

Chhatrapati Shahu Maharaj Shikshan Sanstha's

CHH. SHAHU COLLEGE OF ENGINEERING

Kanchanwadi, Paithan Road, Chh. Sambhajinagar 431 011 Ph. No.: (0240) 2646373, 9922668199, 2646350 Fax: (0240) 2646222 Website: www.csmssengg.org



Approved by AICTE New Delhi, DTE (Govt. of Maharashtra) and affiliated to Dr. BATU, Lonere (Raigad). DTE Code: 2533

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEEERING

A.Y.	Semester	Code of Subject	Name of Course	Co No.	Course Outcome
		, and the second		1	Student will be able to describe the concept of Laplace transform
			Engineering	2	Student will be able to apply the concept of LT and ILT to solve differential equations
		BTBS301	Mathematics –	3	Student will be able to solve problems related to Fourier Transform to Deep Learning, Signal & Image Processing
			III	4	Student will be able to apply the concepts of PDE in Engineering Concepts
				5	Student will be able to analyze Function of Complex Variables.
				1	Students will be able to construct logical expressions using propositional and predicate logic.
	III		Discrete Mathematics	2	Students will be able to solve combinatorial problems using recurrence relations and generating functions while defining and differentiating between injective, surjective, and bijective functions.
		BTCOC302		3	Students will be able to apply graph theory concepts to solve problems related to paths, circuits, and graph coloring.
2023 -24				4	Student will be able to implement algorithms to determine minimal spanning trees in various contexts
				5	Student will be able to simplify and manipulate algebraic structures using group and Boolean algebra principles.
		BTCOC303		1	Student will be able to determine representation and storage mechanisms of data structures
				2	Student will be able to describe basic fundamentals of data structures like array, skip list, linked list, stack, queue, tree, graph, hashing and their application
			Data Structures	3	Student will be able to illustrate operations like searching, insertion, deletion, traversing mechanism etc. on linked list data structures
				4	Student will be able to illustrate operations like searching, insertion, deletion, traversing mechanism etc. on trees and graph data structures
				5	Student will be able to determine appropriate sorting and searching technique for given problem
		PTCOC204	Computer Architecture	1	Student will be able to identify functional units of a digital computer system.
		BTCOC304	& Organization	2	Student will be able to explain the basics of instructions sets, addressing modes & assembly language structure



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			3	Student will be able to manipulate representations of
			3	numbers stored in digital computers
			4	Student will be able to determine various types of
			4	memories and its organization
				Student will be able to describe basics of hardwired,
				pipelined architectures, I/O organization, DMA and
			5	develop micro-operation using micro-programmed
				control unit
				Student will be able to discuss the fundamental concepts
			1	of Java programming language, including classes,
				objects, methods and the memory concepts.
				Student will be able to illustrate the use of control
			2	structures, methods, and Java API packages developing
		Elective –I		comprehensive Java programs.
		(1) (0)		Student will be able to demonstrate the Java array
	BTCOC305	(b) Object	3	concepts and the skills to develop Java applications
		Oriented		Student will be able to use the concept of Object-Oriented
		Programmin g in Java		Programming (OOP) concepts with a focus on
			4	inheritance, polymorphism, and interface in Java
				programming
			5	Student will be able to apply the exception handling
				techniques in Java and client-side scripting with
				JavaScript to develop high-quality web applications.
			1	Student will be able to determine the time and space
			1	efficiency of the data structure
			2	Student will be able to identify the appropriate data
				structure for given problem
			3	Student will be able to practice stack, Queue and their
			3	applications
		Data	4	Student will be able to develop various types of linked
		Structures	4	lists and their applications
		Lab	5	Student will be able to develop sorting and searching
	BTCOL306	& Object	5	algorithms
	B1COL300	Oriented	1	Student will be able analyze and implement the basics of
		Programmin	1	object-oriented programming using java
		g Lab		Student will be able identify and apply the concept of
		g Lau	2	classes, Java, JDK components and develop simple java
				programs
			3	Student will be able to design simple java programs using
			_ 3	inheritance and exception handling
			4	Student will be able design programming on interfaces
			5	Student will be able implement programs on dealing with
)	arrays.
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					Student will be able to Survey a latest research papers of
				1	professional interest to understand new fields in the
					absence of a textbook, and synthesize summaries and
					reviews.
		DECC 202	G . T	2	Student will be able to evaluate and identify promising
		BTCOS307	Seminar-I		new directions in various cutting-edge technologies
				3	Student will be able to Enhance technical writing skills in
					preparing detailed reports describing results
				1	Student will be able to effectively Communicate with
				4	professional technical presentation skills by making oral
					presentations.
				1	Students will be able to explain the concept of algorithm
					writing and its performance analysis
				2	Students will be able to use divide and conquer algorithm
					designing technique for algorithm writing. Students will be able to demonstrate the Backtracking
			Design & Analysis of Algorithms	3	and Branch and Bound concepts for designing algorithms
		BTCOC401			Student will be able to apply the process of greedy
				4	technique to solve a variety of optimization problems
					Student will be able to know various problem categories
					based on their complexity and to Apply dynamic
				5	programming approach for solving variety of complex
					problems.
					Student will be able to describe functional architecture of
				1	an operating system
					Student will be able to determine processes and CPU
				2	scheduling
	IV	DTCOC402	Operating		Student will be able to describe synchronization
		BTCOC402	Systems	3	techniques to achieve better performance of a computer
					system
				4	Student will be able to apply segmentation and paging
				4	techniques
				5	Student will be able to explain file system working
				1	Student will be able to explain the basic concepts of
				1	human rights and its origin
				2	Student will be able to describe the fundamental rights
	BTHM403 Basic I Rights				and social problems in society
				3	Student will be able to explore the concept of migrant
		BTHM403	Basic Human		workers, human rights violations, and various issues:
			Rights	4	Student will be able to acquire in-depth knowledge of the
					Constitution of India
					Student will be able to explore UDHR (Universal
				5	Declaration of Human Rights) and NHRC (National Human Rights Commission
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			1	Students will be able to apply fundamental concepts of probability, Bayes' theorem, and standard probability
				distributions to describe real-life phenomena
				Students will be able to utilize the basic concepts of
			2	probability distributions and random variables to solve
				engineering problems.
	DED CC 10.1	Probability		Students will be able to apply the concepts of correlation
	BTBSC404	and Statistics	3	and their applications in engineering disciplines.
				Students will be able to interpret the concepts of linear
			4	regression, including regression lines and coefficients, in
				practical scenarios.
				Students will be able to apply estimation techniques and
			5	hypothesis testing to draw conclusions and assess errors
				in statistical analyses
				Student will able to convert different type of codes and
				number systems which are used in digital communication
			1	and computer systems. Familiar with basic gates.
		DLD&M		Understand Boolean algebra and basic properties of
	BTES405			Boolean algebra.
				Students will be able to illustrate simple logic using
			2	Karnaugh maps, understand "don't care". Familiar with
				combinational digital circuit.
				Students will be able to develop sequential logic
			3	components: SR Latch, D Flip-Flop and their usage and
				able to analyze sequential logic circuits.
			4	Students will be able to describe internal architecture of
			4	8086 microprocessor with memory segmentation
				Students will be able to write 8086 instruction set and
			5	addressing modes and explain Interrupts, memory and
				I/O interfacing in 8086
			1	Students will be able to compare the performance of
			1	various CPU Scheduling Algorithms
			2	Students will be able to solve Deadlock avoidance and
		Onomotina		Detection Algorithms.
		Operating	3	Students will be able to develop processes and IPC.
	PTCOI 404	Systems &	4	Students will be able to analyze the performance of the
	BTCOL406	Python	4	various Page Replacement Algorithms.
		Programmin		Students will be able to analyze the fundamental python
		g Lab	1	syntax and semantics and be fluent in the use of python
				control flow statements.
			2	Students will be able to design proficiency in the
			2	handling of strings and functions.
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	_			
			3	Students will be able to implement the methods to create and manipulate python programs by utilizing the data structures like lists, dictionaries, tuples and sets.
			4	Students will be able to analyze how to design object? oriented programs with python class
			5	Students will be able to identify and perform how to use exception handling in python applications for error handling
			1	Student will be able to survey a latest research papers of professional interest to understand new fields in the absence of a textbook, and synthesize summaries and reviews.
	BTCOS407	Seminar – II	2	Student will be able to evaluate and identify promising new directions in various cutting-edge technologies
			3	Student will be able to enhance technical writing skills in preparing detailed reports describing results
			4	Student will be able to effectively communicate with professional technical presentation skills by making oral presentations.
		Database Systems	1	Students will able to list and describe the key components of a database management system (DBMS). Create simple ER diagrams for given database application scenarios.
			2	Students will able to "Define and describe the key elements of an RDBMS, including tables, rows, columns, primary keys, and foreign keys. Use relational algebra operations to perform basic queries on a relational database schema.
V	BTCOC501		3	Students will able to write SQL queries to retrieve and manipulate data from a relational database for given business scenarios. Write code snippets in a chosen programming language to connect to a database, execute queries, and process the results.
			4	Students will able to define and describe the different normal forms (1NF, 2NF, 3NF, BCNF, etc.) used in database normalization. Demonstrate how to apply the rules of normalization to a database schema to transform it into higher normal forms. Explain how file and page organizations work in databases, and describe the principles behind indexing methods like B-trees and hashing.
			5	Students will able to define key concepts related to transaction processing, such as ACID properties (Atomicity, Consistency, Isolation, Durability), and basic



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	1		l	
				concurrency control mechanisms. Explain how
				transaction processing ensures data integrity and
				consistency, and describe the role of concurrency control
				in managing simultaneous database access.
			1	Student will be able to design Finite Automata (FA)
				machines and generate a language and RE for given FA Student will be able to understand the rules and
			2	
		Theory of		simplification of context free grammars Student will be able to produce the strings of a given
	BTCOC502	Computation	3	context-free languages using its grammar
		Computation		Student will be able to outline Pushdown Automata
			4	machine for given CF language(s)
				Student will be able to design Turing machines for given
			5	any computational problem
				Student will be able to differentiate the given project in
			1	various phases of software lifecycle.
			2	Student will be able to describe Agile Methodology
		Software		Student will be able to illustrate various types of System
	BTCOC503	Engineering	3	Modelling
		Zinginicerinig		Student will be able to apply System Patterns in various
			4	scenarios
			5	Student will be able to explain software testing concepts
			4	Student will be able to explain the Interaction Process
			1	between Human & Computer
			_	Student will be able to describe the Fundamentals of
		Elective – II	2	Design Process in HCI
	DTCOE504	(A) Human	3	Student will be able to discover the Concept of
	BTCOE504	computer	3	Implementation & Evaluation In HCI Process
		Interaction	4	Student will be able to explain in Depth Knowledge of
			4	the Models & Systems in HCI Process
			5	Student will be able to analyse Modern Systems in HCI
			3	process
			1	Students will be able to explain the need and importance
			1	of business communication
				Students will be able to discuss intercultural,
	Elective – III	2	interpersonal and ethical communication aspects to make	
	BTHM505	Licetive III	_	business
		(B) Business		communication effective
		Communicati		Students will be able to use non-verbal communication
		on	3	codes, various communication styles and avoid
				communication barriers while interaction
				Student will be able to demonstrate group
			4	communication and negotiation tactics required to make
				business deals successful.



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				5	Student will be able to describe the leadership styles,
				3	business writing skills and skills adapting a new culture
				1	Students able to design Schema for any real time
				1	applications.
				2	Students able to apply SQL queries for CRUD operation
				3	Students able to write subqueries, join operation and set
				3	operation using SQL
			D (1	4	Students able to design given relation using
			Database	4	Normalization.
		DTCOL 506	Systems & Software	5	Students able to manipulate Transactions using SQL
		BTCOL506		1	Student will be able to discuss how to develop software
			Engineering	1	requirements specifications for a given problem.
			Lab	2	Student will be able to explain DFD models
				3	Student will be able to construct Use case diagram
				4	Student will be able to construct various structure and
				4	behavior UML diagrams.
					Student will be able to illustrate implementation and
				5	environmental view diagram and testing tools
					Student will be able to identify complex problems, define
			7 Mini-project	1	project objectives, and scope effectively, developing the
				1	skills needed to recognize and address industry-specific
					challenges and issues.
					Student will be able to perform a comprehensive
				2	literature survey, critically evaluate sources, synthesize
				2	information, and contribute to knowledge in a specific
		BTCOM507			field
		B1CON1307			Student will be able to analyze intricate problems by
				3	conducting a comprehensive review of the current state
				3	of the art and then formulate practical and feasible
					solutions.
					Student will be able to create well-structured reports
				4	using elements of technical writing, engage in critical
				7	thinking to present information clearly and logically, and
					deliver compelling and well-organized presentations.
				1	Student will be able to analyze and be able to know the
					various phase of compiler.
				2	Student will be able to design and implement a lexical
		/I BTCOC601	Compiler		analyzer.
	VI		Design	3	Student will be able to design and implement a parser.
			201511	4	Student will be able to know about Intermediate code
				<u> </u>	generation and syntax directed translation
				5	Student will be able to optimize and design code
					generator.
					generator.



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			1	Student will be able to analyze the functioning of data
				communication and computer network
			2	Student will be able to understand different types of LAN
				technologies
	BTCOC602	Computer	3	Student will be able to analyze the transmission errors in
	DICOC002	Networks	3	the data link layer
			1	Student will be able to analyze the network layer and
			4	congestion control
			_	Student will be able to configure different application
			5	protocols and analyze network security
				Students will implement machine learning algorithms to
				real-world problems, demonstrating proficiency in
			1	learning paradigms, evaluation methods, and model
				optimization and deployment.
				Students will be able to solve Probability and Bayesian
			2	learning problem, and implement Logistic Regression
		Machine Learning		and SVM, including the use of Kernel functions
	BTCOC603		2	Students will be implementing Perceptron, multilayer
			3	networks, backpropagation, and an introduction to deep
				neural networks
				Students will be implementing computational learning
			4	theory, PAC learning model, sample complexity, VC
				dimension, and ensemble learning
			5	Students will be implementing clustering techniques such
				as k-means, adaptive hierarchical clustering, and
				Gaussian mixture models.
			1	Student will be able to describe GIS, name major GIS
			1	software available, know where to find more information.
				Student will be able to explain the components and
		Elective – IV	2	functionality of a GIS and the difference between GIS
		(A)		and other information systems.
	DTCOECO4	Geographic		Student will be able to discuss the nature of geographic
	BTCOE604	Information	3	information and explain in how it is stored in computer
		System		and the two types of GIS data structure.
		J ~ 		Student will be able to discover simple spatial analysis
			4	using GIS software.
				Student will be able to illustrate design and complete a
			5	GIS project from start to finish.
				Student will be able to describe basic concepts in
		Elective – V	1	=
				Development Engineering Student, will be able to explain World Poverty, and
	BTHM605	(A)	2	Student will be able to explain World Poverty and
		Development		Sustainable Development
		Engineering	3	Student will be able to explain the role of Social Justice in Religious & Secular Perspectives
		i l	1	In Religious X Secular Perspectives



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			4	Student will be able to discover various Development
				Strategies in Development Engineering
				Student will be able to explain in depth Knowledge of
			5	Engineering for Sustainable Community Development &
				use of ICT for Development Engineering
			1	Student will be able to read and examine the real-world
			1	dataset
				Student will be able to apply Machine Learning
			2	techniques of Regression, Classification, and Clustering
				Student will be able to analyze the results of Machine
			3	Learning techniques
				Student will be able to predict answers for given values
			4	from learned models or techniques
				Student will be able to discuss the concepts of online
		Compatitiva	1	Judges, feedback and the standard input output to solve
		Competitive Programmin	1	the programming challenges.
	BTCOL606	_		Student will be able to develop the advanced programs of
	B1COL000	g & Machine		
		Learning Lab	2	Arrays, Linked list, Strings, Dynamic Programming,
				Greedy method, Graph Algorithm etc. on Hackerrank,
				Codechef websites
			3	Student will be able to analyze the guidelines for
				designing the test cases for the programs.
				Student will be able to practice in the programming
			4	challenges in competitive platforms like codechef.com,
				uva.onlinejudge.com. organization like TCS, INFOSYS.
				Student will be able to practice the challenging problems
			5	to succeed in the programming challenges of reputed
				recruiting
				Student will be able to identify complex problems, define
			1	project objectives, and scope effectively, developing the
			1	skills needed to recognize and address industry-specific
				challenges and issues.
				Student will be able to perform a comprehensive
			2	literature survey, critically evaluate sources, synthesize
				information, and contribute to knowledge in a specific
	DTCOM(COZ	Mini-project		field
	BTCOM607	- II		Student will be able to analyze intricate problems by
				conducting a comprehensive review of the current state
			3	of the art and then formulate practical and feasible
				solutions.
				Student will be able to create well-structured reports
				using elements of technical writing, engage in critical
			4	thinking to present information clearly and logically, and
				deliver compelling and well-organized presentations.
LL			l	actives competing and well organized presentations.



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			1	Student will be able to explain the basic concepts of artificial intelligence and the significance of intelligent
				systems
			2	Student will be able to describe the various search based techniques to design intelligent systems.
	BTCOC701	Artificial Intelligence	3	Student will be able to demonstrate various knowledge representation techniques and the application of resolution method to derive conclusions from a set of logical statements.
			4	Student will be able to discuss the probabilistic reasoning concepts useful for designing systems taking actions in uncertain situations.
			5	Student will be able to know how the systems with learning abilities are designed.
			1	Students will be able to interpret the concept of virtualization and how this has enabled the development of cloud computing
			2	Students will be able to illustrate the fundamentals of
	BTCOC702	Cloud		cloud, cloud architectures and types of services in cloud
		Computing	3	Students will be able to examine scaling, cloud security and disaster management
VII			4	Students will be able to analyse different applications in cloud
			5	Students will be able to summarize some important cloud computing driven commercial systems
	DEGO ETOS	Elective – VI	1	Student will be able to illustrate and develop the basics of big data structures, Characteristics of big data, distribution packages.
			2	Student will be able to discover the knowledge of big data analytics and implement different file management task in Hadoop.
	BTCOE703	(C) Big Data Analytics	3	Student will be able to describe Map Reduce Paradigm and develop data applications using variety of systems.
			4	Student will be able to analyze and examine different operations on data using Pig Latin scripts.
			5	Student will be able to illustrate and apply different operations on relations and databases using Hive.
	BTCOE704 (C)	Open Elective – VII	1	Student will be able to identify the structure of a blockchain and Learn about Bitcoin, Cryptocurrency, Security
		(C) Block chain Technology	2	Student will be able to explain the individual components of the Bitcoin,the peer-to-peer network,Consensus and PoW



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					Student will be able to identify Permissioned Blockchain
				3	and different Consensus mechanism
					Student will be able to identify Enterprise application of
				4	Blockchain
					Student will be able to explain the architecture of
				_	Hyperledger Fabric, including its modular design,
				5	permissioned nature, and the concept of channels for data
					privacy along with Ripple and Corda
				1	Students will be able to describe what is involved in deep
				1	learning models from data.
			Open	2	Student will be able to illustrate a wide variety of learning
			Elective –		optimization and activation algorithms.
		BTCOE705	VIII	3	Student will be able to apply how to preprocess and
		(B)	(A)		evaluate models generated from data.
			(B) Deep	4	Students will be able to analyze models to solve real
			Learning	4	problems, optimize the learned models, and assess the
			(C)		expected accuracy of the models Student will be able to analyze and evaluate advanced
				5	deep machine learning algorithms.
					Students will be able to apply the predicate logic to
				1	design reasoning based programs using Prolog.
					Students will be able implement constraint-based
				2	solutions using Prolog.
				3	Students will be able to design program using heuristic-
				3	based search strategies.
				4	Students will be able to demonstrate the use of state space
				7	and heuristic evaluation in the context of puzzles.
				5	Students will be able to know how to use planning and
			Artificial		means-end analysis problem-solving strategies in Prolog
		BTCOL707	Intelligence	1	Students will be able to illustrate the basic concepts of
			& Cloud		cloud computing
			Computing	2	Students will be able to create a virtual machine and
			Lab		perform virtualization. Students will be able to utilize Moodle to develop a
				3	warehouse application in Salesforce
					Students will be able to implement a scenario in
				4	WordPress
					Students will be able to analyze the architecture of Aneka
				5	and execute a scenario.
				6	Students will be able to evaluate and analyze the use of
				6	Planio.
		BTCOS708	Project Phase	1	Student will be able to solve real-life problems by
		B1005700	- I	1	applying knowledge.



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			2	Student will be able to implement alternative approaches, apply and use the most appropriate one for a feasible solution.
			3	Student will be able to write precise reports and technical documents concisely.
			4	Student will be able to participate effectively in multi- disciplinary and heterogeneous teams, exhibiting teamwork, interpersonal relationships, conflict management, and leadership qualities.
	BTCOF801	Project phase – II (In- house) / Internship and Project in Industry	1	Student will be able to engage in self-directed research to gather and synthesize relevant information
			2	Student will be able to assess the validity and significance of findings, providing a thorough analysis and interpretation
VIII			3	Student will be able to structure and communicate research outcomes clearly, identifying and discussing unresolved issues
			4	Student will be able to connect existing methodologies and results with ongoing and prospective research efforts
			5	Student will be able to appreciate and articulate the real- world applications and constraints of the research area

Sold Engineering * Grant State of Engineering

Dr. Y. H. Bhosale Head of Department