And Power Electronic Circuit
ANALOG & DIGITAL ELECTRONIC S LAB	21ECL35	CO1	Explain The Biasing Of Transistors, Working Of Oscillator, Functioning Of Linear Ics And Basics Of Power Electronics
		CO2	Analyze Amplifiers With And Without Feedback.
		CO3	Analyze Power Amplifiers And Linear IC Based Circuits
		CO4	Design Of Linear IC Based Circuits And Power Electronic Circuit
UHV SOCIAL CONNECT AND RESPONSIBILITY	21UH36	CO1	Understand Social Responsibility And Ethics Towards Mankind And Environment
		CO2	Practice Sustainability And Creativity To Have An Impact On The Society.
		CO3	Exhibit Planning And Organizational Skills In A Given Platform
		CO4	Effectively Communicate The Ideas/Process/Solutions In Both Verbal And Written
ABILITY ENHANCEMENT COURSE -	AEC 21EC38X	CO1	Perform Arithmetic And Boolean Operation Using Graphical Programming
		CO2	Simple Applications Using For Loop, While Loop



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III			Using Labview Structure.
		CO3	Build Virtual Instrument To Control Room Temperature, Water Level Detection. Calculator.
		CO4	Build Virtual Instrument To Find Area, Perimeter Of Circle
		CO5	Use Various Editing And Debugging Techniques.
COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS	21MAT41	CO1	Understand The Concepts Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations
		CO2	Demonstrate Various Physical Phenomena Using The Concepts Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations
		CO3	Apply The Knowledge Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations In Modeling Various Physical And Engineering Phenomena.
		CO4	Relate The Concepts Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations To Their Respective Branches.
DIGITAL SIGNAL PROCESSING	IPCC 21EC42	CO1	Outline The Concepts Of Discrete Fourier Transform (DFT), Filter Design And Processors.
		CO2	Compute DFT For Short/Long Duration Input Sequence Using DFT Properties And FFT Algorithms
		CO3	Design Digital IIR/FIR Filter For Given Specifications
		CO4	Realize Digital IIR /FIR Filters In Direct Forms And Cascade, Lattice Structure
		CO5	Simulate And Verify The Properties Of DFT ,Magnitude And Phase Response Of IIR And FIR Filters For Given Specifications.
CIRCUITS & CONTROLS	IPCC 21EC43	CO1	Solve Electric Circuit Parameters By Applying Loop Analysis, Nodal Analysis And Network Theorems.
		CO2	Evaluate Two Port Parameters Of A Network And Apply Laplace Transforms To Solve Electric Networks
		CO3	Apply Block Diagram Reduction Technique To Deduce Transform Function
		CO4	Analyze The Performance And Stability Using Transfer Function Of Feedback Systems
COMMUNICATION THEORY	21EC44	CO1	Explain The Fundamental Concept Of Different Modulation And Demodulation Techniques Used In Analog Communication.
		CO2	Compute Various Parameters Related To Analog Communication System..



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		CO3	Analyze The Performance Of The Analog Communication System In The Presence Of Noise.
		CO4	Analyze And Compute Performance Of Digital Formatting Processes With Quantization Noise.
BIOLOGY FOR ENGINEERS	AEC 21BE45	CO1	To Know The Fundamentals Of Biological Cellular Systems And To Familiarize The Students With The Basic Biological Concepts And Their Engineering Applications.
		CO2	To Enable The Students With An Understanding Of Biodesign Principles To Create Novel Devices And Structures.
		CO3	To Provide The Students An Appreciation Of How Biological Systems Can Be Re-Designed As Substitute Products For Natural Systems.
		CO4	To Motivate The Students Develop The Interdisciplinary Vision Of Biological Engineering.
COMMUNICATION LABORATORY I	PCC 21ECL46	CO1	Demonstrate AM Generation And Detection Using Suitable Electronic Circuits
		CO2	Test The Concepts Of FM Circuits For Modulation, Demodulation And Noise Suppression
		CO3	Test And Analyze Sampling, Multiplexing And Pulse Modulation Techniques Using Electronic Hardware Components.
		CO4	Demonstrate RF Transmitters And Receivers Using Electronic Circuits.
ABILITY ENHANCEMENT COURSE-IV EMBEDDED C BASICS	AEC 21EC481	CO1	Write 8051 C Program for Solving Problems
		CO2	Simulate /Demonstrate The Experiments With Given Specification
		CO3	Tabulate, Validate The Readings And Infer The Results Logically
		CO4	Interpret The Concept And Results Both Orally And Written
UNIVERSAL HUMAN VALUES	UHV 21UH49	CO1	Demonstrate Sound Knowledge In The Chosen Domain Through Skill Up Gradation.
		CO2	Correlate The Knowledge Gained For Different Applications Scenarios.
		CO3	Work As Individual Or As Good Team Player In An Environment.
		CO4	Communicate The Content Effectively Through Written And Oral Presentations.
INTER/INTRASTITUTIONAL INTERNSHIP	INT 21INT49	CO1	Demonstrate Sound Knowledge In The Chosen Domain Through Skill Up Gradation.
		CO2	Correlate The Knowledge Gained For Different Applications Scenarios.
		CO3	Work As Individual Or As Good Team Player In An Environment.





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		CO4	Communicate The Content Effectively Through Written And Oral Presentations.
DIGITAL COMMUNICATION	21EC51	CO1	Apply The Knowledge Of Spectral Analysis, Theory Of Detection And Estimation In DCS.
		CO2	Analyze Digital Modulation Schemes, ISI And Spread Spectrum Techniques(SST).
		CO3	Determine Performance Parameters Of Digital Modulation Techniques And SST.
		CO4	Compute Entropy, Efficiency And Redundancy Of Source Codes
		CO5	Detect And Correct Errors Using Channel Coding Technique
CO & ARM	IPCC 21EC52	CO1	Describe The Basic Structure & I/O Organization Of A Computer.
		CO2	Explain Memory Organization And Management For Processing In Computer.
		CO3	Describe The Architecture Of ARM Based Embedded Systems
		CO4	Illustrate The ARM & Thumb Instruction Set In Writing Programs.
		CO5	Write An Assembly Program (ARM And Thumb Instructions) And Simulate Using Keil Microvision.
		CO6	Demonstrate The Application Of Interfacing IO Devises To ARM Controller
COMPUTER COMMUNICATION NETWORKS	PCC 21EC53	CO1	Describe The Roles And Services Of Layering Achritecture In TCP/IP /OSI Model
		CO2	Discuss Services Standards And Protocols Associated With Data Link Layer And Network Layer
		CO3	Obtain The Performance Parameters Of Dta Link Layer And Routing Protocols
		CO4	Identify The Function And Protyocols Associated With Transport Layer
		CO5	Differentiate Different Types Of Coordinate Systems And Use Them For Solving The Problems Of Electromagnetic Field Theory.
ELECTROMA GNETICS WAVE	PCC 21EC54	CO1	Describe Static Electric And Magnetic Fields, Their Behaviour In Different Media, Associated Laws, Boundary Conditions And Electromagnetic Potentials.
		CO2	Use Integral And Point Form Of Maxwell'S Equations For Solving The Problems Of Electromagnetic Field Theory.
		CO3	Calculate Magnetic Force, Potential Energy And Magnetization With Respect To Magnetic Materials And Voltage Induced In Electric Circuits.
		CO4	Describe Time Varying Fields, Propagation Of Electromagnetic Waves In Different Media, Poynting



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			Theorem, Their Sources & Effects And To Apply The Theory Of Electromagnetic Waves In Practical Problems.
COMMUNICATION LAB II	PCC 21ECL55	CO1	Design And Demonstrate Communication Circuits For Different Digital Modulation Techniques.
		CO2	To Simulate Source Coding Algorithms Using C/C++/ MATLAB Code.
		CO3	To Simulate Error Correcting And Detecting Codes Using C/C++/ MATLAB Code.
		CO4	Simulate The Networking Concepts And Protocols Using C/C++/ Network Simulation Tool.
		CO5	Understand Entropies And Mutual Information Of Different Communication Channels.
RESEARCH METHODOLOGY & INTELLECTUAL PROPERTY RIGHTS	AEC 21EC56	CO1	Explain The Concepts Of Engineering Research And Ethics Associated With It .
		CO2	Illustrate The Procedure Of Literature Review, Technical Reading And Citations.
		CO3	Describe The Fundamentals Of Intellectual Property, Patent Laws And Drafting Procedure.
		CO4	Explain The Copyright Laws, Related Rights And Concepts Of Trademarks.
		CO5	Describe The Principles Of Industrial Designs, Design Rights And Geographical Indications Concepts.
ENVIRONMENTAL STUDIES	HSMC 21CIV57	CO1	Gain Knowledge Of Ecology, Environment, Environmental Policies And Regulations, Clean Energy Sources, Natural Resource Management And Sustainability Natural Resource Management And Sustainability
		CO2	Understand The Factors Causing Pollution To Water, Soil, Noise And Air And Their Global Environmental Concerns.
ABILITY ENHANCEMENT COURSE-V	AEC 21EC58X	CO1	Understand Internet Of Things And Its Hardware And Software Components
		CO2	Interface I/O Devices, Sensors & Communication Modules To Node MCU
		CO3	Write Program To Send Data To The Thingspeak Cloud
		CO4	Build IOT Based System To Remotely Monitor Data And Control Devices



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INNOVATION AND DESIGN THINKING	21IDT19/29	CO1	Describe Various Design Process Procedure To Solve Problems.
		CO2	Discuss The Design Ideas Through Different Techniques To Enhance The Critical Thinking.
		CO3	Explain The Significance Of Reverse Engineering To Be Aware Of Realistic Products.
		CO4	Draw Technical Drawing For Design Ideas .
PROBLEM-SOLVING THROUGH PROGRAMMING	21PSP23	CO1	Illustrate Basic Concepts Of Computer And C Programming.
		CO2	Design The Solution For The Given Problems And Develop The Same Using C Programming Language.
		CO3	Apply The Concepts Of Looping, Branching, And Decision Making Statements For A Given Problem.
		CO4	Demonstrate The Ability To Write C Programs Using Pointers, Structures, Unions, Arrays And Strings.
		CO5	Develop Modular Applications Using C Programming Language.
COMPUTER PROGRAMMING LABORATORY	21CP7/27	CO1	Write The Program For The Given Specifications
		CO2	Simulate The Experiments With The Given Specification
		CO3	Tabulate, Validate The Readings And Infer The Results Mathematically.
		CO4	Interpret The Concepts And Results Both Orally And Written
DATA STRUCTURES AND APPLICATIONS	21CS32	CO1	Illustrate Various Linear And Non-Linear Data Structures.
		CO2	Analyze Appropriate Data Structure To Be Applied For A Specific Problem.
		CO3	Assess Basic Operations On Various Data Structures.
		CO4	Construct Programs For Applications In Data Structures Using A High-Level Language.
ANALOG AND DIGITAL ELECTRONICS	21CS33	CO1	Implement Various Simple Analog And Digital Circuits For The Given Specification Using Appropriate Design Techniques.
		CO2	Apply The Knowledge Of Various Boolean Expression Minimization Techniques To Obtain Simplified Equations Required For The Implementation Of Simple Combinational And Sequential Digital Circuits.
		CO3	Develop HDL Programs To Simulate Simple Digital Circuits.
		CO4	Analyze The Operational Characteristics & Performance



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			Of Various OPAMP Application Circuits.
COMPUTER ORGANIZATION AND ARCHITECTURE	21CS34	CO1	Distinguish Organization And Architecture Of Computer Systems With Machine Instructions And Programs.
		CO2	Analyse The Input/Output Devices Communicating With Computer System
		CO3	Analyse The Functions Of Different Types Of Memory Devices And Its Mapping
		CO4	Apply Different Data Types On Simple Arithmetic And Logic Unit
OBJECT ORIENTED PROGRAMMING WITH JAVA LABORATORY	PCC 21CSL35	CO1	Analyze The Necessity For Object Oriented Programming Paradigm Over Structured Programming And Become Familiar With The Fundamental Concepts In OOP.
		CO2	Demonstrate The Ability To Design And Develop Java Programs, Analyze, And Interpret Object-Oriented Data And Document Results.
		CO3	Apply The Concepts Of Multiprogramming, Exception/Event Handling, Abstraction To Develop Robust Programs
		CO4	Develop User Friendly Applications Using File I/O And GUI Concepts.
SOCIAL CONNECT AND RESPONSIBILITY	UHV 21UH36	CO1	Understand Social Responsibility And Ethics Towards Mankind And Environment
		CO2	Practice Sustainability And Creativity To Have An Impact On The Society.
		CO3	Exhibit Planning And Organizational Skills In A Given Platform
		CO4	Effectively Communicate The Ideas/Process/Solutions In Both Verbal And Written
SAMSKRUTIKA KANNADA	HSMC 21KSK37/47	CO1	Kannada Nadu,Nudi Mattu Samsruthiya Bagge Parichaya
		CO2	Kannada Adalitha Padagala Parichaya.
		CO3	Kannada Vachanagala Parichaya.
		CO4	Kannada Janapada Sahithya.
BALAKE KANNADA	21KBK37/47	CO1	Kannada Padagala Parichaya
		CO2	Kannada Bhaseyalli Mathanaduvudu ,Oduvudhu, Bareyuvudhu.
		CO3	Kannadadhali Samvahana Nadesuvudhu.
		CO4	Prathi Dina Kannada Padagala Balake
		CO5	Kannadadhali Vyavahisuvadu.
CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS	HSMC 21CIP37/47	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.



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		CO4	Understand Our State Executive & Elections System Of India.
		CO5	Remember The Amendments And Emergency Provisions, Other Important Provisions Given By The Constitution.
PROGRAMMI NG IN C++	21CS382	CO1	Able To Understand And Design The Solution To A Problem Using Object-Oriented Programming Concepts.
		CO2	Able To Reuse The Code With Extensible Class Types, User-Defined Operators And Function Overloading.
		CO3	Achieve Code Reusability And Extensibility By Means Of Inheritance And Polymorphism
		CO4	Identify And Explore The Performance Analysis Of I/O Streams.
		CO5	Implement The Features Of C++ Including Templates, Exceptions And File Handling For Providing Programmed Solutions To Complex Problems.
MATHEMATI CAL FOUNDATION S FOR COMPUTING	BSC 21CS41	CO1	Apply The Concepts Of Logic For Effective Computation And Relating Problems In The Engineering Domain.
		CO2	Analyze The Concepts 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 Analysing The Probability Models Arising In The 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.
DESIGN AND ANALYSIS OF ALGORITHMS	IPCC 21CS42	CO1	Illustrate Time And Space Complexity Of The Algorithm Mathematically Using Asymptotic Notations.
		CO2	Apply Divide And Conquer Approaches And Decrease And Conquer Approaches In Solving The Problems Compute The Performance Of The Same.
		CO3	Apply The Appropriate Algorithmic Design Technique Like Greedy Method, Spanning Tree, Shortest Path And Compare The Efficiency Of Algorithms To Solve The Given Problem
		CO4	Analyze Dynamic Programming, Transitive Closure Approaches To Solve Problems And Analyze The Space-Time Complexity
		CO5	Apply Backtracking, Branch And Bound, NP-Complete And NP-Hard Methods To Solve Given Problems.



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MICROCONTROLLER AND EMBEDDED SYSTEMS	IPCC 21CS43	CO1	Develop Simple Programs Using The Conceptual Knowledge Of Hardware Organization And Instruction Set Of Microcontrollers (ARM-7 TDMI LPC-2148)
		CO2	Analyze The Features And Functionalities Of Different RTOS, Simulators And Ides Used For Designing And Debugging The Embedded Systems.
		CO3	Develop And Execute Simple Data Processing Programs In ARM Assembly Language Using Keil IDE.
		CO4	Develop And Execute C Programs Based On Control Logic For Interfacing Hardware Peripherals With The Microcontrollers.
OPERATING SYSTEMS	PCC 21CS44	CO1	Identify The Structure Of An Operating System And Its Scheduling Mechanism.
		CO2	Demonstrate The Allocation Of Resources For A Process Using Scheduling Algorithm.
		CO3	Identify Root Causes Of Deadlock And Provide The Solution For Deadlock Elimination
		CO4	Explore About The Storage Structures And Learn About The Linux Operating System.
		CO5	Analyze Storage Structures And Implement Customized Case Study
BIOLOGY FOR ENGINEERS	21BE45	CO1	To Know The Fundamentals Of Biological Cellular Systems And To Familiarize The Students With The Basic Biological Concepts And Their Engineering Applications.
		CO2	To Enable The Students With An Understanding Of Biodesign Principles To Create Novel Devices And Structures.
		CO3	To Provide The Students An Appreciation Of How Biological Systems Can Be Re-Designed As Substitute Products For Natural Systems.
		CO4	To Motivate The Students Develop The Interdisciplinary Vision Of Biological Engineering.
PYTHON PROGRAMMING LABORATORY	21CSL46	CO1	Demonstrate Proficiency In Handling Of Loops And Creation Of Functions.
		CO2	Identify The Methods To Create And Manipulate Lists, Tuples And Dictionaries.
		CO3	Discover The Commonly Used Operations Involving Regular Expressions And File System.
		CO4	Interpret The Concepts Of Object-Oriented Programming As Used In Python.
		CO5	Determine The Need For Scraping Websites And Working With PDF, JSON And Other File Formats.
AUTOMATA THEORY AND COMPILER	21CS51	CO1	1. Illustrate The Fundamental Concepts In Automata Theory And Theory Of Computation
		CO2	2. Construct DFA, NFA, E-NFA, RE For Different



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DESIGN			Languages
		CO3	3. Design Grammars, PDA And Turing Machine For Different Language
		CO4	4. Illustrate The Fundamental Concepts Of Compiler Design.
		CO5	5. Design Lexical Analyzers, Parsers And Code Generators By Applying The Concepts Of Automata Theory And Theory Of Computation
COMPUTER NETWORKS	21CS52	CO1	1. Illustrate The Fundamental Concepts Of Network Hardware, Software, Reference Models And Physical Layer.
		CO2	2 .Apply The Various Schemes, Techniques And Protocol Concepts In Resolving Simple Issues Like Error Detection And Correction Encountered In The Data Link Layer.
		CO3	3. Apply The Various Routing Algorithms, Congestion Control Algorithm And Techniques To Achieve Good Qos In Resolving The Network Layer Design Issues And Improve Performance.
		CO4	4. Illustrate Transport Layer Service, Protocols
		CO5	5. Illustrate The Various Functionalities And Associated Protocols With Respect To Application Layer.
		CO6	6. Simulate Basic Functionalities Of Various Kind Of Networks For The Given Specification Using NS2 Simulator. Write Java Programs To Simulate Basic Network Algorithms And Functionalities.
DATABASE MANAGEMENT SYSTEMS	21CS53	CO1	1.Describe The Concepts Of Database Objects, Enforce Integrity Constraints On A Database Using RDBMS.
		CO2	2.Identify How To Apply Constraints And Query Using Relational Model And Overview Of Relational Algebra
		CO3	3.Design Simple Database Systems For Some Application To Interact With Databases
		CO4	4.Implement Normalization Algorithms Using Database Design Theory For Different Applications
		CO5	5.Analyze And Implement Transaction Processing, Concurrency Control And Database Recovery Protocols In Databases
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	21CS54	CO1	1.Apply Artificial Neural Networks And Analyze Different Clustering Algorithms.
		CO2	2. Apply Various Classification Algorithms On Different Datasets And Compare The Results.
		CO3	3.Analyze What Is AI, Foundations, History Of AI, Problem-Solving Agents, Searching For Solutions And Uninformed Search Strategies.
		CO4	4. Examine Different AI Algorithms For Informed



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			Search Strategies, Introduction To Machine Learning, And Understanding Data.
		CO5	5.Compare And Contrast Learning Theory And Similarity Based Learning By Applying Various Regression Algorithms On Different Datasets And Validate Results.
DATABASE MANAGEMEMENT SYSTEMS LABORATORY WITH MINI PROJECT	21CSL55	CO1	1. Write SQL Queries For Manipulation Of Data
		CO2	2.Design Suitable Applications Using Databases
		CO3	3. Implement SQL Queries And Applications, Document The Results.
RESEARCH METHODOLOGY & INTELLECTUAL PROPERTY RIGHTS	21CS56	CO1	1.Explain The Concepts Of Engineering Research And Ethics Associated With It.
		CO2	2. Illustrate The Procedure Of Literature Review And Technical Reading And Analyze The Literature Review And Technical Reading With Citations
		CO3	3.Describe The Fundamentals Of Intellectual Property, Patent Laws And Drafting Procedure
		CO4	4.Explain The Copyright Laws, Related Rights And Concepts Of Trademarks
		CO5	5.Describe The Principles Of Industrial Designs, Design Rights And Geographical Indications Concepts
ENVIRONMENTAL STUDIES	21CIV57	CO1	1.Understand The Principles Of Ecology And Environmental Issues That Apply To Air, Land, And Water Issues On A Global Scale,
		CO2	2.Develop Critical Thinking And/Or Observation Skills, And Apply Them To The Analysis Of A Problem Or Question Related To The Environment.
		CO3	3. Demonstrate Ecology Knowledge Of A Complex Relationship Between Biotic And A Biotic Components.
		CO4	4. Apply Their Ecological Knowledge To Illustrate And Graph A Problem And Describe The Realities That Managers Face When Dealing With Complex Issues.
C# AND .NET FRAMEWORK	21CS582	CO1	1. Develop Programs Involving Basic Features Of C# Programming Language
		CO2	2. Make Use Of Exception Handling Features To Safeguard Program Against Runtime Anomalies
		CO3	3. Apply Concepts Of OOP In Developing Solutions To Problems
		CO4	4. Develop Programs To Illustrate Handling Of Text Files
		CO5	5. Make Use Of Modern Tools To Develop C# Programs And Applications
SOFTWARE ENGINEERING	21CS61	CO1	1. Illustrate Various Models For Software Engineering Process.





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G AND PROJECT MANAGEMEN T		CO2	2. Analyze Software Engineering And UML Models Through Various Use Cases.
		CO3	3. Illustrate Various Agile Models For Software Development.
		CO4	4. Apply Various Planning Models To Project Management Activities.
		CO5	5. Apply Quality Management Techniques To Enhance Software Quality.
FULL STACK DEVELOPME NT	21CS62	CO1	1. Understand The Working Of MVT Based Full Stack Web Development With Django
		CO2	2.Designing Of Models And Forms For Rapid Development Of Web Pages
		CO3	3.Analyze The Role Of Template Inheritance And Generic Views For Developing Full Stack Web Applications.
		CO4	4.Apply The Django Framework Libraries To Render Nonhtml Contents Like CSV And PDF
		CO5	5.Perform JQuery Based AJAX Integration To Django Apps To Build Responsive Full Stack Web Applications,
		CO6	6.Demonstrate Working Of Django And Activating Virtual Environment
		CO7	7.Implement Views, Templates, Forms, MIME Types With Admin Interface By Using Django
COMPUTER GRAPHICS AND FUNDAMENT ALS OF IMAGE PROCESSING	21CS63	CO1	1.Apply Computer Graphics Principles To Draw Lines And Basic Geometric Primitives
		CO2	2.Apply 2D And 3D Geometric Transformations Using Opgl Apis To Transform Objects
		CO3	3.Analyze GUI, Input Interactions And Animation Techniques To Animate The Created Objects.
		CO4	4.Apply Image Processing Concepts In Image Processing Operations.
		CO5	5.Apply Image Segmentation And Edge Detection Techniques For Developing Simple Applications In Image Processing.
ADVANCED JAVA PROGRAMMI NG	21CS642	CO1	1.Interpret The Collection Framework And Interfaces
		CO2	2.Discuss The Various String Handling Functions With Example
		CO3	3.Apply The Concepts Of Servlets And Jsp To Develop Distrubuted Web Applications
		CO4	4.Illustrate The Concepts Of JDBC ,Transaction Pocessing,Statement Object Resultset To Perform Operatios On Database
ADVANCED COMPUTER	21CS643	CO1	1.Analyze The Underlying Hardware Impact In Performance Of The Software



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ARCHITECTURE		CO2	2.Explain The Concepts Of Parallel Computing And The Benefits Over The Sequential Computing
		CO3	3.Analyze The Different Kind Of Parallel Architectures Which Impacts The Performance Of The Whole Computing System
		CO4	4.Explain The Concept Of Parallel Programming And Its Impact In Software Development
INTRODUCTION TO DATA STRUCTURES	21CS651	CO1	1. Illustrate The Concepts Of Arrays, Pointers, Structures And Unions To Develop Efficient And Modular C Programs.
		CO2	2.Apply The Concepts Of Stack And Queues For Solving Real World Problems.
		CO3	3. Illustrate The Concept Of Linked List To Efficiently Manage Dynamic Data Structures In C Programming.
		CO4	4. Apply The Concepts Tree Data Structure In Problem Solving.
		CO5	5. Apply Various Searching And Sorting Techniques For Data Retrieval And Organization In Software Applications.
INTRODUCTION TO CYBER SECURITY	21CS653	CO1	1. Explain Cybercrime Terminologies And Acts
		CO2	2. Describe Steps To Be Taken In Response To A Cyber-Attack And Tools Used To Do Cyber-Attack.
		CO3	3. Classify The Tools And Methods Used In Cybercrime.
		CO4	4. Discuss The Motive And Causes For Cybercrime And Detection Techniques
COMPUTER GRAPHICS AND IMAGE PROCESSING LABORATORY	PCC 21CSL66	CO1	1. Analyze CG Principles And Open GL API For Polygon Fill Areas, Area Detection, Clipping, 2D And 3D Viewing And Illumination.
		CO2	2. Illustrate Opendgl Apis And Related Mathematics/Algorithms For 2D And 3D Geometric Operations On The Objects.
		CO3	3. Classify The Tools And Methods Used In Cybercrime.
		CO4	4. Discuss The Motive And Causes For Cybercrime And Detection Techniques
MINI PROJECT	21CSMP67	CO1	1.Demonstrate An Ability To Identify And Formulate A Hypothesis For A Given Problem And Test Through Appropriate Experiments.
		CO2	2.Apply Relevant Modern Tools To Solve The Identified Technical Problem.
		CO3	3.Analyze And Evaluate The Experimental Results And Propose Suitable Modifications To Improve Performance.
		CO4	4.Work Effectively As A Team Member As Well As A Leader Of A Team.



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		CO5	5.Communicate Technical Content Effectively Through Written Reports And Oral Presentations.
INNOVATION /ENTREPREN EURSHIP /SOCIETAL INTERNSHIP	21INT68	CO1	1. Demonstrate An Ability To Identify And Formulate A Hypothesis For A Given Problem And Test Through Appropriate Experiments.
		CO2	2.Apply Relevant Modern Tools To Solve The Identified Technical Problem.
		CO3	3.Analyze And Evaluate The Experimental Results And Propose Suitable Modifications To Improve Performance.
		CO4	4.Work Effectively As A Team Member As Well As A Leader Of A Team.
		CO5	5.Communicate Technical Content Effectively Through Written Reports And Oral Presentations.



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## 2018 SCHEME COURSE OUTCOMES

Course Name	Course Code	CO. No.	Course Outcomes
C PROGRAMMING FOR PROBLEM SOLVING	18CPS13/23	CO1	Illustrate simple algorithms from the different domains such as mathematics ,Physics,etc.
		CO2	Construct a programming solution to the given problem using C.
		CO3	Identify and correct the syntax and logical errors in C programs.
		CO4	Modularize the given problem using functions and structures.
C PROGRAMMING LABORATORY	18CP7/27	CO1	Write algorithms,flowcharts and program for simple problems.
		CO2	Correct syntax and logical errors to execute a program.
		CO3	Write iterative and Wherever possible recursive programs.
		CO4	Demonstrate use of functions,arrays,strings,structures and pointers in problem solving.
DATA STRUCTURES AND APPLICATIONS	18CS32	CO1	Use different types of data structures, operations and algorithms
		CO2	Apply searching and sorting operations on files
		CO3	Use stack, Queue, Lists, Trees and Graphs in problem solving
		CO4	Implement all data structures in a high-level language for problem solving.
ANALOG AND DIGITAL ELECTRONICS	18CS33	CO1	Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.
		CO2	Explain the basic principles of A/D and D/A conversion circuits and develop the same.
		CO3	Simplify digital circuits using Karnaugh Map , and Quine-McClusky Methods
		CO4	Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types
		CO5	Develop simple HDL programs
COMPUTER ORGANIZATION	18CS34	CO1	1.Explain the basic organization of a computer system.
		CO2	2.Demonstrate functioning of different sub systems, such as processor, Input/output,and memory.
		CO3	3.Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems.
		CO4	4.Design and analyse simple arithmetic and logical units.



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SOFTWARE ENGINEERING	18CS35	CO1	1.Design a software system, component, or process to meet desired needs within realistic constraints
		CO2	2.Assess professional and ethical responsibility
		CO3	3.Function on multi-disciplinary teams
		CO4	4.Use the techniques, skills, and modern engineering tools necessary for engineering practice
		CO5	5.Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems
DISCRETE MATHEMATICAL STRUCTURES	18CS36	CO1	1.Use propositional and predicate logic in knowledge representation and truth verification
		CO2	2.Demonstrate the application of discrete structures in different fields of computer science.
		CO3	3.Solve problems using recurrence relations and generating functions.
		CO4	4.Application of different mathematical proofs techniques in proving theorems in the courses.
		CO5	5.Compare graphs, trees and their applications.
ANALOG AND DIGITAL ELECTRONICS	18CSL37	CO1	1.Use appropriate design equations / methods to design the given circuit.
		CO2	2.Examine and verify the design of both analog and digital circuits using simulators.
		CO3	3.Make us of electronic components, ICs, instruments and tools for design and testing of circuits for the given the appropriate inputs.
		CO4	4.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	CO1	1.Analyze and Compare various linear and non-linear data structures
		CO2	2.Code, debug and demonstrate the working nature of different types of data structures and their applications
		CO3	3.Implement, analyze and evaluate the searching and sorting algorithms
		CO4	4.Choose the appropriate data structure for solving real world problem
VYAVAHARIKA KANNADA (KANNADA FOR COMMUNICATION)	18KVK39	CO1	1.At the end of the course, the student will be able to understand Kannada and communicate in Kannada language.
AADALITHA KANNADA (KANNADA FOR	18KAK39	CO1	1.At the end of the course, the student will be able to understand Kannada and communicate in Kannada language.



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ADMINISTRATI ON)			
CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW	18CPC39	CO1	1.Have constitutional knowledge and legal literacy.
		CO2	2.Understand Engineering and Professional ethics and responsibilities of Engineers.
		CO3	3.Understand the the cybercrimes and cyber laws for cyber safety measures.
COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS	18MAT41	CO1	1.Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
		CO2	2.Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
		CO3	3.Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
		CO4	4.Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
DESIGN AND ANALYSIS OF ALGORITHMS	18CS42	CO1	1.Describe computational solution to well known problems like searching, sorting etc.
		CO2	2.Estimate the computational complexity of different algorithms.
		CO3	3.Devise an algorithm using appropriate design strategies for problem solving.
OPERATING SYSTEMS	18CS43	CO1	1.Demonstrate need for OS and different types of OS
		CO2	2.Apply suitable techniques for management of different resource
		CO3	3.Use processor, memory, storage and file system commands
		CO4	4.Realize the different concepts of OS in platform of usage through case studies
MICROCONTRO LLER AND EMBEDDED SYSTEMS	18SC44	CO1	1.Describe the architectural features and instructions of ARM microcontroller
		CO2	2.Apply the knowledge gained for Programming ARM for different applications.
		CO3	3.Interface external devices and I/O with ARM microcontroller.
		CO4	4.Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system
		CO5	5.Develop the hardware /software co-design and firmware design approaches
		CO6	6.Demonstrate the need of real time operating system for embedded system applications
OBJECT ORIENTED	18CS45	CO1	1.Explain the object-oriented concepts and JAVA.
		CO2	2.Develop computer programs to solve real world



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CONCEPTS			problems in Java
		CO3	3.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	CO1	1. Explain the various components of data communication
		CO2	2.Explain the fundamentals of digital communication and switching.
		CO3	3.Compare and contrast data link layer protocols.
		CO4	4.Summarize IEEE 802.xx standards
DESIGN AND ANALYSIS OF ALGORITHM LABORATORY	18CSL47	CO1	1.Design algorithms using appropriate design techniques (brute-force, greedy, dynamic programming, etc.
		CO2	2.Implement a variety of algorithms such as sorting, graph related, combinatorial, etc., in a high level language
		CO3	3.Analyze and compare the performance of algorithms using language features.
		CO4	4.Apply and implement learned algorithm design techniques and data structures to solve real-world problems.
MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY	18CSL48	CO1	1.Develop and test program using ARM7TDMI/LPC2148
		CO2	2..Conduct the following experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler
MANAGEMENT, ENTREPRENEURSHIP FOR IT INDUSTRY,	18CS51	CO1	1,Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship
		CO2	2.Utilize the resources available effectively through ERP
		CO3	3.Make use of IPRs and institutional support in entrepreneurship
COMPUTER NETWORKS AND SECURITY	18CS52	CO1	1.Explain principles of application layer protocols
		CO2	2.Recognize transport layer services and infer UDP and TCP protocols
		CO3	3.Classify routers, IP and Routing Algorithms in network layer
		CO4	4.Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard
		CO5	5.Describe Multimedia Networking and Network Management
DATABASE MANAGEMENT SYSTEM	18CS53	CO1	1.Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS.
		CO2	2.Use Structured Query Language (SQL) for database manipulation



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		CO3	3.Design and build simple database systems
		CO4	4.Develop application to interact with databases
AUTOMATA THEORY AND COMPUTABILITY	18CS54	CO1	1.Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation
		CO2	2.Learn how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models)
		CO3	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.
		CO4	4.Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness
		CO5	5.Classify a problem with respect to different models of Computation
APPLICATION DEVELOPMENT USING PYTHON	18CS55	CO1	1.Demonstrate proficiency in handling of loops and creation of functions.
		CO2	2.Identify the methods to create and manipulate lists, tuples and dictionaries.
		CO3	3.Discover the commonly used operations involving regular expressions and file system.
		CO4	4.Interpret the concepts of Object-Oriented Programming as used in Python.
		CO5	5.Determine the need for scraping websites and working with CSV, JSON and other file formats.
UNIX PROGRAMMING	18CS56	CO1	1.Explain Unix Architecture, File system and use of Basic Commands
		CO2	2.Illustrate Shell Programming and to write Shell Scripts
		CO3	3.Categorize, compare and make use of Unix System Calls
		CO4	4.Build an application/service over a Unix system
COMPUTER NETWORK LABORATORY	18CSL57	CO1	1.Analyze and Compare various networking protocols.
		CO2	2.Demonstrate the working of different concepts of networking.
		CO3	3.Implement, analyze and evaluate networking protocols in NS2 / NS3 and JAVA programming language
DBMS LABORATORY WITH MINI PROJECT	18CSL58 18CSL58	CO1	1.Analyze and Compare various networking protocols.
		CO2	2.Demonstrate the working of different concepts of networking.
		CO3	3.Implement, analyze and evaluate networking protocols in NS2 / NS3 and JAVA programming language
DBMS LABORATORY WITH MINI PROJECT	18CSL58	CO1	1.Create, Update and query on the database
		CO2	2.Demonstrate the working of different concepts of DBMS
		CO3	3.Implement, analyze and evaluate the project





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			developed for an application
ENVIRONMENTAL STUDIES	18CIV59	CO1	1.Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale
		CO2	2.Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
		CO3	3.Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
		CO4	4.Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
SYSTEM SOFTWARE AND COMPILERS	18CS61	CO1	1.Explain system software
		CO2	2.Design and develop lexical analyzers, parsers and code generators
		CO3	3.Utilize lex and yacc tools for implementing different concepts of system software
COMPUTER GRAPHICS AND VISUALIZATION	18CS62	CO1	1.Design and implement algorithms for 2D graphics primitives and attributes.
		CO2	2.Illustrate Geometric transformations on both 2D and 3D objects
		CO3	3.Apply concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination Models.
		CO4	4.Decide suitable hardware and software for developing graphics packages using OpenGL.
WEB TECHNOLOGY AND ITS APPLICATIONS	18CS63	CO1	1.Adapt HTML and CSS syntax and semantics to build web pages.
		CO2	2.Construct and visually format tables and forms using HTML and CSS
		CO3	3.Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically
		CO4	4.Appraise the principles of object oriented development using PHP
		CO5	5.Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features
DATA MINING AND DATA WAREHOUSING	18CS641	CO1	1.Identify data mining problems and implement the data warehouse
		CO2	2.Write association rules for a given data pattern
		CO3	3.Choose between classification and clustering solution
OBJECT ORIENTED MODELLING AND DESIGN	18CS642	CO1	1.Describe the concepts of object-oriented and basic class modelling.
		CO2	2.Draw class diagrams, sequence diagrams and interaction diagrams to solve problems.



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		CO3	3.Choose and apply a befitting design pattern for the given problem.
CLOUD COMPUTING AND ITS APPLICATIONS	18CS643	CO1	1.Explain cloud computing, virtualization and classify services of cloud computing
		CO2	2.Illustrate architecture and programming in cloud
		CO3	3.Describe the platforms for development of cloud applications and List the application of cloud.
ADVANCED JAVA AND J2EE	18CS644	CO1	1.Interpret the need for advanced Java concepts like enumerations and collections in developing modular and efficient programs
		CO2	2.Build client-server applications and TCP/IP socket programs
		CO3	3.Illustrate database access and details for managing information using the JDBC API
		CO4	4. Describe how servlets fit into Java-based web application architecture
		CO5	5.Develop reusable software components using Java Beans
MOBILE APPLICATION DEVELOPMENT	18CS651	CO1	1.Create, test and debug Android application by setting up Android development environment
		CO2	2.Implement adaptive, responsive user interfaces that work across a wide range of devices.
		CO3	3.Infer long running tasks and background work in Android applications
		CO4	4.Demonstrate methods in storing, sharing and retrieving data in Android applications
		CO5	5.Analyze performance of android applications and understand the role of permissions and security
		CO6	6.Describe the steps involved in publishing Android application to share with the world
PROGRAMMING IN JAVA	18CS653	CO1	Explain the object-oriented concepts and JAVA.
		CO2	Develop computer programs to solve real world problems in Java. Develop simple GUI interfaces for a computer program to interact with users
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	18CS71	CO1	1. Illustrate the concepts of Artificial Intelligence and Machine learning.
		CO2	2. Analyze different Artificial Intelligence and Machine learning algorithm for a given input data.
		CO3	3. Apply the mathematical concepts in different machine learning algorithms.
		CO4	4. Implement Artificial Intelligence and Machine Learning algorithms using the state of art Python libraries/tools
BIG DATA ANALYTICS	18CS72	CO1	1 Illustrate the fundamentals of big data analytics, NOSQL, using MongoDB and Cassandra for bog data
		CO2	2 Develop Hadoop framework and hadoop distributed



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			file system
		CO3	3 Demonstrate the mapReduce programming model to process the big data along with hadoop tools
		CO4	4 Use machine learning algorithm for real world big data
UID	18CS734	CO1	1 Illustrate the fundamental concepts of User interface, Principles of UI, characteristics & Components of Windows
		CO2	2 Interpret the various problems in windows design with color,text , graphics and different test methods
		CO3	3 Analyze the connection between menus and interfaces
		CO4	4 Analyze the various business functions, Business definition and Human computer interactions and design standards
NETWORK MANAGEMENT	18CS742	CO1	1. Illustrate the different concepts of NMS, Standards, Models and Applications.
		CO2	2. Illustrate the various components of network and prepare the scheme to manage them.
		CO3	3. Analyze the issues and challenges pertaining to management of emerging network technologies.
NLP	18CS743	CO1	Analyze the natural language text
		CO2	Define the importance of natural language.
		CO3	Understand the concepts Text mining
		CO4	Illustrate information retrieval techniques.
CRYPTOGRAPHY	18CS744	CO1	1.Illustrate Cryptography and its principles, digital certificates, authentication protocols and email and Internet security.
		CO2	2.Analyze different cryptographic algorithms for encryption and decryption.
		CO3	3.Apply various key distribution and management schemes
PYTHON APPLICATION PROGRAMMING	18CS752	CO1	1.Illustrate Python syntax and semantics, control Statements, Looping statements, Functions, and Strings
		CO2	2.Apply the concept of File Systems, data structures like Lists, Dictionaries and use of Regular Expressions.
		CO3	3.Implement the concepts of Object-Oriented Programming, Network Programming, Web Services and Database as used in Python
MACHINE LEARNING LABORATORY	18CSL76	CO1	Analyze the machine learning algorithms on appropriate datasets.
		CO2	Tabulate target values, accuracy, precision and f1-score of different algorithms.
		CO3	Demonstrate effectively through written records and viva.
PROJECT WORK PHASE-1	18CSP77	CO1	1.Demonstrate an ability to identify and formulate a hypothesis for a given problem and test through



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			appropriate experiments.
		CO2	2. Apply relevant modern tools to solve the identified technical problem.
		CO3	3. Analyze and evaluate the experimental results and propose suitable modifications to improve performance.
		CO4	4. Work effectively as a team member as well as a leader of a team.
		CO5	5. Communicate technical content effectively through written reports and oral presentations.
IOT	18CS81	CO1	1. Interpret the impact and challenges posed by IoT networks leading to new architectural models.
		CO2	2. Compare and contrast the deployment of smart objects and the technologies to connect them to network.
		CO3	3. Appraise the role of IoT protocols for efficient network communication.
		CO4	4. Elaborate the need for Machine learning, Data Analytics and Security in IoT.
		CO5	5. Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.
		CO6	6. Installing, Configuring and Programming Arduino UNO with C and RaspberryPi with Python for different applications
NOSQL	18CS823	CO1	1. Illustrate types of NOSQL Data Bases (Key Value Pairs, Document Store, Columnar family, Graph)
		CO2	2. Demonstrate an understanding of the detailed architecture
		CO3	3. Interpret load data, query data and performance time column oriented NoSQL databases
		CO4	4. Explain the detailed architecture define objects, load data, query data and performance tune, document-oriented NOSQL databases
PROJECT WORK PHASE-2	18CSP83	CO1	Demonstrate an ability to identify and formulate a hypothesis for a given problem and test through appropriate experiments.
		CO2	Apply relevant modern tools to solve the identified technical problem.
		CO3	Analyze and evaluate the experimental results and propose suitable modifications to improve performance.
		CO4	Work effectively as a team member as well as a leader of a team.
		CO5	Communicate technical content effectively through written reports and oral presentations.
INTERNSHIP	18CSI85	CO1	1. Demonstrate an ability to identify and formulate a hypothesis for a given problem and test through



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			appropriate experiments.
		CO2	2. Apply relevant modern tools to solve the identified technical problem.
		CO3	3. Analyze and evaluate the experimental results and propose suitable modifications to improve performance.
		CO4	4. Work effectively as a team member as well as a leader of a team.
		CO5	5. Communicate technical content effectively through written reports and oral presentations.