



Annasaheb Dange College of Engineering and Technology
 Ashta - 416301, Dist. : Sangli, Maharashtra
 (An Empowered Autonomous Institute)
 Department of Computer Science and Engineering

**Course Information:**

Class, Semester	S. Y. B. Tech. Semester - III				Category	BS
Course Code, Course Title	3CSBS201 – Discrete Mathematics				Type	T1
Prerequisites	Basic Mathematics					
Teaching Scheme (per week)	Lecture 02	Tutorial 01	Practical 00	Self-Study 03	Credits 03	
Examination Scheme (Marks)	Theory	MSE 40	TA 20	ESE 40	Practical CIA -	ESE -

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

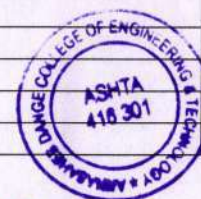
CO1	Apply concepts of mathematical logic using statements, connectives, truth tables, tautologies, equivalence, normal forms, and propositional & first-order logic
CO2	Apply propositional and first-order logic to represent knowledge, construct logical arguments, and solve problems using logical equivalences, predicates, quantifiers, and rules of inference.
CO3	Solve problems of set theory using relations, equivalence relations, partitions, POSETs, Hasse diagrams, and functions
CO4	Compute counting and probability problems using rule of sum, rule of product, permutations, combinations, discrete probability, and conditional probability
CO5	Develop algebraic structures using semigroups, monoids, groups, subgroups, homomorphisms, and lattices

Syllabus:

Module	Contents	Lecture Hours
I	Mathematical logic: Introduction, statements and notations, Connectives – negation, conjunction, disjunction, conditional, bi-conditional, Statement formulas and truth tables, well-formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal and principal normal forms	6
II	Propositional and First Order Logic: Propositional Logic, Knowledge Representation in First-Order Logic, Propositional Equivalences, Predicates and Quantifiers, Rules of Inference	4
III	Set theory: Basic concepts of set theory, types of operations on sets, ordered pairs, Cartesian Product, Representation of discrete structures, relation, properties of binary relations, matrix and graph representation, partition and covering of set, equivalence relation, composition, POSET and Hasse diagram, Function – types, composition of functions, Inverse function.	5
IV	Permutations, Combinations and Discrete Probability: Permutations and Combinations: rule of sum and product, Permutations, Combinations, Discrete Probability, Conditional Probability	5
V	Algebraic systems: Semigroups and Monoids, properties and examples, Groups: Definition and examples, subgroups and homomorphism.	4
VI	Lattices: Lattice as POSETs, definition, examples and properties, Lattice as algebraic systems, Special lattices	6
Total Lecture Hours		30

List of Tutorials

S. No	Title / Topic of the Tutorial
1	Mathematical Logic- Tautological implications, Equivalence of formulas
2	Mathematical Logic- Normal and principal normal forms



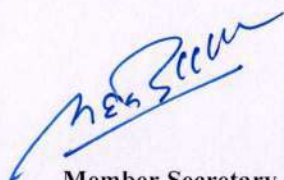
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3	Propositional and First Order Logic
4	Set Theory-basic concepts, types of operations on sets.
5	Set Theory- Relations, POSET and functions.
6	Permutations and Combinations
7	Discrete Probability, Conditional Probability
8	Algebraic Systems
9	Groups
10	Lattices
Total Tutorial Sessions	
15	Total Tutorial Hours
15	
Text Books	
1) Discrete Mathematical Structures with Applications to Computer Science , J. P. Tremblay and R. Manohar, Tata McGraw-Hill International, 2007.	
2) Elements of Discrete Mathematics , C. L. Liu and D. P. Mohapatra, Tata McGraw-Hill (SI Edition), 4th Edition, 2013.	
3) Theory of Computation , Sushilkumar Azad, Dhanpat Rai and Co., 2nd Edition, 2005.	
4) Discrete Mathematical Structures , Bernard Kolman, Robert Busby, S. C. Ross, and Nadeemur Rehman, Pearson Education, 2nd Edition, 2009.	
Reference Books	
1) Discrete Mathematics and Its Applications , Kenneth H. Rosen, Tata McGraw-Hill, 7th Edition, 2012.	
2) Discrete Mathematics, Schaum's Outlines , Seymour Lipschutz and Marc Lipson, Tata McGraw-Hill, 3rd Edition, 2012.	
3) Discrete Mathematical Structures , Bernard Kolman, Robert Busby, and S. C. Ross, PHI Learning Pvt. Ltd., 6th Edition, 2009.	
4) Foundations of Discrete Mathematics , K. D. Joshi, New Age International Ltd., 5th Edition, 2003.	
Online Resources	
https://onlinecourses.nptel.ac.in/noc20_cs82/preview	
https://onlinecourses.nptel.ac.in/noc26_cs68/preview	
https://www.coursera.org/learn/discrete-mathematics	



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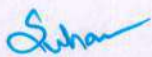




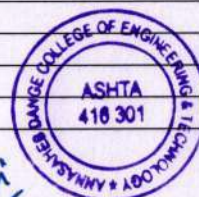
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 Established:	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering							
Course Information:								
Class, Semester		S. Y. B. Tech. Semester - III				Category	PC	
Course Code, Course Title		3CSPC202 – Data Structures and Algorithms				Type	LIT1	
Prerequisites		Computer Programming						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		03	00	02	03	04		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	50
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Describe fundamentals in data structures for solving problems using a programming language							
CO2	Explain the fundamental concepts of structuring, managing and organizing the data for solving problems using linear data structures with ADTs.							
CO3	Apply appropriate linear data structure to solve the problem using a programming language.							
CO4	Explain the fundamental concepts of structuring, managing and organizing the data for solving problems using non-linear data structures with ADTs.							
CO5	Apply appropriate non-linear data structure to solve the problem using a programming language.							
CO6	Analyze different data structure algorithms and searching, sorting methods for solving problems using complexity methods.							
Syllabus:								
Module	Contents						Lecture Hours	
I	Basics of Data Structures: Algorithm, ADT, Space and Time Complexity, Direct and Indirect recursion, analysis of recursive functions e.g. Towers of Hano						5	
II	Lists Definition, representation, operations, implementation and applications of singly, doubly and circular linked lists						9	
III	Stack and Queue Stacks as ADT, operations, representation using static and dynamic structures, applications of stack Queue as ADT, operations, representation using static and dynamic structures, circular queue, priority queue, double ended queue						9	
IV	Searching and Sorting Techniques Linear search, binary search, Internal and External Sorts, bubble sort, selection sort, insertion sort, merge sort, quick sort, radix sort, heap sort. Hashing – Definition, hash functions, overflow, collision, Collision resolution techniques, Open addressing, Chaining						9	
V	Trees Basic terminology, representation, binary tree, traversal methods, binary search tree, AVL search tree, Heaps- Operations and their applications, Introduction to M-way trees						8	
VI	Graphs Basic concept of graph theory, storage representation: adjacency matrix, adjacency list, adjacency multi-lists, graph traversal techniques- BFS and DFS						5	
Total Lecture Hours						45		
List of Experiments								
S. No	Title / Topic of the Experiment							
1	Function and Recursion							
2	Singly Linked List							
3	Doubly Linked List							
4	Circular Linked List							
5	Stack							


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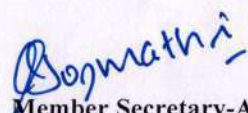
6	Queue
7	Sorting Techniques – Bubble, Selection, Insertion, Merge and Quick Sort
8	Searching Techniques- Linear, Binary Search
9	Binary Search Trees and traversal
10	Graph using adjacency list
Total Practical Sessions	
15	Total Practical Hours
	30
Text Books	
1) Data Structures- A Pseudocode Approach with C, Richard F. Gilberg and Behrouz A. Forouzon, Cengage Learning, 2nd Edition, 2004.	
2) Data Structures with C Schaum's Outlines Series, S. Lipschutz, Tata McGraw-Hill, 2017.	
3) Data Structure using C, Reema Thareja, Oxford, 2nd Edition, 2014.	
Reference Books	
1) Data Structure using C, A. M. Tanenbaum, Y. Langsam, M. J. Augenstein, Prentice-Hall Of India Pvt. Limited, 2003.	
2) C and Data Structures, N. B. Venkateshwarlu, E. V. Prasad, S. Chand and Company, 2010.	
NPTEL and Online Resources	
1) YouTube Channel: https://www.youtube.com/watch?v=bNOhMCYTuzU&list=PLbBX4c0PriKSbARYgvX23jt35eYEVuXXG	



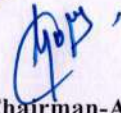
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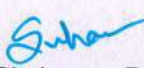


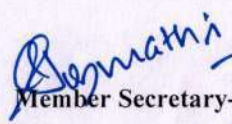
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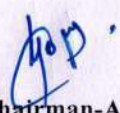


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Course Information:								
Class, Semester		S. Y. B. Tech. Semester - III					Category	PC
Course Code, Course Title		3CSPC203 – Computer Organization and Architecture					Type	LIT2
Prerequisites		3CSES105 Computer Programming						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		02	00	02	02	03		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	-
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:								
CO1	Explain 8085, 8086, and modern microprocessor architectures given diagrams and instruction formats with correct interpretation of cycles.							
CO2	Differentiate microprocessor and microcontroller architectures given 8051 features and diagrams with accurate comparison of structure and applications.							
CO3	Apply 8051 instruction set to write simple assembly programs with correct syntax and expected output using simulators.							
CO4	Implement embedded C programs for 8051 interfacing using Keil and Proteus with correct execution and verified results.							
CO5	Explain control unit, memory organization, and pipelining concepts given system models with proper interpretation of performance.							
Syllabus:								
Module	Contents							Lecture Hours
I	Microprocessor Architectures The 8085 & 8086 Microprocessor Architecture and its operations, Comparison of 8085, and 8086 architecture with modern microprocessor architecture. Flag concept and cautions, instruction and data format, Addressing modes, Instruction cycle, Timing Diagram and							4
II	8051 MICROCONTROLLER ARCHITECTURE Evolution of microcontrollers, Difference between Microprocessor vs Microcontroller, Features and applications of 8051, Embedded Systems, Embedded Microcontrollers, 8051 Architecture- Registers, Pin diagram, I/O ports functions, Internal Memory organization. External Memory (ROM & RAM) interfacing							5
III	8051 Instruction Set: Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Bit manipulation instructions. Simple Assembly language program examples (without loops) to use these instructions.							6
IV	EMBEDDED C PROGRAMMING FOR 8051 Embedded C structure, data types, keywords for microcontrollers, Bit-level, byte-level, and register-level programming, Interfacing using Embedded C, LED, Switch, 7-segment, LCD interfacing, Motor driver control, Timer & Interrupt programming, Serial communication Development Tools: Keil µVision IDE, Proteus / Multisim for simulation							6
V	Control Design and memory organization Basic concepts, Control unit, Hardwired control Unit and its types, Micro-programmed control unit and its types, Memory Technology, Memory Systems, Caches: Main features, Introduction to Cache Coherence and Multi-core memory hierarchy, Direct Memory Access (DMA).							5
VI	Pipelining Basic concepts in pipelining, data hazards, instruction hazards, influence of pipelining on instruction set, data-path & control considerations, performance considerations, and Flynn's classification of computer architectures.							4
Total Lecture Hours							30	


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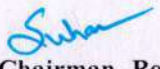

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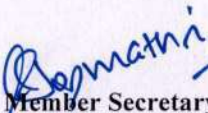

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List of Experiments			
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1	To study the architecture of 8085 and 8086 microprocessors and analyze different types of machine cycles and timing diagrams using simulation tools.		
2	To study the internal architecture, pin configuration, and memory organization of the 8051 microcontroller using simulation software.		
3	To write and simulate assembly language programs for data transfer operations in 8051 microcontroller.		
4	To implement arithmetic instructions such as addition and subtraction using 8051 assembly language.		
5	To perform logical operations (AND, OR, XOR, NOT) using 8051 instruction set.		
6	To develop assembly programs using branching instructions for decision-making operations.		
7	To implement bit-level operations such as set, clear, and complement using 8051 instructions.		
8	To interface LEDs with 8051 microcontroller and control them using Embedded C program.		
9	To interface and display numeric data on a 7-segment display using 8051.		
10	To interface an LCD with 8051 and display messages using Embedded C programming.		
Total Practical Sessions		15	Total Practical Hours
			30
Text Books			
1) Microprocessors and Microcontrollers: Architecture, Programming and System Design, Soumitra Kumar Mandal McGraw Hill Education (India) 1st Edition 2013			
2) The 8051 Microcontroller and Embedded Systems using Assembly and C, Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, Pearson Education, 2nd Edition 2008			
3) Computer Architecture and Organization, John P Hayes Tata McGraw-Hill, edition 3 2019.			
Reference Books			
1) Embedded Systems: Architecture, Programming and Design, Raj Kamal, McGraw Hill Education (India), 3rd Edition 2017			
2) Computer Organization and Architecture: Designing for Performance, William Stallings, Pearson Education, 8th Edition/10th Edition, 2010/2016.			
3) Computer Systems Organization and Architecture John D. Carpinelli, PEARSON Education, 3rd Edition, 2000			
NPTEL and Online Resources			
1) https://nptel.ac.in/courses/106106166			
2) https://www.udemy.com/course/computer-organization-and-architecture-j/?couponCode=LEADERSALE24B			


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Course Information:							
Class, Semester		S. Y. B. Tech. Semester - III				Category	PC
Course Code, Course Title		3CSPC204 – Software Engineering				Type	T1
Prerequisites		--					
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits	
		02	00	00	02	02	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA
			40	20	40		ESE
							-
							-
Course Outcomes (COs):							
Upon successful completion of this course, the student will be able to:							
CO1	Apply various software process models to select an appropriate process model for a given project scenario.						
CO2	Design Software Requirement Specifications (SRS) for any software by analyzing the problem statement.						
CO3	Develop a software system design to solve a given problem using structured or function-oriented design methodology						
CO4	Apply testing techniques for given application to check correctness of code using test cases.						
CO5	Identify appropriate standard for a given process to maintain software reliability and quality using quality standards like ISO 9000, CMM etc.						
Syllabus:							
Module	Contents						Lecture Hours
I	Software Processes and Agile Methodology: Software Process, Software Development Process Models, Plan-driven and agile development, Scrum, Extreme Programming, Kanban and Scaling agile methods						6
II	Software Requirements Analysis and Specification : Software Requirements, Problem Analysis, Requirements, Specification, Functional Specification with Use Cases, Validation.						4
III	Planning a Software Project : Process Planning, Effort Estimation, Project Scheduling and Staffing, Gantt Chart, PERT Chart, Quality Plan, Risk Analysis & Management.						5
IV	Function Oriented Design : Design Principles, Module-Level Concepts, Design Notation and Specification, Structured Design Methodology, quality metrics.						6
V	Coding and Testing : Programming Principles and Guidelines, Coding Process, Testing Fundamentals, Black-Box Testing, White-Box Testing, Gatling						5
VI	Software Reliability and Quality Management : Software Reliability, Software Quality, Software Quality Management System, ISO 9000, SEI CMM.						4
Total Lecture Hours						30	
Text Books							
1) An integrated Approach to Software Engineering-Pankaj Jalote, 3rd Edition, 2011.							
2) Fundamentals of Software Engineering, Rajib Mall, PHI, 3rd Edition 2014.							
3) Software Engineering –Jawadekar W.S, Tata McGraw-Hill, 5 th Edition, 2007.							
Reference Books							
1) Software Engineering, Lan Sommer vile, Pearson, 10 th Edition, 2016.							
2) Software Engineering Practitioner Approach- Roger S. Pressman, McGraw-Hill, 9 th Edition, 2023							
NPTEL and Onljne Resources							
1) Youtube Channel: https://www.youtube.com/watch?v=NILM3sVF8wY https://www.youtube.com/results?search_query=software+engineering							
2) NPTEL Course: i. https://onlinecourses.nptel.ac.in/noc25_cs108/preview ii. https://onlinecourses.swayam2.ac.in/cec26_cs06/preview							



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Course Information:								
Class, Semester		S. Y. B. Tech. Semester - III				Category	PC	
Course Code, Course Title		3CSPC205-Operating Systems				Type	LIT2	
Prerequisites		--						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		03	00	02	03	04		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Explain the basic concepts of operating systems and their structures with respect to various operating systems using different OS parameters.							
CO2	Analyze issues related to process scheduling and resource management with the help of different scheduling algorithm.							
CO3	Develop appropriate solution to solve critical section problem by using accurate operating system algorithm							
CO4	Use deadlock handling and Memory management techniques with suitable method to handle a deadlock and memory management.							
CO5	Analyze the performance of various page replacement algorithms with the help of logical and physical address space							
Syllabus:								
Module	Contents						Lecture Hours	
I	Overview: Introduction to Operating Systems, objectives and functions of operating systems, operating system as a resource manager, operating system structure and structure models, types of operating systems, operating system services, views of operating system, user mode and kernel mode, system calls and types of system calls, system programs, kernel and types of kernel, booting process (overview), overview of Linux and Android operating systems. Applications in						7	
II	Process Management Process concept: Basic concepts, Process States, Process Control Block, Context switch, Operations on processes, Inter-process communication Process Scheduling: Scheduling criteria, preemptive and non-preemptive scheduling, scheduling criteria, Types of Scheduler, Scheduling algorithms, Multiple-Processor scheduling, Multilevel Queue Scheduling,						8	
III	Process Synchronization Background and need for synchronization, race conditions, critical section problem and its requirements, Peterson's solution, hardware-based synchronization and atomic operations, semaphores and their types, classic synchronization problems including producer-consumer, readers-writers and dining philosophers, and monitors.						7	
IV	Deadlock System model and resource allocation, deadlock characterization and necessary conditions, resource allocation graph, methods for handling deadlocks including prevention, avoidance, detection, and recovery, deadlock avoidance using Banker's algorithm, deadlock detection algorithms, and recovery techniques through process termination and resource preemption.						7	
V	Memory management Background and need for memory management, swapping, contiguous memory allocation, paging and page table structure, segmentation, logical and physical address space, memory management unit, virtual memory concepts, demand paging, copy-on-write, page replacement algorithms.						8	

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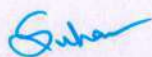
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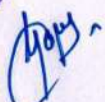


VI	File System & I/O Subsystem File concept and access methods, directory and disk structure, file sharing and protection, file-system implementation including allocation methods and free-space management, disk scheduling and scheduling algorithms, overview of I/O system, I/O hardware, application I/O interface, kernel I/O subsystem, and I/O buffering, Real-Time Operating System (RTOS) Case Studies(Autonomous Vehicle Control System and Smart ICU Monitoring System)	8
Total Lecture Hours		45
List of Experiments		
S. No	Title / Topic of the Experiment	
1	Installation of various Operating System.	
2	Demonstration of basics of UNIX utility commands.	
3	Program based on process creation with the help of FORK system Call	
4	Program based on inter-process communication	
5	Program based on CPU Scheduling Algorithms.	
6	Program to simulate producer-consumer problem using semaphores.	
7	Program based on Bankers algorithm for Deadlock Avoidance.	
8	Program to simulate Paging technique of memory management.	
9	Program based on Page Replacement Policies.	
10	Program based on Disk scheduling.	
Total Practical Sessions		15
Total Practical Hours		30
Text Books		
1) Operating System Concepts Silberschatz, Galvin, John Wiley,2009		
2) Operating Systems - A Concept Based approach, Dhananjay M Dhamdhare, Tata McGraw Hill,2007		
3) Understanding Operating System, Flynn,(Thomson), Ann McHoes& Ida M.2014		
Reference Books		
1) The design of Unix Operating System, Maurice J. Bach,2006		
2) A practical Guide to Linux commands, Editors and shell programming, Mark G. Sobell, Pearson Education India,2013		
Web Links		
1) https://www.youtube.com/watch?v=bkSWJJZNgf8&list=PLxCzCOWd7aiGz9donHRrE9I3Mwn6Xdp8p		
2) https://www.youtube.com/watch?v=RozoeWzT7IM		
3) https://onlinecourses.swayam2.ac.in/cec26_cs07/preview		


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Course Information:								
Class, Semester		S. Y. B. Tech. Semester - III					Category	PC
Course Code, Course Title		3CSPC206 - C++ Programming					Type	L1
Prerequisites		3CSES105 Computer Programming						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		01	00	02	01	02		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			-	-	-		50	50
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:								
CO1		Design C++ programs using functions, arrays, and strings to solve computational problems efficiently.						
CO2		Develop class-based C++ solutions using constructors, access specifiers, static members, and friend functions to model real-world problems.						
CO3		Implement reusable and extensible C++ programs by applying inheritance concepts.						
CO4		Demonstrate polymorphism concepts using function overloading, operator overloading, and virtual functions to create flexible C++ programs.						
CO5		Develop C++ applications using advanced concepts such as file handling, dynamic memory allocation, templates, exception handling, and STL.						
Syllabus:								
Module		Contents						Lecture Hours
I		Fundamentals of Programming & OOP Concepts Programming Paradigms: Procedural vs Object-Oriented, Limitations of Procedural Programming, Need for Object-Oriented Programming, Structure of C++ Program, Basic Input/Output (cin, cout), Tokens, Data Types, Variables, Operators and Expressions, Control Structures: if, switch loops (for, while, do-while), Functions: Function Prototype, Inline Functions, Default Arguments, Arrays and Strings, Pointers, this Pointer, Type Conversion (basic)						3
II		Classes and Objects Basic Concepts of OOP: Objects, Classes, Encapsulation, Abstraction, Data Hiding, Inheritance and Polymorphism, Class and Object Definition, Data Members and Member Functions, Access Specifiers, Constructors: Default, Parameterized, Copy Constructor, Static Members (data & functions), Friend Function and Friend Class Dynamic Memory Allocation (new, delete)						3
III		Inheritance Concept and Types of Inheritance: Single, Multilevel, Multiple, Hierarchical, Hybrid Inheritance						2
IV		Polymorphism Polymorphism: Function Overloading, Function Overriding, Operator Overloading Virtual Functions, Virtual Class, And Abstract Class.						3
V		File Handling Concept of Files and Streams, File Operations: open, close, read, write, File Modes and EOF, File Pointers (seekg, seekp),						2
VI		Advanced C++ Concepts Templates: Function and Class Templates, Exception Handling: try, catch, throw, Introduction to STL: Containers (vector, stack), Basic Algorithms						2
Total Lecture Hours								15

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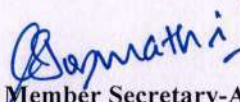
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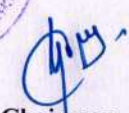


List of Experiments			
S. No	Title / Topic of the Experiment		
1	Write a C++ program to demonstrate basic input/output operations using cin and cout, and implement simple arithmetic operations.		
2	Write a program to demonstrate the use of different data types, operators, and expressions in C++.		
3	Implement programs using control structures: Conditional statements (if, switch), Looping constructs (for, while, do-while)		
4	Design a class for a real-world application (e.g., Student/Bank Account) with data members and member functions, and create objects to access them.		
5	Implement constructors (default and parameterized) and demonstrate the use of static data members and static member functions.		
6	Implement different types of inheritance (single, multilevel, multiple) with suitable examples and demonstrate function overriding.		
7	Implement different types of inheritance (hybrid, hierarchical) with suitable examples and demonstrate function overriding.		
8	Develop programs to demonstrate polymorphism using: Function overloading		
9	Develop programs to demonstrate polymorphism using: Operator overloading, Virtual functions.		
10	Write a program to perform file operations: Create, open, read, write, and close a file.		
11	Implement Generic Programming Using Function Templates and Class Templates in C++.		
12	Implementation of Exception Handling in C++.		
Total Practical Sessions		15	Total Practical Hours 30
Text Books			
1) The Complete Reference: C++, Herbert Schildt, Tata McGraw-Hill, 4th Edition, 2010.			
2) C++ Programming Language, Bjarne Stroustrup, AT&T, 4th Edition, 2013..			
3) Programming with C++, E. Balagurusamy, Tata McGraw-Hill (TMGH), 4th Edition, 2010.			
Reference Books			
1) Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia Publications, 4th Edition, 2010.			
2) C++ Programming, John Thomas Berry, PHI, 2nd Edition, 1992..			
3) Programming with C++, D. Ravichandran, Tata McGraw-Hill (TMGH), 1st Edition, 2011.			
4) Test Your C++ Skills, Yashwant Kanetkar, BPB Publications, 1st Edition, 2010.			
NPTEL and Online Resources			
1) Youtube Channel: CodeWithHarry https://www.youtube.com/c/CodeWithHarry			
2) NPTEL Course: Programming in C++ https://elearn.nptel.ac.in/shop/nptel/programming-in-c/?v=13b5bfe96f3e			


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Course Information:									
Class, Semester		S. Y. B. Tech. Semester - III					Cate gory	HS	
Course Code, Course Title		3CSHS207A- Foreign Language - Japanese					Type	T2	
Prerequisites		-							
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits			
		02	00	00	02	02			
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE	
			-	50	-		-	-	
Course Outcomes (COs):									
Upon successful completion of this course, the student will be able to:									
CO1	Explain basic Japanese vocabulary, grammar, pronunciation, and common expressions used in everyday communication.								
CO2	Apply basic Japanese language skills to communicate in familiar situations through listening, speaking, reading, and writing activities.								
CO3	Apply appropriate Japanese vocabulary, sentence structures, and grammar to engage in simple conversations and respond to routine personal and social situations.								
CO4	Apply appropriate Japanese vocabulary and grammatical structures to compose simple written texts such as emails, messages, and short paragraphs.								
Syllabus:									
UNIT	Contents							Lecture Hours	
MODULE 1 - PRE-TERM									
I	Introduction to Japanese Language and Culture - Overview of Japanese language and culture - Japanese writing systems: Hiragana, Katakana, Kanji - Basic pronunciation and phonetics - Greetings according to time of day - Classroom and workplace expressions - Asking for repetition and clarification - Basic etiquette and manners							10	
II	Self-Introduction and Personal Information - Introducing oneself and others - Name, nationality, occupation, and residence - Family members - Languages spoken - Basic sentence patterns - Introduction to Hiragana writing practice							10	
III	Hiragana and Katakana Mastery - Complete Hiragana characters - Complete Katakana characters - Reading and writing practice - Simple words and phrases - Listening and pronunciation exercises - Everyday vocabulary development							10	
MODULE 2 - IN-TERM									
IV	Food and Dining - Food and beverage vocabulary - Expressing likes and dislikes - Reading simple menus							10	



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	• Ordering food and drinks • Restaurant conversations • Japanese dining etiquette	
V	Home, Family and Surroundings • Describing houses and rooms • Household objects and furniture • Family relationships • Location expressions • Counting objects and people • Describing surroundings	10
VI	Daily Life and Time Expressions • Telling time • Days, dates, and months • Daily routines • Operating hours and schedules • Borrowing and lending items • Making simple appointments	10
VII	Hobbies, Interests and Social Interaction • Hobbies and leisure activities • Sports, movies, music, manga, and anime • Inviting friends • Accepting and declining invitations • Expressing preferences and interests • Social conversations	10
MODULE 3 - SELF STUDY		
VIII	Transportation and Navigation • Public transportation vocabulary • Trains, buses, stations, and landmarks • Asking for directions • Giving simple directions • Understanding signs and notices • Travel-related conversations	10
IX	Shopping and Everyday Transactions • Shopping vocabulary • Asking for products and prices • Quantities and measurements • Locating items in stores • Purchasing goods • Customer-service interactions	10
X	Holidays, Experiences and Future Plans • Talking about past weekend activities • Introduction to simple past tense • Expressing wishes and desires • Travel plans and future intentions • Introduction to frequently used Kanji • Course review and consolidation • Speaking role-plays and presentations • Reading and writing assessment	10
Total Lecture Hours		100
Text Books		
1. Irodori: Japanese for life in Japan (A1), The Japan Foundation, 2020		
Reference Books		
1. Marugoto Starter (A1) Katsudoo + Rikai (2 Books set) https://amzn.in/d/07fApBbW		
2. Genki: An Integrated Course in Elementary Japanese Vol. 1 [3rd Edition] https://amzn.in/d/0gXGM2Ef		
3. Minna no Nihongo 1-1&1-2 Main Textbook elementary +Translation & Grammatical with downloadable CDs. https://amzn.in/d/0dyQ9ips		

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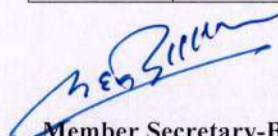
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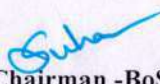
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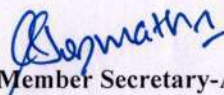
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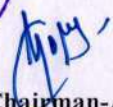


 Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering				
Course Information:				
Class, Semester	S. Y. B. Tech. Semester - III		Category	HS
Course Code, Course Title	3CSHS207B- Foreign Language - German		Type	T2
Prerequisites	-			
Teaching Scheme (per week)	Lecture 02	Tutorial 00	Practical 00	Self-Study 02
	Credits 02			
Examination Scheme (Marks)	Theory	MSE -	TA 50	ESE -
			Practical	CIA -
				ESE -
Course Outcomes (COs) :				
Upon successful completion of this course, the student will be able to:				
CO1	Explain basic German vocabulary, grammar, pronunciation, and common expressions used in everyday communication.			
CO2	Apply basic German language skills to communicate in familiar situations through listening, speaking, reading, and writing activities.			
CO3	Apply appropriate German vocabulary, sentence structures, and grammar to engage in simple conversations and respond to routine personal and social situations.			
CO4	Prepare simple written texts such as emails, messages, and short paragraphs in German using appropriate vocabulary and grammatical structures.			
Syllabus:				
Unit	Contents			Lecture Hours
	PRE-TERM SECTION			
1	Introduction to German Language • Introduction to German language and culture • German alphabets • Pronunciation and phonetics • Greetings and farewells • Classroom expressions • Basic vocabulary			10 hrs
2	Self-Introduction and Basic Communication • Personal pronouns • Verbs Haben and Sein • Verb conjugation • Introducing oneself and others • Numbers (0-1000) • Days of the week • Basic sentence structure • W-Fragen (Question Words)			10 hrs


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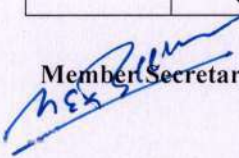

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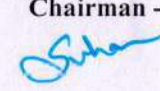

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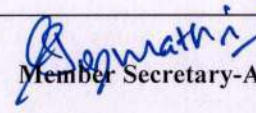

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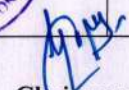


3	Countries, Languages and Daily Communication • Countries and nationalities • Languages • Asking and answering simple questions • Yes/No questions • Articles (Definite and Indefinite) • Simple conversations	10 hrs
	IN TERM SECTION	
4	Friends, Family and Hobbies • Talking about friends and colleagues • Family members • Hobbies and interests • Daily routine • Possessive articles • Describing people	10 hrs
5	Time, Dates and Appointments • Days, months and seasons • Telling time • Dates and birthdays • Making appointments • Invitations • Apologizing • Modal verbs	10 hrs
6	Work and Workplace Communication • Occupations and professions • Workplace vocabulary • Talking about studies and work • Telephone conversations • Job advertisements • Expressing opinions about jobs	10 hrs
7	City, Transport and Directions • Places in a city • Means of transport • Asking for and giving directions • Enquiring information • Imperative forms • Negation • Definite and indefinite articles	10 hrs
	Self-Study Section	
8	Food, Shopping and Restaurants • Food and beverages • Shopping conversations • Ordering food • Paying bills	10 hrs

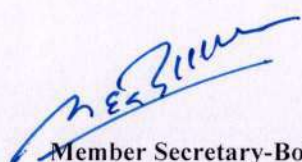

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	• Akkusativ case • Verbs with Akkusativ • Restaurant communication	
9	Home, Communication and Writing Skills • Describing home and surroundings • Understanding advertisements • Likes and dislikes • Letters and emails • Understanding texts • Dativ case • Dativ prepositions • Wechselpräpositionen	10 hrs
10	Social Life, Past Events and Fashion • Planning activities with friends • Event information and radio announcements • Separable verbs • Personal pronouns • Präteritum of Haben and Sein • Perfekt tense and Partizip II • Conjunctions (und, oder, aber) • Clothes and fashion • Demonstrative and interrogative articles • Verbs with Dativ	10 hrs
Total Lecture Hours		100
Text Books:		
1. Netzwerk neu A1 Kursbuch Goyal publishers & Distributors Pvt. Ltd. First Indian reprint 2020 Reprinted 2023		
2. Netzwerk neu A1 Übungsbuch Goyal publishers & Distributors Pvt. Ltd. First Indian reprint 2020 Reprinted 2023		
References:		
3. Fit fürs Goethe -Zertifikat A1 Start Deutsch 1 Hübner		


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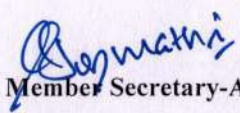



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 Established:	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering							
Course Information:								
Class, Semester		S. Y. B. Tech. Semester – III				Category	HS	
Course Code, Course Title		3CSHS208 Psychology				Type	T2	
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		01	00	00	01	01		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			-	50	-		-	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Identify the basic concepts of decision making, emotional intelligence, and procrastination from given real-life situations with appropriate accuracy.							
CO2	Differentiate between effective and ineffective thinking patterns, emotional responses, and time-management behaviors in structured scenarios with logical reasoning.							
CO3	Apply suitable psychological strategies for decision making, emotional regulation, and task management in case-based scenarios.							
CO4	Analyze the influence of cognitive biases, emotions, distractions, and mindset on personal and academic performance.							
CO5	Select appropriate behavioral and self-management techniques from given practical situations to effectively improve focus, interpersonal understanding, and productivity							
Syllabus:								
Module	Contents						Lecture Hours	
I	Smart Thinking & Decision Making - What is decision making - Importance in engineering/management - Common mistakes (3 biases only) - Fast vs Slow thinking - Good enough vs perfect decision - Six Thinking Hats (application) - Individual vs group decision making - Growth Mindset vs Fixed Mindset Decision making in real-life situations						5	
II	Understanding Emotional Intelligence - Understanding emotions and importance - EI vs IQ 5 Domains of EI - Emotional Intelligence and Personality						3	
III	Emotional Regulation & Interpersonal Skills - Impulse control (self-regulation) - Handling criticism (self-management) - Empathy and altruism (social awareness) - Assertiveness (relationship management)						3	
III	Procrastination - Introduction and definition of procrastination - Why do we procrastinate						4	


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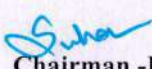

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	• Time management myths • Distractions and attention • Techniques to beat procrastination	
Total Lecture Hours		15
Reference Books		
• “Thinking, Fast and Slow”, Daniel Kahneman, Penguin Books, 2011 • Emotional Intelligence: Why It Can Matter More Than IQ”, Daniel Goleman, Bantam Books, 1995 • “Atomic Habits: An Easy & Proven Way to Build Good Habits & Break Bad Ones”, James Clear, Avery, 2018 • “Deep Work: Rules for Focused Success in a Distracted World”, Cal Newport, Grand Central Publishing, 2016 • “The Power of Habit: Why We Do What We Do in Life and Business”, Charles Duhigg, Random House, 2012 • “Nudge: Improving Decisions About Health, Wealth, and Happiness”, Richard H. Thaler & Cass R. Sunstein, Penguin Books, 2008 • “The 7 Habits of Highly Effective People”, Stephen R. Covey, Free Press, 1989		
NPTEL and Online Resources		
Youtube Channel: 1) https://www.youtube.com/watch?v=O2y1QGC1zMw 2) https://www.youtube.com/watch?v=33d61cpRfog 3) https://www.youtube.com/watch?v=b6FpfGiENPo 4) https://www.youtube.com/watch?v=YLhGgef7SvA 5) https://www.youtube.com/watch?v=TOFjyi0tg5w		


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Course Information:							
Class, Semester		S.Y.B. Tech, Semester - III			Category	HS	
Course Code, Course Title		3CSHS209 Environmental Studies			Type	T2	
Prerequisites		---					
Teaching Scheme (per week)	Lecture	Tutorial		Practical	Self-Study	Credits	
	02	00		00	02	02	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	50	-		-	-
Course Outcomes (COs):							
Upon successful completion of this course, the student will be able to:							
CO1	Explain environmental systems, population dynamics, natural resources, and sustainability concepts.						
CO2	Explain the Sustainable Development Goals (SDGs) and their significance in engineering for sustainable development.						
CO3	Apply pollution concepts to identify sources, impacts, and suitable control measures for air, water, soil, and noise pollution.						
CO4	Apply principles of climate change mitigation and adaptation, renewable energy, waste management, and environmental governance to recommend sustainable engineering practices.						
Syllabus:							
Module	Contents					Lecture Hrs.	
I	Environmental Systems, Population, and Resource Use: Components of environment and earth systems, Population growth, urbanization, and industrial development, Natural resources: water, energy, land, minerals, Resource depletion, carrying capacity, and environmental stress, Human–environment interactions and sustainability challenges					5	
II	Sustainable Development Goals (SDGs) and Engineering Responsibility: Evolution of sustainable development concept, Overview of 17 Sustainable Development Goals and key targets, Interlinkages among SDGs (water–energy–food–climate nexus), SDGs relevant to engineering disciplines, Role of engineers in achieving SDGs					5	
III	Pollution Science and Environmental Quality: Air pollution: sources, types, impacts, and control overview, Water pollution: indicators, standards, reuse and recycling, Soil pollution: contamination sources and remediation concepts, Noise pollution: sources, measurement, impacts, and mitigation.					5	
IV	Climate Change – Science, Mitigation, and Adaptation: Greenhouse effect and climate change science, Evidence of climate change and observed impacts, Mitigation strategies: technology, energy transition, efficiency, Adaptation strategies: climate-resilient infrastructure and planning, Role of engineers in climate action.					5	
V	Renewable Energy and Sustainable Technologies: Overview of renewable energy technologies, Solar energy (PV and thermal systems), Wind energy systems, Hydropower, geothermal, ocean energy, Bioenergy and waste-to-energy, Comparative assessment of renewable technologies.					5	

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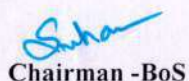
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VI	Waste Management, and Environmental Governance: Solid waste management and E-waste management, Life Cycle Assessment (LCA): concept and applications, Environmental policies and legislation (India and global overview), Environmental Impact Assessment (EIA), Ethics and professional responsibility of engineers	5
Total Lecture Hours		30
Text Books:		
1. Singh, J. S., Singh, S. P., Gupta, S. R., and Singh, R. <i>Ecology, Environmental Science and Conservation</i> . 2nd Edition. S. Chand Publishing, 2025.		
2. Bharucha, E. <i>Environmental Studies for Undergraduate Courses</i> . 4th Edition. Universities Press (India) Pvt. Ltd. 2025.		
3. Cunningham, W.P., & Cunningham, M.A., <i>Environmental Science: A Global Concern</i> , 15th Edition, McGraw-Hill Education, New Delhi, 2020.		
4. Rathoure, V.C., <i>Fundamentals of Environmental Studies</i> , 2nd Edition, Tata McGraw-Hill Education, New Delhi, 2019		
5. Singh, J.S., & Singh, S.P., <i>Environmental Science: An Integrated Approach</i> , 5th Edition, Jones & Bartlett Learning, 2019		
6. Kaushik, A., & Kaushik, C.P., <i>Perspectives in Environmental Studies</i> , 5th Edition, New Age International Publishers, New Delhi, 2018.		
References:		
1. Trivedi, R.K., & Goel, P.K., <i>An Introduction to Environmental Biology</i> , 1st Edition, University Book House, Jaipur, 2018.		
2. Odum, E.P., <i>Fundamentals of Ecology</i> , 5th Edition, Cengage Learning, 2017.		
3. Dash, M.C., <i>Fundamentals of Ecology</i> , 4th Edition, McGraw-Hill Education, New Delhi, 2016.		
Online Learning Resources		
https://www.youtube.com/watch?v=MtpxOdtS9KU&list=PL3qvHcrYGylu2egw2tipHWODV6eIVC2Gg		
https://niti.gov.in/divisions/division/sustainable-development-goal		
https://sdgs.un.org/goals		
https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_de04		


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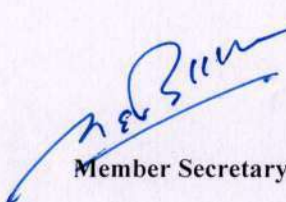

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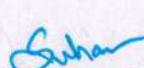



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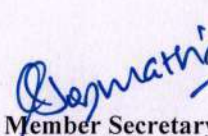
 Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering			
Course Information:			
Class, Semester	S. Y. B. Tech. Semester – III		Category
Course Code, Course Title	3CSMA210 Aptitude and Reasoning - I		MA
Prerequisites			
Teaching Scheme (per week)	Lecture	Tutorial	Credits
	02	00	00
Examination Scheme (Marks)	Theory	MSE	ESE
		50	-
Course Outcomes (COs):			
Upon successful completion of this course, the student will be able to:			
CO1	Solve problems based on HCF & LCM Vedic Math Ages		
CO2	Solve problems based on Number Series, Alphabet Series (Quant) Percentage		
CO3	Solve problems based on Profit & Loss Coding-Decoding Cubes & Dice		
CO4	Apply SWOT Analysis Engineering Ecosystem Email writing, Essay writing Logical Thinking Basics for personality development		
Syllabus:			
Module	Contents		Lecture Hours
I	HCF & LCM Vedic Math		4
II	Number Series, Alphabet Series (Quant) Percentage		4
III	Profit & Loss Coding-Decoding		4
IV	Cubes & Dice SWOT Analysis		4
V	Introduction to Engineering Ecosystem Ages		4
VI	Email writing, Essay writing Logical Thinking Basics		4
Total Lecture Hours			24
Text Books			
1. Quantitative Aptitude R.S. Agarwal S Chand 2019			
2. Verbal & Non-verbal Reasoning R.S. Agarwal S Chand 2010			
3. Wren & Martin (Verbal, Grammar) P.C. Wren S Chand 2017			
Reference Books			
1. APTIPEDIA (Quantitative, Logical, Verbal Aptitude) Face Wiley 2017			
2. Wiley (Quantitative Aptitude) P.A. Anand Maestro 2015			
3. Arun Sharma (Verbal Ability) Meenakshi Upadhyay McGraw Hill 2020			



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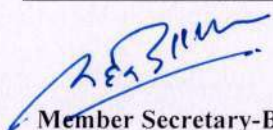
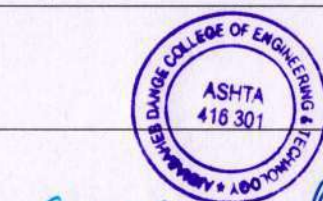
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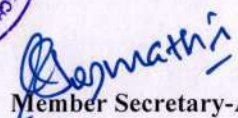
 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering							
Course Information:								
Class, Semester		S. Y. B. Tech. Semester - IV					Category	PE
Course Code, Course Title		3CSPE211 – Responsible AI					Type	T1
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		03	00	00	03	03		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		-	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Explain the concepts, principles, risks, and lifecycle of Responsible AI using appropriate Responsible AI frameworks and ethical checkpoints, with correctness in identifying key principles and societal impacts.							
CO2	Evaluate bias, fairness, and explainability aspects of AI systems using fairness metrics, XAI techniques, and relevant tools, with justified assessment of model behavior and bias mitigation approaches.							
CO3	Apply privacy, security, and safety techniques in AI systems to given problem scenarios involving data protection and model robustness, with appropriate selection of methods and safeguards.							
CO4	Analyze ethical, governance, legal, and regulatory requirements for AI applications based on organizational guidelines and regulatory frameworks, with accurate identification of compliance and accountability considerations.							
CO5	Assess Responsible AI practices in real-world case studies and applications through structured case analysis, with evidence-based conclusions and recommendations for responsible deployment.							
Syllabus:								
Module		Contents						Lecture Hours
I		Introduction to Responsible AI: What is Responsible AI?, Need and importance in modern AI systems, AI risks and societal impact, Key principles: fairness, accountability, transparency, privacy, Overview of AI lifecycle and ethical checkpoints.						7
II		Bias, Fairness, and Explainability: Types of bias: data bias, algorithmic bias, Fairness metrics and evaluation, Bias mitigation techniques, Explainable AI (XAI) concepts, Tools: LIME, SHAP.						8
III		Privacy, Security, and Safety : Data privacy concepts (PII, anonymization), Privacy-preserving techniques: differential privacy, federated learning, AI security risks: adversarial attacks, Safe AI system design, Robustness in AI models						8
IV		AI Ethics and Governance: Ethical theories (utilitarianism, deontology), AI ethics principles by organizations like IEEE and OECD, AI governance frameworks, Responsible AI lifecycle management, Human-in-the-loop systems.						8
V		Legal and Regulatory Frameworks: Overview of global AI regulations, GDPR, EU AI Act, Indian perspective on AI governance, Compliance and accountability.						7
VI		Case Studies and Applications: AI failures (bias in hiring, facial recognition issues), Ethical issues in autonomous systems, AI in healthcare, finance, and surveillance, Case study discussions and analysis.						7
							Total Lecture Hours	45



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Text Books
1) Artificial Intelligence: A Guide for Thinking Humans – Melanie Mitchell, Farrar, Straus and Giroux, 1st Edition 2019.
2) Ethics of Artificial Intelligence – Nick Bostrom , Oxford University Press
Reference Books
1) Atlas of AI: Power, Politics, and the Planetary Costs of AI, Kate Crawford, Yale Univ. Press, 1st Edition 2021
2) The Alignment Problem: Machine Learning and Human Values, Brian Christian, W. W. Norton & Company, 1st Edition, 2020.
3) Human Compatible: Artificial Intelligence and the Problem of Control, Stuart Russell, Viking Press, 1st Edition 2019
Online Resources
1) Google AI Responsible AI Practices
2) Microsoft Responsible AI Guidelines
3) UNESCO AI Ethics Recommendations



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 Established:		Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering						
Course Information:								
Class, Semester		S. Y. B. Tech. Semester - IV					Category	PE
Course Code, Course Title		3CSPE212 – Introduction to Internet of Things					Type	T1
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		03	00	00	03	03		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		-	-
Course Outcomes (Cos):								
Upon successful completion of this course, the student will be able to:								
CO1	Explain the fundamental mechanisms, architecture, and characteristics of the Internet of Things (IoT).							
CO2	Describe the basic concepts, working principles, and applications of sensors, actuators, RFID, and wireless sensor networks in IoT systems. .							
CO3	Design conceptual IoT applications for real-world scenarios using appropriate IoT technologies.							
CO4	Apply IoT Communication principles to solve real life problems.							
CO5	Analyze the components and design considerations required for prototyping IoT applications.							
Syllabus:								
Module	Contents							Lecture Hours
I	Basics of IoT and IoT devices Introduction, history and evolution of IoT , IoT ecosystem and applications, IoT architecture: 3-layer and 5-layer models, ITU-T definition and framework, Smart objects and IoT devices, Embedded systems in IoT, Overview of Arduino and Raspberry Pi, Characteristics: scalability, interoperability, heterogeneity, reliability							7
II	Sensors, Actuators and IoT Enabling Technologies Sensors: definition, classification (analog/digital, active/passive), Types: temperature, humidity, light, motion, pressure, gas, Actuators: relay, motor, servo, buzzer; Sensor interfacing basics and Signal conditioning, ADC/DAC basics, Basic RFID concept, IoT enabling technologies Device communication and power management							7
III	Radio Frequency Identification Technology Radio Frequency Identification (RFID): Introduction, working principles of RFID, components of RFID systems, RFID tags, RFID readers, RFID middleware, RFID standards and issues in RFID deployment. Wireless Sensor Networks (WSN): History and context of WSN, architecture of sensor nodes, connecting nodes, communication among sensor nodes, networking protocols in WSN, securing communication in wireless sensor networks.							9
IV	Internet Principles for IoT Communication: Internet communication overview, IP addresses, MAC addresses, TCP and UDP ports, Application Layer Protocols.							7
V	Prototyping Introduction to prototyping in IoT system development: purpose and importance of prototyping, role of prototypes in product development lifecycle. Design thinking for IoT systems: problem identification, idea generation, conceptual modeling, sketching and system-level design considerations. Prototypes and production systems: comparison between prototype and production models, scalability issues, cost versus ease of prototyping. Open-source and closed-source platforms for IoT development: concepts, advantages and limitations. Overview of embedded computing platforms used in IoT , Arduino and Raspberry Pi , features, capabilities and role of embedded computing platforms in IoT-based system development.							8

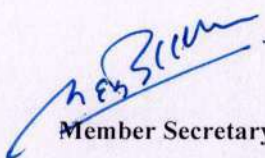
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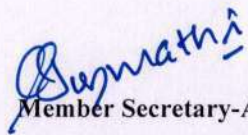
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VI	Domain Specific IoT: Introduction, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agricultural Industry and Health and Lifestyle.	7
Total Lecture Hours		45
Text Books		
1) A.K. Sawhney – Electrical and Electronic Measurements & Instrumentation, Dhanpat Rai & Co. Pvt. Ltd., New Delhi, 19 th Edition, 2022		
2) Internet of Things: A Hands-On Approach, Vijay Madisetti, Arshdeep Bahga, Universities Press (India) Private Limited, 1 st edition, 2016		
3) The Internet of Things, Connecting Objects to the Web, Hakima Chaouchi, Wiley Publications, 1 st edition, 2010		
4) Building the Internet of Things with Ipv6 and MIPv6 The Evolving World of M2M Communications, Daniel Minoli, Wiley Publications, 1 st edition, 2015		
5) Designing the Internet of Things Adrian McEwen, hakim Cassimally, Wiley, Reprint 2015		
Reference Books		
1) Architecting the Internet of Things, Bernd Scholz-Reiter, Florian Michahelles, ISBN 978-3842-19156-5, Springer, 1 st Edition, 2011		
2) The Internet of Things: Key Applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi, ISBN 978-1-119-99435-0, Wiley Publications, 2 nd Edition, 2012		
3) Internet of Things, A Hands on Approach, Arshdeep Bahga, Vijay Madisetti University Press, 1 st edition, 2015		
4) Sensors Handbook, Sabrie Soloman, McGraw Hill, 2 nd edition, 2015		
5) Internet of Things: Systems Design Project Workbook, Charith Perera, IOT Garage, 2025		
NPTEL and Onljne Resources		
1) Youtube Channel: i. https://youtu.be/UrwbEOIlc68		
2) NPTEL Course: i. https://onlinecourses.nptel.ac.in/noc26_cs37/course		


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 Established: 1999		Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering							
Course Information:									
Class, Semester		S. Y. B. Tech Semester - IV					Category	PE	
Course Code, Course Title		3CSPE213 Fundamentals of Cyber security and Cyber Laws					Type	T1	
Prerequisites		Data Communication and Network, Operating System							
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits			
		03	00	00	03	03			
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE	
			40	20	40		-	-	
Course Outcomes (COs):									
Upon successful completion of this course, the student will be able to:									
CO 1	Explain cyber security concepts and types of cyber-attacks under given theoretical scenarios and case studies								
CO 2	Describe cyber security safeguards including intrusion detection, intrusion prevention, and firewalls using standard system and network security setups with clear identification of their functions and roles.								
CO 3	Illustrate web services, applications, and related cyber-attacks and crimes using practical examples and web-based environments with accurate representation of attack mechanisms.								
CO 4	Explain the types and process of cyber forensics and ethical hacking tasks using standard tools and laboratory environments.								
CO 5	Analyze possible cyber-attacks in real-world scenarios using case studies and simulated environments with correct identification of attack type and impact assessment.								
Syllabus:									
Module	Contents							Lecture Hours	
I	Introduction to Cyber Security: Basics of Cyber Crimes Overview of Cyber Space/World- Cyber Crime/Offense, Cyber Defense, Cyber Warfare, Cyber terrorism, Cyber Espionage, Recent Cyber Crime Cases, Impact on Society, Reasons for Commission of Cyber Crimes Vulnerabilities and Threats - Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Poor Cyber Security Awareness. Attacks - SQL Injections, Cross-site scripting, Virus dissemination, Logic bombs, Denial-of-Service attack, Phishing, Password cracking, Keyloggers and spyware, Steganography, DoS attack, Web jacking, Cyber stalking, Data diddling, Identity Theft and Credit Card Fraud, Cybersquatting, Software Piracy Internet Governance – What is it? Actors, Challenges and Constraints, Need for a Comprehensive Cyber Security Policy, Need for an International convention on Cyberspace.							7	
II	Security Measures and Controls: Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography- Encryption, Understanding cryptographic algorithms, Deception, Denial of Service Filters, Ethical Hacking Authentication and Remote Access - User, Group, and Role Management - Password Policies - Single Sign-On - Security Controls and Permissions - Preventing Data Loss or Theft - The Remote Access Process - Remote Access Methods Intrusion Detection Systems- IDS Overview - Network-Based IDSs - Host-Based IDSs- Intrusion Prevention Systems – Honeypots, types, VPN Firewalls – Types, Security policy, Threat Management.							8	
III	Cybercrimes and Cyber Security Prevention of Cybercrimes and Legal Perspectives Preventing Cyber Crime – Password Protection – Get Safe Online – Cyber Security Guidance for Business. Smartphone security Guidelines. Safe browsing guidelines for							8	

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	social networking sites, Operational and Organizational Security Policies, Procedures, Standards, and Guidelines - Cyber Security Awareness and Training, counter cyber security initiatives in India, Introduction to Cyber Laws- Fundamental of Cyber Laws, IT Act 2000, Intellectual Property issues, Patents, Copyright, Trademark law, E-Commerce and E-Governance, Need of Cyber laws- The Indian context, Certifying Authority and Controller, Offences under IT Act 2000, Digital signature and the Indian IT Act, Computer Offences and its penalty under IT Act 2000, Amendments in Indian IT Act 2008, Intellectual Property Rights in Cyberspace	
IV	Securing Web Application, Services and Servers Introduction of Web Application, Web Service and Web Server Web Application Architecture, Securing Web Applications, Threats to web assets, Overview of Web services, Basic security for HTTP Applications and Services Basic Authentication, Transport Layer Security Web Server Securing Web Server Web Services, Security, common types SOAP Services- SOAP-based Web Services REST API- Application to REST Services Identity Management and Web Services Identity Management System, Authentication, Multi-Factor Authentication (MFA), Authorization, Identity Federation, Single Sign-On (SSO), Identity Management in Web Services, Identity Protocols for Web Services-Security Assertion Markup Language (SAML), Advanced HTTP Security, Authorization Patterns	8
V	Digital Forensics: Introduction to Digital Forensics, Need, Types of Digital Forensics, Role of forensics Investigator, Handling Preliminary Investigations, Digital Forensics Process, Phases, Forensic Tools, Forensic Imaging, Challenges, Applications. Controlling an Investigation, Conducting disk-based analysis, Investigating Information hiding, Collecting Network based Evidence, Scrutinizing E-mail, Validating E-mail header information, Tracing Internet access, Tracing memory in real-time, Writing Computer Forensics Reports, Auditing, Introduction to ISO 27001:2013	8
VI	Ethical Hacking: Types of hacking technologies, phases of ethical hacking, Foot Printing, Social Engineering, Scanning and enumeration, Understanding the password hacking techniques, Session hijacking, Google Hacking, Windows Hacking, Linux Hacking, Email hacking, Proxy & Packet Filtering, Sniffer, Incident handling and response.	6
Total Lecture Hours		45
Text Books		
1) Cyber Security-Nina Godbole & Sunit Belapure, Wiley India, 1 st Edition, 2011		
2) Introduction to Information Security and Cyber Laws, Surya Prakash Tripathi, Goel, Shukla dreamtech press Edition 2014		
3) Computer Forensics and Investigations, Nelson Phillips and Enfinger Steuart, Cengage Learning, New Delhi, 1 st Edition, 2009.		
Reference Books		
1) Cyber Security Essentials-J. Graham, R. Howard, Ryan Olson, CRC Press, Taylor An Auerbach Book, 1 st Edition 2010		
2) Cryptography and Security, CK Shyamala et al., Wiley India Pvt. Ltd, 4 th Edition 2018		

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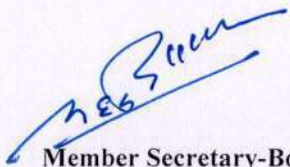
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3) Cyber Law and Information Security by Faiyaz Ahamad dreamtech press Edition 2013
4) Computer Forensics and Cyber Crime, Marjie T. Britz, Pearson, 3 rd Edition 2013.
Useful Links
NPTEL Course: Introduction to Cyber Security https://onlinecourses.swayam2.ac.in/e-learning/course/nou26_cs04



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	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering							
Course Information:								
Class, Semester		S. Y. B. Tech. Semester - IV				Category	PE	
Course Code, Course Title		3CSPE214 Probability and Statistics for Data Science				Type	T1	
Prerequisites		Basic Mathematics for Engineering						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		03	00	00	03	03		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		-	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Explain fundamental concepts of probability, sample spaces, events, and conditional probability including Bayes' theorem.							
CO2	Apply probability distributions such as Binomial, Poisson, and Normal to real-world problems.							
CO3	Analyze statistical data using descriptive statistics, frequency distributions, and graphical methods.							
CO4	Evaluate hypothesis testing results using statistical tests, p-values, and confidence intervals.							
CO5	Implement statistical analysis using correlation, regression techniques, and R for data visualization.							
Syllabus:								
Module		Contents					Lecture Hours	
I		Introduction to Probability Theory Sample spaces and events, counting, probability, some elementary theorems, conditional probability, Bayes' theorem.					7	
II		Probability Distribution Random variables, The Binominal Distribution, The Hypergeometric Distribution, The mean and the Variance of a probability distribution, The Poisson Distribution and rare events, Poisson Processes, The Geometric and Negative Binomial Distribution, The Multinomial Distribution.					8	
III		Introduction to Statistics Why Study Statistics, modern Statistics, Statistics and Engineering, The Role of the Statistics and Engineering quality Improvement, Pareto Diagram and Dot Diagram, Frequency Distribution, Graphs of Frequency Distribution, Quartiles and Percentiles.					8	
IV		Testing of Hypotheses Introduction: relation between confidence interval and testing of hypothesis, level of significance and p – values, Testing of Hypothesis, Classification of hypothesis test, Large sample testes, Small Sample test					7	
V		Simple Correlation and Regression Introduction to Simple Correlation, Properties of Correlation coefficient, Rank Correlation coefficient, Introduction to Simple Regression- Estimation of regression lines (Y on X and X on Y), Angle Between two regression lines and standard Error of Estimate.					8	
VI		Introduction To R History and overview of R, Getting started with the R interface, R Nuts and Bolts, Control Structures, Functions.					7	
						Total Lecture Hours	45	

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Text Books
1) Probability and Statistics for Engineering and the Sciences — by Richard A. Johnson
2) Probability and Statistics for Engineerings – by Dr . J. Ravichandran, Wiley publication
3) R Programming for Data Science – Roger D. Peng.
Reference Books
1)Probability & Statistics for Engineers & Scientists: Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers Keying Ye: Prentice Hall 2 Probability and Statistics for Data Science, Math + R + Data: Norman Matloff (CRC Press, Taylor and Francis group)
Web Links
1) https://onlinecourses.nptel.ac.in/noc21_ma74/preview
2) https://www.coursera.org/learn/probability-and-statistics


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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering						
Course Information:							
Class, Semester		S. Y. B. Tech. Semester - IV				Category	PE
Course Code, Course Title		3CSPE215 – Distributed System				Type	T1
Prerequisites		3CSPC205 Operating System					
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits	
		03	00	00	03	03	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA
			40	20	40		ESE
							-
Course Outcomes (COs):							
Upon successful completion of this course, the student will be able to:							
CO1	Apply the fundamental concepts of distributed systems to distinguish distributed and centralized computing environments.						
CO2	Analyze different distributed system architectures and models to evaluate scalability, transparency, and performance issues.						
CO3	Apply communication and coordination mechanisms in distributed systems for efficient distributed processing.						
CO4	Analyze consistency, replication, transaction management, and fault tolerance techniques to ensure reliability in distributed systems						
CO5	Apply the principles of distributed storage systems and storage networking architectures to manage data reliability and availability.						
CO6	Analyze distributed storage systems and architectures to ensure reliable and secure data storage solutions.						
Syllabus:							
Module	Contents						Lecture Hours
I	Introduction to Distributed Systems: Definition of distributed systems, Goals and characteristics, Advantages and limitations, Distributed vs centralized systems, Types of distributed systems, Design challenges in distributed environments, Examples of real-world distributed systems						7
II	Distributed System Models and Architectures Architectural models- Client-Server, Peer-to-Peer, Multi-tier architecture, Fundamental models - Physical model, Interaction model, Failure model, Design issues: scalability, transparency, performance						8
III	Communication and Coordination Inter-process communication (IPC), Message-oriented communication, Remote Procedure Call (RPC), Remote Method Invocation (RMI), Logical clocks and event ordering, Distributed mutual exclusion, Leader election algorithms						8
IV	Consistency, Replication, and Fault Tolerance Data consistency models. Replication techniques, Distributed transactions, Two-Phase Commit (2PC), Failure types and fault tolerance, Check pointing and recovery.						7
V	Distributed Storage Systems and Storage Networks Distributed file systems: concepts and features, Storage architectures- Direct Attached Storage (DAS), Network Attached Storage (NAS), Storage Area Network (SAN), Storage networking fundamentals, RAID levels and data redundancy, Backup and recovery in distributed storage, Local replication and its technologies, Storage Security Framework, Risk Triad, Storage Security Domains.						8
VI	Advanced Distributed Storage and Modern Systems Scalable and fault-tolerant storage systems, Object-based storage, Metadata management, Data consistency in distributed storage, Introduction to cloud storage systems, Case study of modern distributed storage platforms.						7

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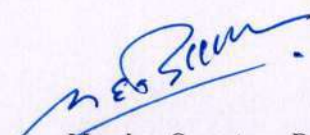
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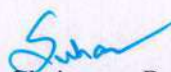
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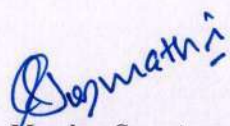
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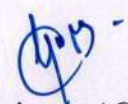


Total Lecture Hours	45
Text Books	
1) Distributed Systems: Concepts and Design – George Coulouris et al.	
2) Distributed Systems: Principles and Paradigms – Andrew S. Tanenbaum	
3) Information Storage and Management- G. Somasudaram, EMC Education Services, Edition 1-2010	
Reference Books	
1) Distributed Operating Systems – Pradeep K. Sinha	
NPTEL and Online Resources	
1) NPTEL Course: https://onlinecourses.nptel.ac.in/noc26_cs29/course	


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 Established:	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering						
Course Information:							
Class, Semester		S. Y. B. Tech. Semester - IV				Category	PC
Course Code, Course Title		3CSPC216 – Database Engineering				Type	LIT1
Prerequisites		-					
Teaching Scheme (per week)		Lecture 03	Tutorial 00	Practical 02	Self-Study 03	Credits 04	
Examination Scheme (Marks)		Theory	MSE 40	TA 20	ESE 40	Practical CIA 50	ESE 50
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:							
CO1	Design ER diagrams and corresponding relational schemas for given problem statements using integrity constraints and appropriate normalization techniques.						
CO2	Identify concepts of database systems, conceptual database design, relational algebra, SQL, and normalization to solve given problems through correct and efficient database design.						
CO3	Analyze the queries to perform the create, delete, extract and update operations on the database using structured query language.						
CO4	Apply transaction processing and concurrency control concepts in database applications to improve system performance, consistency, and security using proper recovery techniques.						
CO5	Demonstrate indexing methods, concurrency protocols, and recovery algorithms for real-world database scenarios ensuring efficient data access and reliable system behavior.						
Syllabus:							
Module		Contents					Lecture Hours
I		Introduction and Database Modelling using ER Model Introduction: Introduction to database systems, its advantages and applications, Data abstraction, Database languages, View of Database, Data Models, Database System Architecture, Database users and Administrator ER Model: Entity set, Entity types, attributes, Notations, Relationship sets, Relationship types, Keys- super key, candidate key, primary key, Roles and Structural Constraints, Extended Features of ER Model Generalization, Specialization and aggregation					7
II		Relational Model and SQL Relational Model: Structure of Relational Database, Reduction of ER model into Relational schemas, Schema-instance distinction, Referential integrity and foreign keys, Relational Algebraic Operations Unary Relational Operations, Binary Relational Operations, Joins. Example queries. SQL: Introduction to SQL, Data definition statements with constraints, Insert, Update and Delete, Set Operations, Aggregate functions group by and having clauses, Window Function on SQL, Nested Queries, Views, Complex Queries, Joins, PLSQL: Triggers, Stored Procedures.					9
III		Relational Database Design Importance of a good schema design, Motivation for normal forms, Atomic domains and 1NF, Dependency theory - functional dependencies, Closure of a set of FD's, Definitions of 2NF, 3NF and BCNF, Decomposition algorithms and desirable properties of them, Multi-valued dependencies and 4NF, Join dependencies and definition of 5NF, Temporal Functional Dependencies					7
IV		Data Storage and Indexing File organization, Organization of records in files, Data Dictionary, Database Buffer, and Indexing: Concept, Ordered Indices-Primary, Secondary, Multilevel, B+ Tree Index, Hashing, Hash Indices, Dynamic hashing, Multiple key access, Bitmap Indices.					7
V		Transaction Processing and Concurrency Control Transaction Processing: Concept, ACID properties, Transaction states, Storage Structure, Implementation of atomicity, isolation and durability, Serializability, Testing for Serializability. Concurrency Control: Lock-based protocols, Timestamp - based Protocols, Validation – based Protocols, Multiple Granularities, Deadlock handling.					8

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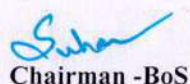
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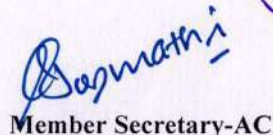
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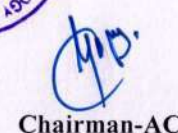


VI	Database security and Recovery System Authentication, Authorization and access control, Discretionary Access Control (DAC), Mandatory Access Control (MAC) and Role of the Database Administrator (RBAC) models, Intrusion detection, and SQL injection. Failure classification, Recovery and Atomicity, Log based recovery, Checkpoints, Shadow Paging, Buffer management in crash recovery.	7
Total Lecture Hours		45
List of Experiments		
S. No	Title / Topic of the Experiment	
1	Drawing an Entity-Relationship (E-R) Diagram for a given organization using Dia.	
2	Converting E-R diagram into Relational Tables.	
3	Installation and Demonstration of DBMS Oracle / MySQL / SQL Server / PostgreSQL etc.	
4	Study and Implementation of Data Definition Language (DDL) Queries (e.g. create, alter and drop tables) and	
5	Study and Implementation of Data Manipulation Language (DML) Queries (e.g. insert, delete, update and select statements).	
6	Study and Implementation of Basic SQL SELECT statement for displaying / extracting data from single table or multiple tables.	
7	Study and implementation of SQL constructs for aggregating data, use of group by, having clauses.	
8	Study and Implementation of SQL Window Functions for Aggregate and Ranking Operations	
9	Study and implementation of nested sub-queries, complex queries, views and Joins.	
10	Study and Implementation of Triggers, Functions and Stored Procedures.	
11	Implementation of Database connectivity with object oriented language (Java).	
12	Few aspects of authorization such as creating and managing users, roles, granting and revoking of privileges etc.	
Total Practical Sessions		15
Total Practical Hours		30
Text Books		
1) Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", Mc- GrawHill New York Publications, 6th Edition, 2011.		
2) J. Date, A. Kannan and S. Swamynathan, "An Introduction to Database Systems", Pearson Education, 8 th Edition, 2006.		
3) Rob & Coronel, "Database Systems –Design, Implementation and Management", Thomson Course Technology, 4 th edition, 2028.		
Reference Books		
1) Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Mc-Graw Hill New York Publications, 3rd Edition, 2003		
2) Ramez Elmasri and Shamkant Navathe, Benjamin Cummings, "Fundamentals of Database Systems", 3 rd Edition, 1999 / later		
3) Bipin c. Desai "An Introduction to Database System", Galgotia Publications, 2nd revised edition		
NPTEL and Online Resources		
1) https://www.geeksforgeeks.org/		
2) NPTEL Course: https://nptel.ac.in/courses/106/105/106105175/		

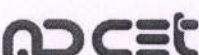

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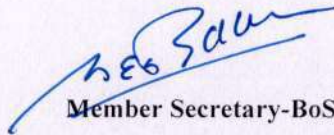

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 Established:	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering							
Course Information:								
Class, Semester		S. Y. B. Tech. Semester - IV				Category	PC	
Course Code, Course Title		3CSPC217 – Theory of Computation				Type	T1	
Prerequisites		3CSBS201 Discrete Mathematics						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		02	01	00	03	03		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		-	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Apply concepts of regular expressions, regular languages, and finite automata using DFA, NFA, ϵ -NFA, closure properties, and equivalence							
CO2	Analyze properties of regular languages using Kleene's Theorem, Pumping Lemma, and automata minimization techniques.							
CO3	Construct context-free grammars and pushdown automata using grammar simplification, normal forms, ambiguity handling, parsing techniques, and CFG-PDA equivalence							
CO4	Evaluate models of computation using Turing Machines, decidability and undecidability problems, and basic complexity classes							
Syllabus:								
Module	Contents						Lecture Hours	
I	Mathematical Foundations & Regular Expressions Alphabets, strings, and languages, Regular expressions and regular languages, Definition & types of grammars & languages, Applications of regular expressions						3	
II	Finite Automata & Regular Languages Finite automata: definition and representation, Deterministic Finite Automata (DFA), Non-deterministic Finite Automata (NFA), NFA with ϵ -moves, Equivalence of DFA, NFA, and ϵ -NFA, Closure properties of regular languages (union, intersection, complement)						8	
III	Properties of Regular Languages Kleene's Theorem (Part I & II – statements and significance), Pumping Lemma for Regular Languages, Applications of Pumping Lemma, Minimization of Finite Automata, Myhill-Nerode Theorem						4	
IV	Context-Free Grammars & Languages Context-Free Grammars (CFG): definition and examples, Derivation and parse trees, Ambiguity in grammars, Operations on CFLs: union, concatenation, Kleene star, Simplification of CFGs, Removal of ϵ -productions, Removal of unit productions, Removal of useless symbols, Chomsky Normal Form (CNF)						5	
V	Pushdown Automata & Parsing Pushdown Automata (PDA): definition and representation, Deterministic and Non-deterministic PDA, Acceptance by final state and empty stack, Equivalence of CFG and PDA, Parsing techniques: Top-down parsing, Bottom-up parsing						5	
VI	Turing Machines, Decidability & Complexity Models of computation, Turing Machine as a language acceptor, Design of Turing Machines, Variants of Turing Machines: Multi-tape TM, Non-deterministic TM, Universal TM, Decidability and undecidability, introduction to complexity theory						5	
						Total Lecture Hours	30	


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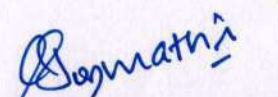

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List of Tutorials			
S. No	Title of the Tutorial		
1	Tutorial 1: Mathematical Induction, Proof Techniques, and Language Basics		
2	Tutorial 2: Regular Expressions and Regular Languages – Properties and Applications		
3	Tutorial 3: Finite Automata: DFA, NFA, and ϵ -NFA – Design and Equivalence		
4	Tutorial 4: Closure Properties of Regular Languages and Kleene's Theorem		
5	Tutorial 5: Pumping Lemma and Finite Automata Minimization		
6	Tutorial 6: Context-Free Grammars: Derivation, Ambiguity, and Normal Forms		
7	Tutorial 7: Operations on CFLs and Grammar Simplification Techniques		
8	Tutorial 8: Pushdown Automata and Equivalence of PDA and CFG		
9	Tutorial 9: Turing Machines: Design, Variants, and Language Acceptance		
10	Tutorial 10: Decidability, Undecidability, and Introduction to Complexity Theory		
Total Tutorial Sessions		15	Total Tutorial Hours
			15
Text Books			
1) Introduction to Languages and Theory of Computation, John C. Martin, Tata McGraw-Hill, 3rd Edition, 2007.			
2) Introduction to Automata Theory, Languages, and Computation, John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman, Pearson Education, 3rd Edition, 2006.			
3) Theory of Computation, Sushilkumar Azad, Dhanpat Rai and Co., 2nd Edition, 2005.			
4) Introduction to the Theory of Computation, Michael Sipser, Cengage Learning, 3rd Edition, 2012.			
5) Theory of Computation: A Problem-Solving Approach, Kavi Mahesh, Wiley India, 1st Edition, 2005.			
Reference Books			
1) Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and R. Manohar, Tata McGraw-Hill, 1997.			
2) Elements of the Theory of Computation, Harry Lewis and Christos H. Papadimitriou, Prentice-Hall Publications, 2nd Edition, 1997.			
3) Theory of Computation, Vivek Kulkarni, Oxford University Press, 1st Edition, 2013.			
NPTEL Course Link			
1) https://onlinecourses.nptel.ac.in/noc21_cs83/preview By Prof. Raghunath Tewari, IIT Kanpur			
2) https://nptel.ac.in/courses/106104028 Prof. Somenath Biswas, IIT Kanpur			
3) https://nptel.ac.in/courses/106106242 Prof. Subrahmanyam Kalyanasundaram, IIT Hyderabad			
4) https://www.youtube.com/watch?v=voO05xhTqRo			




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 Established:	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering							
Course Information:								
Class, Semester		S. Y. B. Tech. Semester - IV				Category	MM	
Course Code, Course Title		3CSWD218 – Fundamentals of Web Development				Type	LIT2	
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		03	00	02	03	04		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Describe the fundamentals of web programming, client-server architecture, and the structure of HTML documents.							
CO2	Apply HTML elements, lists, tables, forms, and semantic tags to construct web pages.							
CO3	Analyze CSS styling techniques, box model concepts, and layout features for designing structured web pages.							
CO4	Implement JavaScript programs using variables, operators, control structures, functions, arrays, and objects to create dynamic web pages.							
CO5	Develop interactive web applications using dynamic DOM manipulation, event handling, client-side validation, and error management.							
Syllabus:								
Module	Contents						Lecture Hours	
I	Introduction to Web Programming & HTML Basics: Introduction to Web Programming, Client-Server Architecture, Static vs Dynamic Websites, Web Browsers and Web Servers, Introduction to HTML, Structure of an HTML Document, Basic HTML Tags, Text Formatting Tags						6	
II	HTML Page Structuring and Forms: HTML Lists, HTML Links and Anchors Images and Multimedia Elements, Tables, Forms, HTML5 Semantic Elements. Introduction to Wordpress						9	
III	CSS Basics and Styling: Introduction to CSS, Types of CSS, CSS Syntax and Selectors Colors, Backgrounds, Fonts, Text Styling and Alignment, Box Model (Margin, Border, Padding, Content)						7	
IV	Advanced CSS and Layout Techniques: CSS Display Properties, Positioning: Static, Relative, Absolute, Fixed, Flexbox Layout, Responsive Web Design Concepts, Media Queries, Styling Forms and Navigation Menus, Introduction to CSS Transitions and Animations						6	
V	JavaScript Basics: Introduction to JavaScript, Variables and Data Types, Operators and Expressions, Conditional Statements, Looping Statements, Functions, Arrays and Objects Basic Input and Output						9	
VI	JavaScript DOM Manipulation and Event Handling: Document Object Model (DOM) DOM Methods and Properties, Event Handling in JavaScript, Form Validation using JavaScript, Error Handling, Basic Introduction to ES6 Features						8	
Total Lecture Hours						45		
List of Experiments								
S. No	Title of the Experiment							
1	Basic HTML Web Page							
2	HTML Lists and Links, Images and Tables							
3	HTML Forms							
4	CSS Styling Techniques							
5	CSS Box Model and Layout, Responsive Web Page Design							
6	AI-assisted HTML Page Generation and Refinement							



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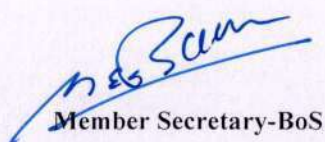

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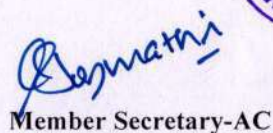
7	JavaScript Basics		
8	JavaScript Functions and Arrays		
9	DOM Manipulation and Event Handling		
10	JavaScript Debugging and Optimization using AI Tools		
Total Practical Sessions		15	Total Practical Hours
			30
Text Books			
1) HTML, CSS, and JavaScript All in One, 3 rd Edition			
2) HTML & CSS: The Complete Reference, Fifth Edition, Thomas A. Powell, 5 th Edition			
3) JavaScript: A Beginner's Guide, John Pollock, 4 th Edition, 2013.			
Reference Books			
1) HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2nd Edition, 2016			
2) Coding with JavaScript, Chris Minnick.			
NPTEL and Online Resources			
1) Youtube Channel: Code with Hurry, Code Step by Step			
2) NPTEL Course:			

Note on Use of AI Tools in Teaching–Learning Process: AI tools may assist in code generation, debugging, UI design suggestions, accessibility improvements, and documentation support.

Students must be able to explain AI-generated code during evaluations. Ethical and responsible use of AI tools will be emphasized to ensure conceptual understanding and academic integrity. AI Integration: AI-assisted code generation, debugging, prompt engineering basics.


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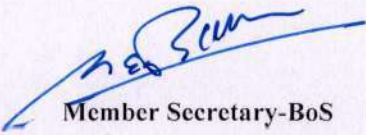

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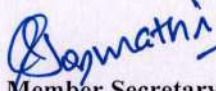



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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering							
Course Information:								
Class, Semester		S. Y. B. Tech Semester - IV					Category	MM
Course Code, Course Title		3CSCS219 Cyber Security Tools and Techniques					Type	LIT2
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		03	00	02	03	04		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	-
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:								
CO 1	Apply cyber security concepts and tools to identify vulnerabilities and attacks in systems, networks and web applications to secure those using standard tools and case scenarios.							
CO 2	Implement malware analysis techniques to examine malicious software using tools such as antivirus and analysis platforms with correct identification of malware behavior and type.							
CO 3	Use cryptographic techniques to secure data and communication using encryption, hashing, and digital signature tools with correct implementation of algorithms.							
CO 4	Configure network security mechanisms to protect systems using firewalls, IDS/IPS, and VPN tools in lab environments with effective rule setting and threat detection.							
CO 5	Apply cyber security policies and legal guidelines to prevent cybercrimes and ensure organizational and personal safety.							
Syllabus:								
Module		Contents						Lecture Hours
I		Introduction to Cyber Security: Overview of Cyber Space/World- Cyber Crime/Offense, Cyber Defense, Cyber Warfare, Cyber terrorism, Cyber Espionage, Recent Cyber Crime Cases, Impact on Society, Reasons for Commission of Cyber Crimes Vulnerabilities and Threats - Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Poor Cyber Security Awareness. Attacks - SQL Injections, Cross-site scripting, Virus dissemination, Logic bombs, Denial-of-Service attack, Phishing, Password cracking, Keyloggers and spyware, Steganography, DoS attack, Web jacking, Cyber stalking, Data diddling, Identity Theft and Credit Card Fraud, Software Piracy						7
II		Malware Concepts: Basics of Malware and Types (Virus, Worms, Trojans, Rootkits, Robots, Adware's, Spywares, Ransomwares, Zombies etc.) Malware Analysis, Antivirus Protection, Understanding Malware analysis using various tools.						8
III		Information Security Measures and Cryptography Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography - Symmetric and Asymmetric key cryptography, Digital Signatures, Applications of Cryptography, Open SSL, Hash value calculations, MD5, SHA, Steganography, Use of open source tools.						8

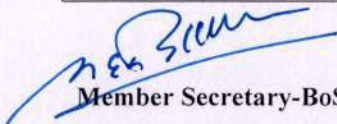

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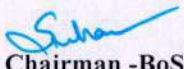

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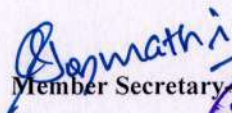

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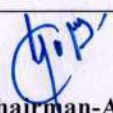

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IV	Intrusion Detection Systems and Firewalls- IDS Overview - Network-Based IDSs - Host-Based IDSs- Intrusion Prevention Systems – Honeypots Firewalls – Types, VPN Security, Security Protocols- Security at the application layer PFP and S/MIME, Security at Transport layer SSL and TSL, Security at Network layer-IPSec	8
V	Securing Web Application, Services and Servers Introduction of Web Application, Web Service and Web Server Web Application Architecture, Securing Web Applications, Threats to web assets, Overview of Web services, Basic security for HTTP Applications and Services Basic Authentication, Transport Layer Security Web Server Securing Web Server Web Services, SOAP and REST Services Identity Management and Web Services Identity Management System, Authentication, Multi-Factor Authentication (MFA), Authorization, Single Sign-On (SSO), Identity Protocols for Web Services-Security Assertion Markup Language(SAML) Advanced HTTP Security, Authorization Patterns	7
VI	Cybercrimes and Cyber Security Prevention of Cybercrimes and Legal Perspectives Preventing Cyber Crime – Password Protection – Get Safe Online – Cyber Security Guidance for Business, Smartphone security Guidelines, Safe browsing guidelines for social networking sites, Operational and Organizational Security Policies, Procedures, Standards, and Guidelines – Cyber Security Awareness and Training, counter cyber security initiatives in India	7
Total Lecture Hours		45
List of Experiments		
S. No	Title of the Experiment	
1	Installation of Kali Linux	
2	Identify Web Application vulnerabilities such as SQL Injection and XSS using Damn Vulnerable Web Application (DVWA).	
3	Demonstrate dictionary and brute-force password attacks using Hydra.	
4	Performing a basic system scan using an antivirus software like Windows Defender.	
5	Implementing File Encryption and Decryption	
6	Firewall Configuration and Traffic Control-Configure firewall rules and block suspicious traffic using Windows Defender Firewall.	
7	Network Packet Analysis	
8	Network Sniffing and Traffic Monitoring- Capture login credentials and analyze network packets using Wireshark.	
9	Network Port Scanning and Service Enumeration	
10	Identifying IP Address and Network Information Analysis using Kali Linux commands like ifconfig, ip a, ipconfig.	
Total Practical Sessions		15
Total Practical Hours		30


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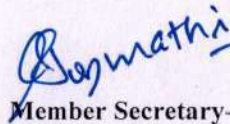

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Text Books
1) William Stallings, "Cryptography and Network Security", Pearson Education/PHI, 2006
2) Dr B B Meshram, Ms K A Shirsath, "TCP/IP and Network Security: Attacks and Defense Mechanisms with Open Source Tools" Shroff publishers and Distributors Pvt Ltd 1 st Edition, 2017
3) Cyber Security-Nina Godbole & Sunit Belapure, Wiley India, 1 st Edition, 2011
Reference Books
1) Cyber Security Essentials-J. Graham, R. Howard, Ryan Olson, CRC Press, Taylor An Auerbach Book, 1 st Edition 2010
2) Cryptography and Security, CK Shyamala et al., Wiley India Pvt. Ltd, 4 th Edition 2018
3) Introduction to Information Security and Cyber Laws, Surya Prakash Tripathi, Goel, Shukla dreamtech press Edition 2014
Online Resources Link
EC Council Learning: https://learn.eccouncil.org/your-portal/courses?logged=true


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 Established:	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering						
Course Information:							
Class, Semester		S. Y. B. Tech. Semester - IV				Category	MM
Course Code, Course Title		3CSDS220 – Python for Data Science				Type	LIT2
Prerequisites		Computer Programming					
Teaching Scheme (per week)		Lecture 03	Tutorial 00	Practical 02	Self-Study 03	Credits 04	
Examination Scheme (Marks)		Theory	MSE 40	TA 20	ESE 40	Practical CIA 50	ESE -
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:							
CO1	Explain the fundamental concepts of Python programming including variables, data types, operators, control structures, and functions for solving basic programming problems.						
CO2	Develop Python programs using appropriate data structures such as lists, tuples, sets, and dictionaries to efficiently store and manipulate data.						
CO3	Perform numerical computations and statistical operations on datasets using NumPy for efficient data processing.						
CO4	Analyze datasets using Pandas to perform data cleaning, transformation, and aggregation.						
CO5	Create meaningful data visualizations and interpret patterns using Matplotlib and Seaborn for exploratory data analysis.						
Syllabus:							
Module	Contents						Lecture Hours
I	Introduction to Python and Programming Basics: Introduction to Python and its features, Applications of Python in Data Science and AI, Installing Python and working with IDEs (Jupyter Notebook / VS Code), Python syntax and program structure, Variables and data types, Input and output functions, Operators and expressions, Basic Python programs						06
II	Control Structures and Functions: Conditional statements, Looping constructs, Nested loops, Functions in Python, Function arguments and return values, Lambda functions, Basic problem solving using functions						08
III	Python Data Structures for Data Handling: Strings and string manipulation, Lists and list operations, Tuples, Sets, Dictionaries, Iterating through collections, Practical programs for data manipulation						08
IV	Numerical Computing using NumPy : NumPy arrays, Creating arrays, Array indexing and slicing, Mathematical operations on arrays, Statistical functions, Vectorized operations ,Basic matrix operations Applications: Dataset numerical operations, Mathematical computations						08
V	Data Analysis using Pandas : Series and DataFrame structures, Creating DataFrames, Reading datasets (CSV files), Data selection and filtering, Handling missing data, Data aggregation and grouping, Basic statistical analysis						08
VI	Data Visualization and Exploratory Data Analysis : Visualization using Matplotlib (Line plots, Bar charts, Histograms, Scatter plots), Statistical visualization using Seaborn (Heatmaps, Distribution plots, Box plots, Correlation analysis) Exploratory Data Analysis (EDA): Understanding data patterns, Identifying trends and outliers, Presenting insights through graphs						07
						Total Lecture Hours	45

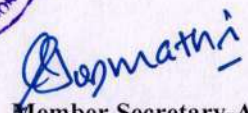


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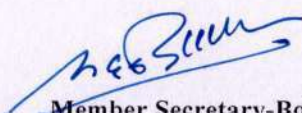

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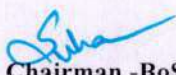

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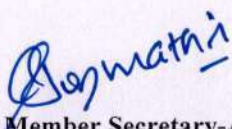

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Title of Experiments			
1	Write programs to demonstrate: Variables and data types, Input/output operations, Type casting		
2	Implement programs using: Conditional statements (if-else), Loops (for, while)		
3	Create user-defined functions, Demonstrate: Function arguments (default, keyword, variable-length)		
4	Perform List and Tuple Operations		
5	Implement Set operations, Dictionary for key-value data handling		
6	Demonstrate NumPy operations		
7	Perform Statistical Analysis using NumPy		
8	Perform Data Cleaning and Preprocessing using Pandas		
9	Implement Data Aggregation and Grouping		
10	Data Visualization using Matplotlib and Seaborn		
Total Practical Sessions		15	Total Practical Hours
			30
Text Books			
1) Jake VanderPlas, <i>Python Data Science Handbook</i>			
2) Wes McKinney, <i>Python for Data Analysis</i>			
Reference Books			
1) Aurélien Géron, <i>Hands-On Machine Learning with Scikit-Learn, Keras & TensorFlow</i>			
2) Joel Grus, <i>Data Science from Scratch</i>			
3) Python Data Science Handbook by Jake VanderPlas O'REILLY publication			




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 Established:	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering						
Course Information:							
Class, Semester		S.Y. B.Tech, Semester - IV				Category	SM
Course Code, Course Title		3CSQT221, Introduction to Quantum Technologies				Type	LIT2
Prerequisites		-					
Teaching Scheme (per week)	Lecture	Tutorial		Practical	Self-Study	Credits	
	03	00		02	03	04	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		40	20	40		50	-
Course Outcomes (COs) :							
Upon successful completion of this course, the student will be able to:							
CO1	Explain fundamental concepts of quantum physics and wave-particle duality.						
CO2	Solve Schrödinger wave equations for simple quantum systems						
CO3	Describe wavefunctions, uncertainty principle, and quantum measurements.						
CO4	Apply angular momentum, spin, and quantum operators in atomic systems.						
CO5	Summarize principles of quantum information, entanglement, and quantum computing.						
Syllabus:							
Module	Contents						Lecture Hours
I	Quantum physics-Photoelectric effect, Compton effect, Line spectra and atomic structure, De Broglie waves, Wave particle duality						7
II	Schrodinger Equations-One dimensional –Time dependent and Time independent equation, boundary condition, Square Well, Quantum Tunneling, Harmonic Oscillator, Three Dimensional-Wave Equations, separation of Cartesian and polar coordinates, Hydrogenic Atom						8
III	Quantum Mechanics- The Wave Function, The Dynamic variables, Probability distributions, Communication relations, The Uncertainty principle, time dependence of wave function, measurement of momentum by Compton scattering						7
IV	Angular Momentum Operators, Eigenvalues and Eigenfunctions, Pauli spin matrices, Spin and the quantum theory of measurement, Dirac notation						8
V	Time Dependence and Scattering Time independent Hamiltonians, Time dependent perturbation theory, transition between atomic energy levels. Scattering in one and three dimensions, The Born approximation, Particle Wave Analysis						9
VI	Quantum Information Quantum Cryptography, Entanglement, Cloning and teleportation, Quantum computing						6
Total Lecture Hours						45	
Text Books							
1. Introduction to Quantum Mechanics – David J. Griffiths & Darrell F. Schroeter, 3rd Edition, Cambridge University Press, 2018.							
2. Quantum Mechanics – G. Aruldas, 2nd Edition, PHI Learning Pvt. Ltd., 2009.							
3. A Textbook of Quantum Mechanics – P. M. Mathews & K. Venkatesan, 2nd Edition, McGraw Hill Education, 2017.							
4. Concepts of Modern Physics – Arthur Beiser, 7th Edition, McGraw Hill Education, 2015.							
References:							
1. Modern Quantum Mechanics – J. J. Sakurai & Jim Napolitano, 2nd Edition, Cambridge University Press, 2017.							
2. Principles of Quantum Mechanics – R. Shankar, 2nd Edition, Springer, 2012.							
3. Quantum Mechanics – Leonard I. Schiff, 3rd Edition, McGraw Hill, 2010.							
4. Quantum Physics – Stephen Gasiorowicz, 3rd Edition, Wiley India, 2007.							
5. Quantum Computation and Quantum Information – Michael A. Nielsen & Isaac L. Chuang, Cambridge University Press, 2010.							
6. Quantum Information Science- R. Manenti M. Motta. Oxford University Press, 2023							

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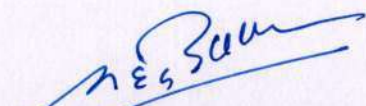
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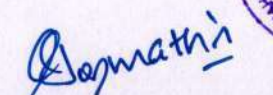
7. Quantum Mechanics concepts and applications- Nouredine Zettili- 2nd Edition, Wiley
8. Quantum Mechanics 500 problems with solutions- G. Aruldas, PHI Learning

Online Learning Resources

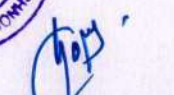
1. For Quantum Physics -<https://nptel.ac.in/courses/122/106/122106034/>


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 Established: 1981	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering							
Course Information:								
Class, Semester		S. Y. B. Tech. Semester - IV				Category	SM	
Course Code, Course Title		3CSAR222 – Computer Graphics & Multimedia				Type	LIT2	
Prerequisites		-						
Teaching Scheme (per week)		Lecture 03	Tutorial 00	Practical 02	Self-Study 03	Credits 04		
Examination Scheme (Marks)		Theory	MSE 40	TA 20	ESE 40	Practical	CIA 50	ESE -
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Explain fundamental concepts, applications, and display technologies used in computer graphics systems.							
CO2	Describe basic graphics algorithms for rendering primitives, filling regions, and clipping operations.							
CO3	Apply 2-D transformations and viewing techniques to construct and visualize graphical scenes.							
CO4	Construct 3-D objects and surfaces using polygonal and spline-based representations.							
CO5	Analyze 3-D transformations and viewing pipelines to render and visualize three-dimensional scenes.							
CO6	Develop basic multimedia and animation applications with introductory knowledge of Augmented Reality (AR) and Virtual Reality (VR) technologies.							
Syllabus:								
Module	Contents						Lecture Hours	
I	Basics of Computer Graphics: Introduction to computer graphics, applications of computer graphics, display devices, random scan and raster scan systems, graphics input devices, graphics software, and graphics standards, graphics hardware including basic role of CPU and GPU in graphics systems, Introduction of OpenGL, Glut, Function of OpenGL.						7	
II	Graphics Primitives: Points, lines, circles, and ellipses as primitives; fill-area primitives including scan-line polygon filling, inside-outside test, boundary-fill and flood-fill algorithms; character generation; line attributes, area-fill attributes, character attributes, bundle attributes; antialiasing, visible surface determination using Z-buffer algorithm, basic shading models including flat, Gouraud, and Phong shading.						7	
III	2-D Transformations and Viewing: 2-D geometric transformations: translation, scaling, rotation, reflection, and shear; matrix representation and homogeneous coordinates, composite transformations; transformations between coordinate systems. 2-D viewing: viewing pipeline, viewing coordinate reference frame, window-to-viewport transformation, viewing functions; clipping operations including point clipping, line clipping (Cohen–Sutherland), and polygon clipping (Sutherland–Hodgman).						8	
IV	3-D Concepts and Object Representation: 3-D display methods; polygon surfaces, mesh representation (vertex, edge, face), basics of texture mapping, polygon tables and plane equations, curved lines and surfaces; quadric surfaces, spline representation; cubic spline interpolation; Bezier curves and surfaces, B-spline curves and surfaces.						7	
V	3-D Transformations and Viewing: 3-D geometric transformations: translation, rotation, scaling, reflection, and shear, composite transformations, model transformation and model matrix. 3-D viewing: viewing pipeline, viewing coordinates, projections, view volume, projection matrix, Model-View-Projection (MVP) concept, general projection transformations, and clipping.						8	
VI	Multimedia Components and Emerging Technologies: Text, audio, images, animation, and video as multimedia components. Basics of data compression including JPEG and MPEG. Fundamentals of audio technologies and digital audio. Basic animation techniques such as keyframing and storyboard design. Introduction to Augmented Reality (AR) and Virtual Reality (VR) covering basic concepts, system components, immersive environments, and applications.						8	
Total Lecture Hours						45		

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List of Experiments			
S. No	Title of the Experiment		
Note: All Programs shall be implemented using OpenGL			
1	Program to initialize a graphics window and display basic graphical output.		
2	Program to create and draw basic graphics primitives such as points, lines, circles, and ellipses		
3	Program to demonstrate antialiasing and visible surface determination using depth buffering		
4	Program to perform two-dimensional geometric transformations using homogeneous coordinates		
5	Program to demonstrate two-dimensional viewing and window–viewport transformation		
6	Program to create three-dimensional objects using wireframe and mesh representation.		
7	Program to apply texture mapping on three-dimensional objects.		
8	Program to perform three-dimensional geometric transformations on objects.		
9	Program to demonstrate three-dimensional viewing and projection transformations		
10	Program to create simple animation using key-frame technique.		
11	Program to simulate a simple three-dimensional animation scene (Bouncing Ball).		
Total Practical Sessions		15	Total Practical Hours
			30
Text Books			
1) Computer Graphics with OpenGL, Donald D. Hearn, M. Pauline Baker & Warren Carithers, Pearson Education, 4th Edition, 2013			
2) Multimedia Systems Design, Prabhat K. Andleigh & Kiran Thakrar, Pearson Education, 1st Edition, 2015.			
Reference Books			
1) Interactive Computer Graphics: A Top-Down Approach Using OpenGL, Edward Angel & Dave Shreiner, Pearson, 8th Edition, 2012			
2) Digital Multimedia, Nigel Chapman & Jenny Chapman, John Wiley & Sons, 3rd Edition, 2009			
3) Principles of Multimedia, Ranjan Parekh, McGraw Hill Education, 1st Edition, 2006.			
NPTEL and Online Resources			
YouTube Channel			
1) https://www.youtube.com/watch?v=d9JzOS07Jzk&list=PL4gu8xQu0_5LvjhIxtfuZEFibf7vd8h_Q			
2) https://www.youtube.com/watch?v=Uy7sFJMuIIe&list=PLxpdYbrffYIPqkCyvvLfvwsaB7CB1r0pV			
NPTEL Course			
1) https://onlinecourses.nptel.ac.in/noc24_cs82/preview			
2) https://onlinecourses.swavam2.ac.in/e-learning/preview/ntr26_ed118			



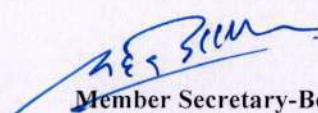
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 Established: 1983		Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering								
Course Information:										
Class, Semester		S. Y. B. Tech. Semester - IV						Category	VSEC	
Course Code, Course Title		3CSVS223 Web Programming - I						Type	L1	
Prerequisites		-								
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits				
		01	00	02	01	02				
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE		
			-	-	-		50	50		
Course Outcomes (COs):										
Upon successful completion of this course, the student will be able to:										
CO1	Design web pages using HTML elements, lists, tables, forms.									
CO2	Apply CSS styling techniques, box model concepts, and advanced layout features									
CO3	Implement JavaScript programs using variables, operators, control structures, functions, arrays, objects, DOM manipulation, and ES6 features.									
CO4	Develop dynamic web applications using PHP, MongoDB, and MVC framework.									
CO5	Design/Develop web pages using AI APIs and chatbot features into web applications.									
Syllabus:										
Module	Contents								Lecture Hours	
I	Web Fundamentals & HTML5: Web Architecture, Client-Server Model, Structure of HTML5, Text Formatting Tags Lists, Links, Table and Forms								2	
II	CSS3 & Responsive Web Design: CSS Syntax and Selectors, Types of CSS, Box Model, Flexbox and grid, Responsive Web Design Concepts, Media Queries, Introduction to CSS Transitions and Animations								3	
III	JavaScript Programming: Variables and Data Types, Operators and Expressions, Conditional Statements, Looping Statements, Functions, Arrays and Objects, DOM Manipulation, Event and Form Validation, ES6 Features								3	
IV	PHP & Database Connectivity: PHP syntax and variables, Arrays and Function, Form Handling, Session & cookies, PHP MongoDB Connectivity								3	
V	PHP Framework & MVC: PHP Frameworks (Laravel/CodeIgniter), MVC Architecture, Routing & Controllers, Blade Templates,								2	
VI	AI Integration in web Applications: Introduction to AI in Web Applications, Using AI APIs (OpenAI API / Google Cloud AI APIs), Chatbot Development using Dialogflow, AI-based Form Auto-fill using JavaScript AI libraries (TensorFlow.js)								2	
Total Lecture Hours								15		
List of Experiments										
S. No	Title of the Experiment									
1	Create a basic HTML5 web page demonstrating text formatting tags, lists, links, tables, and forms.									
2	Design a styled web page using CSS3 to demonstrate selectors, types of CSS, and box model.									
3	Develop a responsive web page using Flexbox, Grid, and Media Queries.									
4	Create a web page with CSS transitions and animations for interactive UI effects.									
5	Write JavaScript programs to demonstrate variables, operators, conditional statements, loops, functions, arrays, and objects.									
6	Develop a dynamic web page using JavaScript to perform DOM manipulation, event handling, and form validation using ES6 features.									
7	Create a PHP program to demonstrate form handling, arrays, functions, sessions, and cookies.									
8	Design a PHP web application to insert, retrieve, update, and delete records in a MySQL database.									
9	Develop a web application using Laravel framework implementing MVC architecture, routing, controllers, and Blade templates.									
10	Develop an AI-powered Web Application using AI APIs (Chatbot / Form Auto-Fill).									


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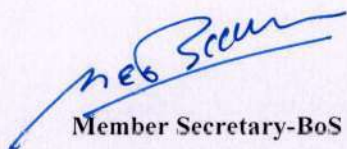

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Total Practical Sessions	15	Total Practical Hours	30
Text Books			
1) HTML, CSS, and JavaScript All in One, 3 rd Edition			
2) HTML & CSS: The Complete Reference, Fifth Edition, Thomas A. Powell, 5 th Edition			
3) JavaScript: A Beginner's Guide, John Pollock, 4 th Edition, 2013.			
Reference Books			
1) HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2nd Edition, 2016			
2) Coding with JavaScript, Chris Minnick.			
NPTEL and Online Resources			
1) YouTube Channel: https://www.youtube.com/watch?v=4WjtQjPQGIs			
2) NPTEL Course: https://onlinecourses.swayam2.ac.in/e-learning/preview/imb26_mg155			




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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering							
Course Information:								
Class, Semester		SY. B. Tech, Semester –IV					Category	HS
Course Code, Course Title		3CSHS224 Indian Constitution					Type	T2
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		01	00	00	01	01		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			-	50	-		-	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1		Describe the evolution and salient features of the Indian Constitution using the Government of India Acts of 1935 and 1947.						
CO2		Illustrate the philosophy of the Indian Constitution using the Preamble, Fundamental Rights, Fundamental Duties, and Directive Principles of State Policy						
CO3		Explain the constitutional amendment process, principles of the Basic Structure, and emergency provisions under the Indian Constitution						
CO4		Summarize the structure and functioning of the Union and State Governments using the parliamentary and legislative systems.						
Syllabus:								
Module		Contents						Lecture Hours
I		Constitution: Basic Structure & Making of Constitution Meaning of the constitution law and constitutionalism, Historical perspective of the constitution of India, Government of India Act of 1935 and Indian Independence Act of 1947, Enforcement of the Constitution, Meaning and importance of Constitution, Making of Indian Constitution – Sources, Salient features of Indian Constitution, Preamble.						04
II		Fundamental Rights & Fundamental Duties Fundamental Rights – Features and characteristics, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles-Definition and Meaning, 42 nd Constitutional Amendment Act, List and Importance of Fundamental Duties.						06
III		Amendments of Constitution and Emergency Provisions: Meaning and need of Constitutional Amendments, Procedure of Amendment under Article 368, Types of Amendments, Important Constitutional Amendments (42 nd , 44 th , 73 rd , 74 th , 86 th and 101 st Amendments), Basic Structure Doctrine. Emergency Provisions – Meaning and Objectives, National Emergency (Article 352), State Emergency/President’s Rule (Article 356), Financial Emergency (Article 360), Effects of Emergency on Fundamental Rights and Centre-State Relations, Safeguards introduced by 44 th Constitutional Amendment.						03
IV		Government of The Union and States: President of India – Election and Powers, Prime Minister of India - Election and Powers, Lok Sabha - Structure, Rajyasabha – Structure, Governor of State, Chief Minister and Council of Ministers in a state.						02
Total Lecture Hours							15	
Text Books								
1. M. Laxmikanth, <i>Indian Polity</i> , 7th Edition, McGraw Hill Publications Delhi, 2023.								
2. P. M. Bakshi, <i>The Constitution of India</i> , 19th Edition, Lexis Nexis, 2023.								
3. Durga Das Basu. <i>Introduction to the Constitution of India</i> . 26th Edition. Lexis Nexis. 2022.								

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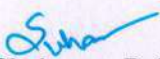
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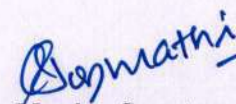
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4. M. Laxmikanth, <i>Governance in India</i> , 3rd Edition, McGraw Hill Publications Delhi, 2021.
5. J. N. Pandey, <i>The Constitutional Law of India</i> , 59th Edition, Allahabad: Central Law Agency, 2022.
References:
1. V. N. Shukla, <i>Constitution of India</i> , 14th Edition, EBC, 2022.
2. V. N. Tripathi, <i>Constitution of India</i> , 9th Edition, Premier Publishing Company, 2021.
3. M. V. Pylee, <i>India's Constitution</i> , 18th Edition, S. Chand Publications, New Delhi, 2020.
Online Learning Resources
https://legislative.gov.in/constitution-of-india/
nptel.ac.in/courses/129106003?utm


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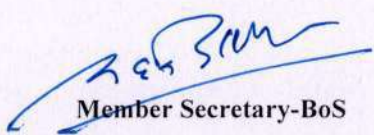

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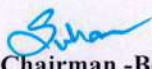

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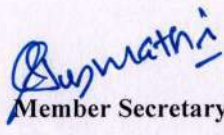



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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering								
Course Information:									
Class, Semester		SY. B. Tech, Semester - IV					Category	HS	
Course Code, Course Title		3CSHS225 Universal Human Values					Type	T2	
Prerequisites		-							
Teaching Scheme (per week)		Lecture	Tutorial		Practical	Self-Study	Credits		
		02	00		00	02	02		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE	
			-	50	-		-	-	
Course Outcomes (COs) :									
Upon successful completion of this course, the student will be able to:									
CO1	Explain the evolution, need, and significance of Universal Human Values in the context of global developments, societal challenges, and professional life.								
CO2	Apply the understanding of self, harmony, and human relationships to improve personal behavior and interpersonal interactions.								
CO3	Demonstrate the principles of social and environmental responsibility by relating human actions to sustainable and ethical living.								
CO4	Analyze ethical issues in engineering and emerging technologies such as Artificial Intelligence and Robotics using appropriate ethical frameworks.								
CO5	Evaluate value-based decisions and approaches for personal growth and professional practice through reflection and case analysis.								
Syllabus:									
Unit	Contents							Lecture Hours	
I	Evolution and Need of Universal Human Values: Meaning and concept of Universal Human Values, Historical evolution of value systems, Impact of Industrial Revolution on society and lifestyle, Consequences of World War II and global conflicts, Emergence of global value frameworks, Role of United Nations and UNESCO, Introduction of UHV in Indian education system by AICTE, Present-day challenges: stress, lack of purpose, environmental issues							05	
II	Understanding the Human Being: Human being as a combination of self and body, Distinction between self (consciousness) and body (physical entity), Needs of self vs needs of body, Happiness vs physical pleasure, Harmony in the self (thoughts, feelings, actions), Self-exploration and self-awareness							05	
III	Harmony in Relationships: Meaning and importance of relationships, Values in relationships (Trust, Respect, Affection, Care, Guidance, Reverence, Love), Mutual fulfillment in relationships, Role of family in value development, Interpersonal conflicts and resolution, Relationship in professional environment							05	
IV	Harmony in Society and Nature: Individual → Family → Society → Nation → World, Concept of undivided society, Social harmony and responsibility, Coexistence in nature, Human-nature relationship, Environmental degradation and its causes, Sustainable living and resource utilization, Local and global environmental issues							05	
V	Universal Human Values in Engineering and Technology: Professional ethics in engineering, Role of engineers in society, Guidelines by IEEE, Ethical issues in modern technology, Role of institutions like OpenAI, Core Framework to Assess Values: Self-Reflection Model, Value-Action Gap Model, Emotional Intelligence (EQ) Framework (The Nine Values (Bhavas) Assessment Model)							05	

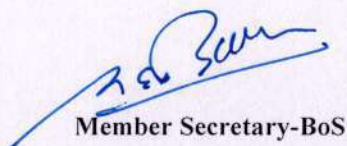

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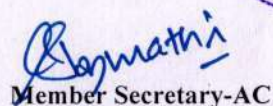

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VI	Application of UHV in Personal and Professional Life: Self-reflection and personal development, Value-based decision making, Goal setting with values, Fulfilling Basic Human Aspirations Application of UHV in career and workplace, Development of holistic and responsible lifestyle, Core Framework to Assess Values: Emotional Intelligence (EQ) Framework, (Human-AI Value Alignment) Ikigai Model	05
Total Lecture Hours		30
Text Books		
1.Human Values and Professional Ethics:R. R. Gaur, R. Sangal, G. P. Bagaria,Excel Books, New Delhi, 2010		
2. Engineering Ethics: Charles E. Harris Jr., Michael S. Pritchard, Michael J. Rabins, Cengage Learning, 2013		
3. Understanding Human Being, Nature and Existence Comprehensively: UHV Team, UHV, 2022.		
4. Life 3.0, Max Tegmark, Knopf, 2017		
References:		
1. AICTE Universal Human Values Course Material, 2017 onwards		
2.IEEE Code of Ethics		
3. Engineering Ethics: Charles E. Harris Jr., Michael S. Pritchard, Michael J. Rabins,Cengage Learning, 2013		
Online Learning Resources		
1.TED Talks on ethics, happiness, human behaviour		
2.NPTEL Courses on UHV and Engineering Ethics		
3.MIT: AI Ethics lectures (OpenCourseWare)		


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 Established:	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering							
Course Information:								
Class, Semester		S. Y. B. Tech. Semester - IV				Category	RM	
Course Code, Course Title		3CSRM226 Research Methodology				Type	L2	
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		00	00	02	00	01		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			00	00	00		50	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Utilize fundamental concepts of research, research problems, literature sources, and research methodologies for engineering applications under given research scenarios.							
CO2	Apply appropriate research design, sampling techniques, and data collection methods to conduct systematic research studies under given problem statements.							
CO3	Analyze research data using qualitative, quantitative, statistical, and hypothesis testing techniques under given research scenarios.							
CO4	Develop a technical research article with ethical publication practices, appropriate referencing standards, and quality research guidelines.							
Syllabus:								
Module	Contents						Lecture Hours	
I	Research Fundamentals Meaning and objectives of research, Significance of research, Types of research, Research process, Criteria of Good Research, Importance of Research in Engineering						4	
II	Research Problem & Literature Review Meaning of Research Problem, Identification & Formulation of research Problem, Techniques for defining Research Problem, Literature Sources: Journals, Conferences, Patents, Use of Digital Libraries, Literature Review techniques and gap identification.						5	
III	Research Design & Methodology Need & Features of Good Research Design, Types of Research Design: Exploratory, Descriptive, Experimental, Sampling Techniques. Data Collection: Types of Data: Primary, Secondary, Methods of Data Collection: Survey, Questionnaire, Interview, Observation, Experimentation						6	
IV	Data Analysis & Testing of Hypothesis Types of data: Qualitative and Quantitative, Basic statistical tools: Mean, Median, Standard Deviation, Data representation: Tables, Graphs, Charts, Introduction to analysis tools, Interpretation of results, Hypothesis, Basic concepts concerning testing of hypothesis, Procedure for hypothesis testing, Flow diagram of hypothesis testing, Test of hypothesis, Hypothesis testing of Means, Hypothesis testing for differences between Means.						5	
V	Report Writing Introduction Technical Report Writing and tools (Latex), Significance of report writing, Steps in writing report, Types of reports, Layout and structure of reports, Documentation and Referencing Styles, Presentation Tools & Techniques: Zotero & Mendeley.						4	
VI	Research Journals and Publication Ethics Research Journals, Types of Journals, Research Publication Process, Journal Indexing: Meaning and Importance of Journal Indexing, Benefits of Indexed Journals, Major Indexing Databases, (Scopus, Web of Science, Google Scholar, SCI, ESCI, and PubMed), Journal Metrics and Quality Indicators: Impact Factor, h-index, i10-index, CiteScore, SNIP and SJR, Types of						6	

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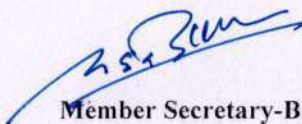
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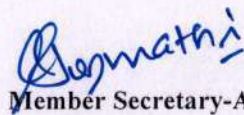


Publications, Ethics in Research Publication: Plagiarism and Similarity Index (Turnitin Software), Copyright and Authorship, Duplicate Publication, Clone, Predatory, and Fake Journals, Researcher Profiles and Identifier (ORCID, Researcher ID)	
Total Lecture Hours	30
Text Books	
1. Research Methodology–Methods and Techniques by C. R. Kothari, Second Edition, New Age International Publishers	
2. Dr. Santosh M Nejakar, Dr. Harish Bendigeri “Research Methodology and Intellectual Property Rights”, ISBN 978-93-5987-928-4, Edition: 2023-24	
Reference Books	
1. Research Methodology Concept and cases By Deepak Chawala and Neena Sondhi	
2. Research Methodology: Step by step guide for beginners, Ranjeet Kumar, 5 th Edition, SAGE Publications	
3. How to Write and Publish a Scientific Paper, Robert A. Day, Barbara Gastel, 8 th Edition: 8th Edition, Cambridge University Press	
NPTEL and Online Resources	
1. https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr26_ed28	
2. https://onlinecourses.swayam2.ac.in/e-learning/course/nou26_ge46	




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		Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering						
Established:								
Course Information:								
Class, Semester		S. Y. B. Tech. Semester - IV					Category	EL
Course Code, Course Title		3CSEL227 Innovation and Product Development					Type	L2
Prerequisites								
Teaching Scheme (per week)		Lecture	Tutorial		Practical	Self-Study	Credits	
		00	00		02	00	01	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			-	-	-		50	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Identify innovative product ideas by observing real-world problems and user needs using creativity and design thinking tools.							
CO2	Apply design thinking techniques to generate and refine innovative solutions for identified engineering or societal problems based on user requirements.							
CO3	Construct functional prototypes and estimate preliminary production costs using appropriate materials, manufacturing methods, and engineering tools.							
CO4	Analyze prototype performance and production feasibility by interpreting testing results, cost data, and scalability requirements.							
CO5	Evaluate intellectual property opportunities, commercialization potential, and production planning based on technical feasibility, market requirements, and economic considerations.							
CO6	Develop a comprehensive entrepreneurial proposal integrating intellectual property protection, commercialization strategy, and production planning for an innovative product.							
Syllabus:								
The Innovation and Product Development course is designed to provide students with experiential learning in innovation, prototyping, product development, and commercialization. The course focuses on identifying real-world problems and transforming innovative ideas into functional prototypes/models/products through systematic design and development processes.								
Students will learn techniques for validating innovative concepts, assessing feasibility and utility, selecting suitable materials, along with design thing approach and developing prototypes/models/products through iterative improvement and performance testing. The course also emphasizes expert reviews, prototype assessment, cost estimation, pricing strategies, and preliminary production planning for scalability.								
Further, students will gain exposure to Intellectual Property Rights (IPR), commercialization processes, and startup development, enabling them to prepare draft proposals for patenting, commercialization, or entrepreneurial ventures based on their innovative solutions.								
Sr. No	Innovation Prototype Course Activities						Planned Week	
01	Introduction to Innovation and Prototyping						Week 1	
02	Revising Design Thinking Approach						Week 2	
03	Identifying Innovative Problems (Students & Faculty)						Week 3	
04	Validating Innovation: Assessing Utility of a Proposed Concept						Week 4	
05	Review No. 1 – by Guides - Innovativeness Assessment - (Final Idea Presentation)						Week 5	
06	Planning and Designing the Prototype						Week 6	
07	Choosing and Testing Materials for the Prototype						Week 7	
08	Building the working Prototype / Model/ Product						Week 8	
09	Improving working Prototype / Model/ Product						Week 9	
10	Testing the Prototype / Model/ Product Performance						Week 10	
11	Review No. 2 – by Expert Panel - Prototype/Model/Product Assessment along with poster						Week 11	

Syllabus:

The Innovation and Product Development course is designed to provide students with experiential learning in innovation, prototyping, product development, and commercialization. The course focuses on identifying real-world problems and transforming innovative ideas into functional prototypes/models/products through systematic design and development processes.

Students will learn techniques for validating innovative concepts, assessing feasibility and utility, selecting suitable materials, along with design thing approach and developing prototypes/models/products through iterative improvement and performance testing. The course also emphasizes expert reviews, prototype assessment, cost estimation, pricing strategies, and preliminary production planning for scalability.

Further, students will gain exposure to Intellectual Property Rights (IPR), commercialization processes, and startup development, enabling them to prepare draft proposals for patenting, commercialization, or entrepreneurial ventures based on their innovative solutions.

Sr. No	Innovation Prototype Course Activities	Planned Week
01	Introduction to Innovation and Prototyping	Week 1
02	Revising Design Thinking Approach	Week 2
03	Identifying Innovative Problems (Students & Faculty)	Week 3
04	Validating Innovation: Assessing Utility of a Proposed Concept	Week 4
05	Review No. 1 – by Guides - Innovativeness Assessment - (Final Idea Presentation)	Week 5
06	Planning and Designing the Prototype	Week 6
07	Choosing and Testing Materials for the Prototype	Week 7
08	Building the working Prototype / Model/ Product	Week 8
09	Improving working Prototype / Model/ Product	Week 9
10	Testing the Prototype / Model/ Product Performance	Week 10
11	Review No. 2 – by Expert Panel - Prototype/Model/Product Assessment along with poster	Week 11

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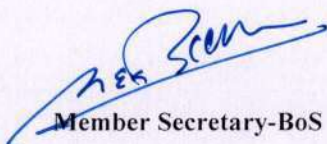
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12	Estimating Costs & Formulating a Pricing Strategy for Product	Week 12
13	Creating a Preliminary Production Plan for Scaling the Prototype	Week 13
14	Formulating IPR or Commercialization or Start up	Week 14
15	Review No. 3 – Submission of Draft Copy for IPR or Commercialization or Start up	Week 15




Member Secretary-BoS

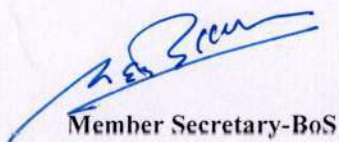

Chairman -BoS


Member Secretary-AC


Chairman-AC

 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science & Engineering						
Course Information:							
Class, Semester	S. Y. B. Tech. Semester – IV		Category	MA			
Course Code, Course Title	3CSMA228 – Aptitude and Reasoning - II		Type	T2			
Prerequisites							
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits		
	02	00	00	00	00		
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	50	-		-	-
Course Outcomes (COs):							
Upon successful completion of this course, the student will be able to:							
CO1	Solve problems based on Partnership Average Syllogism.						
CO2	Solve problems based on Seating Arrangements Puzzles Direction.						
CO3	Apply Presentation Skills Grooming & Body Language Group Discussion Interview techniques for hiring process						
CO4	Apply Resume Writing LinkedIn Cold Calling for internship and job opportunity						
Syllabus:							
Module	Contents						Lecture Hours
I	Partnership, Average						4
II	Seating Arrangements, Puzzles						4
III	Syllogism, Direction						4
IV	Presentation Skills, Grooming & Body Language						4
V	Resume Writing, LinkedIn Cold Calling						4
VI	Group Discussion, Interview						4
Total Lecture Hours						24	
Text Books							
1. Quantitative Aptitude R.S. Agarwal S Chand 2019							
2. Verbal & Non-verbal Reasoning R.S. Agarwal S Chand 2010							
3. Wren & Martin (Verbal, Grammar) P.C. Wren S Chand 2017							
Reference Books							
1. APTIPEDIA (Quantitative, Logical, Verbal Aptitude) Face Wiley 2017							
2. Wiley (Quantitative Aptitude) P.A. Anand Maestro 2015							
3. Arun Sharma (Verbal Ability) Meenakshi Upadhyay McGraw Hill 2020							




 Member Secretary-BoS


 Chairman-BoS


 Member Secretary-AC


 Chairman-AC