



A CMI INSTITUTION

**CHRIST COLLEGE OF ENGINEERING
(AUTONOMOUS)**

**DEPARTMENT OF COMPUTER SCIENCE &
ENGINEERING (DS)**

CURRICULUM AND SYLLABUS

2025 REGULATION

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND
ENGINEERING (DATA SCIENCE)

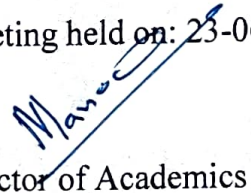
CURRICULUM AND SYLLABUS 2025 REGULATION SEMESTER 3

Approved by BoS meeting held on: 19-06-2026

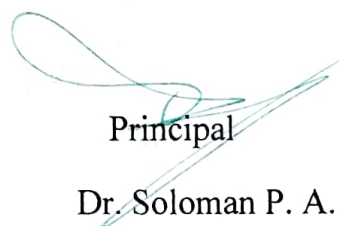
Approved by Academic Council meeting held on: 23-06-2026


BoS Chairperson

Dr. Nitha C Velayudhan


Director of Academics

Dr. Manoj George


Principal

Dr. Solomon P. A.

CHAIRPERSON
Board of Studies
B.Tech Computer Science &
Engineering (Data Science)
Christ College of Engineering
(Autonomous)
Irinjalakuda, Kerala

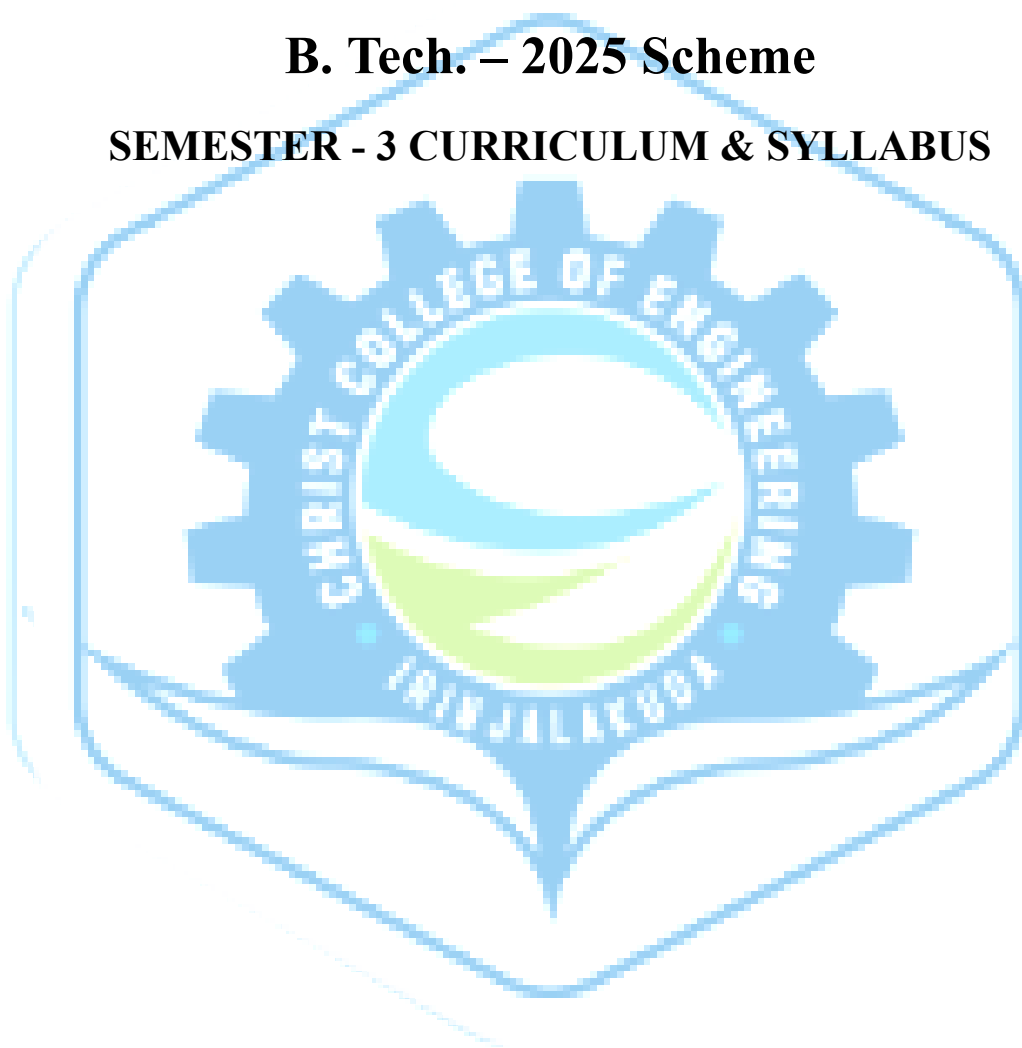
(College seal)



COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

B. Tech. – 2025 Scheme

SEMESTER - 3 CURRICULUM & SYLLABUS



CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

THIRD SEMESTER: Computer Science & Engineering (DS)															
SL. No:	Slot	Course Code	Course Type	Course Category	Course Title (Course Name)	Credit Structure				SS	Total Marks		Credits	Hrs./Week	
						L	T	P	R		CIE	ESE			
THEORY															
1	A	G25PRT311	BS	GC	Probability Distributions and Random Processes	2	1	0	0	3.5	40	60	3	3	
2	B	D25OPR302	PC-PBL	PC	Object Oriented Programming using Java	2	1	0	1	4.5	60	40	4	4	
3	C	D25DET303	PC	PC	Digital Electronics & Microcontrollers	2	1	0	0	3.5	40	60	3	3	
4	D	R25DST304	PC	PC	Data Structures and Algorithms	3	1	0	0	5	40	60	4	4	
5	F	A25AEP306	HM	CC	Strategic Communication and Documentation in Engineering Practice	2	0	0	0	3	50	-	2	2	
6	G	G25EST307	HM	CC	Environmental Science	1	0	0	0	1.5	40	60	1	1	
PRACTICALS															
7	H	R25DSP308	PC	PC	Data Structures Lab	0	0	3	0	1.5	50	50	2	3	
8	I	A25EDR359	SE	CC	Engineering Design and Innovation Studio (EDIS-I)	0	0	0	2	1	50	-	1	2	
9	J	D25PSP310	PC	PC	Python and Statistical Modeling Lab	0	0	3	0	1.5	50	50	2	3	
MANDATORY NON-CREDIT COURSES															
10	K	A25UHE311	MC	CC	Universal Human Values and Professional Ethics	1	0	1	0	2	40	60	Pass/Fail	2	

**CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME**

ACTIVITY POINT PROGRAMME													
11		A25APP311	MC	CC	Activity Point Programme					0			-
VALUE ADDED COURSES													
12	R/M-		VA	CC	Remedial/Minor course	3	1	0	0	5	40	60	4
Total										27/ 32*			22/ 26*
													27/ 31*

**SEMESTER S3
PROBABILITY DISTRIBUTIONS AND RANDOM PROCESSES
(Group A)**

Course Code	G25PRT311	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	4:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hr. 30 Min.
Prerequisites (if any)	Basic calculus	Course Type	Theory

Course Objectives:

- To familiarize students with the foundations of probability and analysis of random processes used in various applications in engineering and science.**

SYLLABUS

Module No.	Syllabus Description	Contact Hours

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

1	Random variables, Discrete random variables and their probability distributions, Cumulative distribution function, Expectation, Mean and variance, the Binomial probability distribution, the Poisson probability distribution, Poisson distribution as a limit of the binomial distribution, Joint pmf of two discrete random variables, Marginal pmf, Independent random variables, Expected value of a function of two discrete variables. [Text 1: Relevant topics from sections 3.1 to 3.4, 3.6, 5.1, 5.2]	9
2	Continuous random variables and their probability distributions, Cumulative distribution function, Expectation, Mean and variance, Uniform, Normal and Exponential distributions, Joint pdf of two Continuous random variables, Marginal pdf, Independent random variables, Expectation value of a function of two continuous variables. [Text 1: Relevant topics from sections 3.1, 4.1, 4.2, 4.3, 4.4, 5.1, 5.2]	9
3	Limit theorems: Markov's Inequality, Chebyshev's Inequality, Strong Law of Large Numbers (Without proof), Central Limit Theorem (without proof), Stochastic Processes: Discrete-time process, Continuous-time process, Counting Processes, The Poisson Process, Interarrival times (Theorems without proof) [Text 2: Relevant topics from sections 2.7, 2.9, 5.3]	9
4	Markov Chains, Random Walk Model, Chapman–Kolmogorov Equations, Classification of States, Irreducible Markov chain, Recurrent state, Transient state, Long-Run Proportions. (Theorems without proof) [Text 2: Relevant topics from sections 4.1, 4.2, 4.3, 4.4]	9

Course Assessment Method (CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Internal Examination- 3 (Written)	Total

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

15	30	30	30	40
	Total 90 marks will be converted to 25			

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
2 Questions from each module. - Total of 8 Questions, each carrying 3 marks (8x3 =24marks)	- Each question carries 9 marks. - Two questions will be given from each module, out of which 1 question should be answered. - Each question can have a maximum of 3 sub divisions. (4x9 = 36 marks)	60

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Apply the concepts of discrete probability distributions of one and two dimensional random variables to solve real-world problems.	P
CO2	Analyze the concepts of continuous probability distributions of one and two dimensional random variables to solve real-world problems.	A

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

CO3	Familiarize and analyze limit theorems and to understand the fundamental characteristics of stochastic processes.	A
CO4	Solve problems involving Markov Chains, to understand their theoretical foundations and to apply them to model and predict the behaviour of various stochastic processes	P
CO5	Analyze mathematical models to solve real-world problems and make informed decisions in Information Sciences.	A

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	-	2	-	-	-	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	-	-
CO3	3	3	-	2	-	-	-	-	-	-	-
CO4	3	3	-	2	-	-	-	-	-	-	-
CO5	3	3		2				2	3	2	2

Note: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Probability and Statistics for Engineering and the Sciences	Devore J. L	Cengage Learning	9 th edition, 2016

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S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

2	Introduction to Probability Models	Sheldon M. Ross	Academic Press	13 th edition, 2024
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Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Probability and Random Processes for Electrical and Computer Engineers	John A. Gubner	Cambridge University Press	2012
2	Probability Models for Computer Science	Sheldon M. Ross	Academic Press	1 st edition, 2001
3	Probability, Random Variables and Stochastic Processes	Papoulis, A. & Pillai, S.U.,	Tata McGrawHill.	4 th edition, 2002
4	Probability, Statistics and Random Processes	Kousalya Pappu	Pearson	2013

Video Links (NPTEL, SWAYAM...)	
Module No.	Link ID
1	https://onlinecourses.nptel.ac.in/noc22_mg31/preview
2	https://onlinecourses.nptel.ac.in/noc22_mg31/preview
3	https://archive.nptel.ac.in/courses/108/103/108103112/
4	https://archive.nptel.ac.in/courses/108/103/108103112/

SEMESTER S3
OBJECT ORIENTED PROGRAMMING

Course Code	D25OPR302	CIE Marks	60
Teaching Hours/Week (L: T:P: R)	3:0:0:1	ESE Marks	40
Credits	4	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To develop a strong understanding of object-oriented principles and core Java programming constructs for creating reliable and well-structured applications.
2. To enable the development of advanced Java applications using multithreading, event-driven GUI programming, and database connectivity.

SYLLABUS

Module No	Syllabus Description	Contact Hours
1	Java Fundamentals and Object-Oriented Design: Structure of a simple java program; Java programming Environment and Runtime Environment (Command Line & IDE); Java compiler; Java Virtual Machine; Primitive Data types and Wrapper Types; Casting and Autoboxing; Arrays; Strings; Vector class; Operators - Arithmetic, Bitwise, Relational, Boolean Logical, Assignment, Conditional (Ternary); Operator Precedence; Control Statements - Selection Statements, Iteration Statements and Jump Statements; Functions; Command Line Arguments; Variable Length Arguments; Classes; Abstract Classes; Interfaces. [<i>Use proper naming conventions</i>] OOP Concepts :- Data abstraction, encapsulation, inheritance, polymorphism, Procedural and object oriented programming paradigm; Microservices. Object Oriented Programming in Java: - Declaring Objects; Object Reference; Introduction to Methods; Constructors; Access Modifiers; <i>this</i> keyword. Project Activities • Identify a real-world problem • Define project objectives and scope • Prepare Use Cases and Functional Requirements • Design Class Diagrams Deliverables • Problem Statement • Requirement Specification UML Class Diagram	10
	Polymorphism: -Method Overloading, Using Objects as Parameters, Returning Objects, Recursion. Static Members, Final Variables, Inner Classes. Inheritance - Super Class, Sub Class, Types of Inheritance, The <i>super</i>	

2	keyword, protected Members, Calling Order of Constructors. Method Overriding, Dynamic Method Dispatch, Using <i>final</i> with Inheritance. Threads and Multithreading in Java-Introduction, Basics of a thread, Creating and Running a Thread, Life cycle of threads, Status of a Thread, Synchronization and Inter-Thread Communication, Synchronization Inter-thread Communication Project Activity Design and develop the core business logic of a Java-based application by implementing inheritance hierarchies, polymorphism, and multithreading concepts. Create reusable classes, establish parent-child relationships, implement method overriding and dynamic binding, and develop concurrent modules for efficient task execution and resource sharing. Deliverables 1. Class Hierarchy Design • UML/Class Diagram showing inheritance relationships and object interactions. 2. Object-Oriented Implementation • Java classes demonstrating inheritance, method overloading, method overriding, dynamic method dispatch, inner classes, and use of static/final members. 2. Multithreaded Module • Implementation of threads for concurrent task execution with synchronization and inter-thread communication. 2. Testing Report • Test cases and outputs validating polymorphism, inheritance, and thread synchronization. 2. Project Demonstration • Functional demonstration of the developed module integrated into the semester project.	8
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3	Packages and Interfaces – Packages - Defining a Package, CLASSPATH, Access Protection, Importing Packages. Interfaces - Interfaces v/s Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface(s). Exception Handling - Checked Exceptions, Unchecked Exceptions, <i>try</i> Block and <i>catch</i> Clause, Multiple catch Clauses, Nested <i>try</i> Statements, <i>throw</i>, <i>throws</i> and <i>finally</i>, Java Built-in Exceptions, Custom Exceptions. Project Activity Enhance the previously developed object-oriented and multithreaded application by organizing the code into reusable packages, implementing interface-based architecture for flexibility and extensibility, and incorporating comprehensive exception handling mechanisms to improve application reliability and maintainability. Deliverables 1. Modular Project Architecture • Organize the existing project into logical packages (Model, Service, Utility, UI, etc.). • Implement access protection and package management. 2. Interface-Based Design • Define and implement interfaces for major project functionalities. • Demonstrate interface inheritance and implementation. • Utilize interface references to achieve loose coupling and extensibility. 2. Robust Exception Handling Framework • Handle runtime and application-specific errors using try-catch-finally blocks. • Implement custom exceptions for business logic validation. • Integrate exception handling into existing project modules.	9
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	2. Enhanced Project Integration - Integrate packages, interfaces, and exception handling with the previously developed inheritance and multithreading modules. 2. Project Review and Demonstration - Demonstrate a scalable, modular, and fault-tolerant application showcasing object-oriented principles, concurrency, abstraction, and error management.	
4	Swings fundamentals – Overview of AWT, Swing v/s AWT, Swing Key Features, Model View Controller (MVC), Swing Controls, Components and Containers, Swing Packages, Event Handling in Swings, Swing Layout Managers, Exploring Swings–JFrame, JLabel, The Swing Buttons, JTextField. Event handling – Event Handling Mechanisms, Delegation Event Model, Event Classes, Sources of Events, Event Listener Interfaces, Using the Delegation Event Model. Developing Database Applications using JDBC – JDBC overview, Types, Steps, Common JDBC Components, Connection Establishment, SQL Fundamentals [For projects only] - Creating and Executing basic SQL Queries, Working with Result Set, Performing CRUD Operations with JDBC Project Activity Complete the development of the Java application by designing an interactive Swing-based graphical user interface, implementing event-driven functionalities, and integrating a backend database using JDBC to provide persistent data storage and retrieval. Deliverables 1. Graphical User Interface (GUI) Design - Develop user-friendly screens using Swing components such as JFrame, JLabel, JTextField, JButton, and other controls. - Apply suitable layout managers for effective interface design. - Implement MVC principles for better separation of concerns. 2. Event-Driven Application Development	10

	• Implement event handling using the Delegation Event Model. • Handle user actions such as button clicks, form submissions, and menu selections through appropriate listener interfaces. • Validate user inputs and provide interactive feedback. 3. Database Integration using JDBC • Establish database connectivity using JDBC. • Design database tables required for the project. • Implement CRUD operations (Create, Read, Update, Delete). • Execute SQL queries and process results using ResultSet. 4. Integrated System Development • Connect the GUI layer with the business logic and database layer. • Enable seamless data entry, retrieval, updating, and deletion through the user interface. 5. Final Project Demonstration • Demonstrate the complete working application with GUI, event handling, and database integration. • Submit project documentation including screen designs, database schema, and user manual.	
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Course Assessment Method (CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Assignment	Internal Examination-1 (Written)	Internal Examination-2 (Written)	Internal Examination-3 (Written)	Total
15*	30	30	30	40
	A total of 90 marks will be scaled to 25.			

*One or more assignments should be given, and the total marks should be consolidated and converted to 15 as per the revised evaluation guidelines.

End Semester Examination Marks (ESE)

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions.

Part A	Part B	Total
2 Questions from each module. - Total of 8 Questions, each carrying 3 marks (8x3 =24marks)	- Each question carries 9 marks. - Two questions will be given from each module, out of which 1 question should be answered. - Each question can have a maximum of 3 sub divisions. (4x9 = 36 marks)	60

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Explain the process of writing, compiling, and executing basic Java programs, including their structure and components, to demonstrate proficiency.	K2
CO2	Utilize object-oriented programming principles in the design and implementation of Java applications.	K3
CO3	Develop and manage Java packages and interfaces, enhancing code modularity and reusability.	K3
CO4	Implement error handling using Java's exception mechanisms and leverage interfaces for modular applications.	K3
CO5	Develop event-driven Java GUI applications with database connectivity using Swing and JDBC.	K3

**CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME**

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2			2						
CO2	3	3	2		3						
CO3	3	3	3		3						
CO4	3	3	3		3						
CO5	3	3	3		3			3			

Note: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Java: The Complete Reference	Herbert Schildt	Tata McGraw Hill	13/e, 2024
2	Introduction to Java Programming, Comprehensive Version	Y Daniel Liang	Pearson	10/e, 2014
3	Head First Design Patterns	Eric Freeman, Elisabeth Robson, Bert Bates, Kathy Sierra	O'Reilly Media	1/e, 2004

Reference Books

**CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME**

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Head First Java: A Brain Friendly Guide	Kathy Sierra & Bert Bates	O'Reilly	3/e, 2022
2	JAVA™ for Programmers	Paul Deitel	PHI	11/e, 2018
3	Clean Code : A Handbook of Agile Software Craftsmanship	Robert C. Martin	Prentice Hall	1/e, 2008
4	Programming with Java	E Balagurusamy	McGraw Hill Education	6/e, 2019
5	Java For Dummies	Barry A. Burd	Wiley	8/e, 2022
6	Effective Java	Joshua Bloch	Pearson	3/e, 2018

SEMESTER S3

DIGITAL ELECTRONICS AND MICRO CONTROLLERS – 3

(Group A)

Course Code	D25DET303	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	2:1:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To familiarize with the basic concepts of Boolean algebra and digital systems.
2. To enable the learner to design simple combinational and sequential logic circuits, which is essential in understanding organization & design of computer systems.

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Introduction to digital Systems :- Number Systems- Binary, Hexadecimal, grouping bits, Base conversion, conversion formulas with examples, one's and two's complement arithmetic; Binary Arithmetic- Addition and subtraction, Unsigned and Signed numbers; Fixed-Point Number Systems; Basic gates- Operation of a Logic circuit; Buffer; Gates- Inverter, AND gate, OR gate, NOR gate, NAND gate, XOR gate, XNOR gate;	11
2	Combinational Logic Design: – Boolean Algebra - Operations, Axioms, Theorems; Combinational logic analysis - Canonical SOP and POS, Minterm and Maxterm equivalence; Logic minimization - Algebraic minimization, K-map minimization, Don't cares; Code convertors- BCD codes, gray codes, excess-3 codes MSI Logic and Digital Building Blocks:- Introduction of multiplexers and their use in combinational logic design, demultiplexers/decoders and their use in combinational logic design, Arithmetic Circuits - Half adder, Full adder, half subtractor, full subtractor, digital comparators.	11
3	Sequential Logic Design :- Latches and Flip-Flops(Characteristic table, Characteristic equation and Excitation table)- SR latch, SR latch with enable, JK flipflop, T and D flip flops, Master-slave flip flops, Edge-triggered flip-flops, Shift registers, Asynchronous ripple counter, Synchronous Counters. Finite State Machines :-Finite State Machines - logic synthesis for an FSM, FSM design process and design examples; Synchronous Sequential Circuits;	11
4	Introduction to Microcontroller 8051-Architecture, Register organization, Addressing modes, Instruction set and basic programming; Programming and Interfacing of Seven-Segment Display,LCD Display; Overview of Embedded Systems, Applications of Embedded Systems, Introduction to Embedded C, Microcontrollers vs. Microprocessors.	11

Course Assessment Method

(CIE: 60 Marks, ESE: 40 Marks)

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

Continuous Internal Evaluation Marks:

Assignment (Activity based)	Assignment (Activity based)	Project	Internal Examination-I (Written)	Internal Examination-II (Written)	Internal Examination-III (Written)	Total
10	10	20	30	30	30	60
			A total of 90 marks will be scaled to 20.			

End Semester Examination Marks (ESE):

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions.

Part A	Part B	Total
2 questions from each module. - Total of 8 questions, each carrying 2 marks (8 x 2 = 16 Marks)	- Each question carries 6 marks. - Two questions will be given from each module, out of which 1 question should be answered. - Each question can have a maximum of 3 sub divisions. (4 x 6 = 24 Marks)	40

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Summarize the basic concept of different number systems and perform conversion and arithmetic operations between different bases.	K2
CO2	Interpret a combinational logic circuit and MSI logic circuits using the classical digital design approach to determine its logic expression, truth table, and to synthesize a minimal logic circuit through algebraic manipulation or with a Karnaugh map	K3

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

CO3	Develop common sequential logic circuits using storage devices such as counters and shift registers, and design finite state machines using both the classical digital design approach.	K3
CO4	Apply 8051 microcontroller and embedded system concepts to develop basic programs and interface display devices	K3
CO5	Design a sustainable digital and embedded system solution for a real-world case study using digital logic and microcontroller concepts.	K6

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	2	2								
CO2	2	2	2	2							
CO3	2	3	3	3	3						3
CO4	2	3	3	3	3						3
CO5	2	3	3	3	3		3	2	2	2	3

Text Books

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Digital Fundamentals	Thomas L. Floyd	Pearson Education	11th Edition, 2015
2	Digital Design	M. Morris Mano	Pearson Education	6th Edition, 2018
3	The 8051 Microcontroller and Embedded Systems: Using Assembly and C	Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay	Pearson Education	2nd Edition, 2008

**CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME**

Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Digital Design and Computer Architecture	David Money Harris, Sarah L. Harris	Morgan Kaufmann (Elsevier)	2nd Edition, 2012
2	Fundamentals of Digital Logic with Verilog Design	Stephen Brown, Zvonko Vranesic	McGraw-Hill Education	3rd Edition, 2014
3	Switching and Finite Automata Theory	Zvi Kohavi, Niraj K. Jha	Cambridge University Press	3rd Edition, 2010
4	The 8051 Microcontroller	Kenneth J. Ayala	Cengage Learning	3rd Edition, 2004

Video Links (NPTEL, SWAYAM...)	
Module No.	Link ID
1	https://nptel.ac.in/courses/117105080
2	https://onlinecourses.nptel.ac.in/noc21_ee39/
3	https://onlinecourses.nptel.ac.in/noc24_cs61/

SEMESTER S3

DATA STRUCTURES AND ALGORITHMS

Course Code	R25DST304	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:1:0:0	ESE Marks	60

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

Credits	4	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	G25PCE206	Course Type	Theory

Course Objectives:

1. To provide the learner a comprehensive understanding of data structures and algorithms.
2. To prepare them for advanced studies or professional work in computer science and related fields.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Basic Concepts of Data Structures Definitions; Data Abstraction; Performance Analysis - Time & Space Complexity, Asymptotic Notations; Polynomial representation using Arrays, Sparse matrix (<i>Tuple representation</i>); Stacks and Queues - Stacks, Queues, Circular Queues, Double Ended Queues; Evaluation of Expressions- Infix to Postfix, Evaluating Postfix Expressions.	11
2	Linked List and Memory Management Singly Linked List - Operations on Linked List, Stacks and Queues using Linked List, Polynomial representation using Linked List; Doubly Linked List; Circular Linked List; Garbage collection and compaction.	11
3	Trees and Graphs Trees :- Representation Of Trees; Binary Trees - Types and Properties, Binary Tree Representation, Tree Operations, Tree Traversals; Expression Trees; Binary Search Trees - Binary Search Tree Operations; Binary Heaps- Binary Heap Operations, Priority Queue. Graphs :- Definitions; Representation of Graphs; Depth First Search and Breadth First Search; Applications of Graphs	11

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

4	Sorting and Searching Sorting Techniques :- Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort, Radix Sort. Searching Techniques:- Linear Search, Binary Search Hashing - Hashing functions: Mid square, Division, Folding, Digit Analysis; Collision Resolution: Linear probing, Quadratic Probing, Double hashing, Open hashing.	11
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Course Assessment Method
(CIE: 40 Marks, ESE: 60 Marks)

Assignment (Activity based)	Internal Examination-I (Written)	Internal Examination-II (Written)	Internal Examination-III (Written)	Total
15*	30	30	30	
	A total of 90 marks will be scaled to 25.			40

*One or more assignments should be given, and the total marks should be consolidated and converted to 15 as per revised evaluation guidelines.

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions.

Part A	Part B	Total
2 questions from each module. - Total of 8 questions, each carrying 3 marks	- Each question carries 9 marks. - Two questions will be given from each module, out of which 1 question should be answered. - Each question can have a maximum of 3 sub divisions.	60

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

(8 x 3 = 24 Marks)	(4 x 9 = 36 Marks)	
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Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Describe the fundamental concepts of data structures including arrays, stacks, queues, and evaluate expressions using postfix notations.	K3
CO2	Implement various linked list operations and apply dynamic memory management techniques.	K3
CO3	Construct and manipulate tree and graph structures and apply traversal/searching techniques to solve hierarchical and network-based problems.	K3
CO4	Compare and evaluate the performance of sorting and searching algorithms and implement appropriate hashing techniques with collision resolution.	K3
CO5	Design optimized data structure solutions for real-world problems that promote sustainable computing by reducing memory usage and improving computational efficiency.	K3

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2
CO 1	2	3	1	2	2	2					2	3	3

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

CO 2	2	3	1	2	2	2					2	3	3
CO 3	2	3	2	2	2	2					2	3	3
CO 4	2	3	2	2	2	2					2	3	3
CO 5	2	3	3	2	2	3	3	2	2		3	3	3

Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Fundamentals of Data Structures in C	Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed,	Universities press,	2/e, 2007
2	Introduction to Algorithms	Thomas H Cormen, Charles Leiserson, Ronald L Rivest, Clifford Stein	PHI	3/e, 2009

Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Classic Data Structures	Samanta D.	Prentice Hall India.	2/e, 2018
2		Aho A. V., J. E.	Pearson Publication.	1/e, 2003

**CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME**

	Data Structures and Algorithms	Hopcroft and J. D. Ullman		
3	Introduction to Data Structures with Applications	Tremblay J. P. and P. G. Sorenson	Tata McGraw Hill.	2/e, 2017
4	Theory and Problems of Data Structures	Lipschuts S.	Schaum's Series	2/e, 2014

Video Links (NPTEL, SWAYAM...)	
Module No.	Link ID
1	https://nptel.ac.in/courses/106102064
2	https://ocw.mit.edu/courses/6-851-advanced-data-structures-spring-2012/

SEMESTER S3

STRATEGIC COMMUNICATION AND DOCUMENTATION IN ENGINEERING PRACTICE

Course Code	A25SDT306	CIE Marks	50
Teaching Hours/Week (L:T:P:R)	2:0:0:0	ESE Marks	0
Credits	2	Exam Hours	Nil
Prerequisites (if any)	-	Course Type	Theory

Course Objective:

1. Develop proficiency in advanced professional and technical communication required in engineering and workplace contexts.
2. Develop the ability to organize, analyze, interpret, and present technical information effectively.
3. Develop competence in professional writing, research-oriented writing, and preparation of technical reports.
4. Strengthen team communication, leadership, negotiation, interview, and professional presentation skills.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Advanced Professional Language and Communication Advanced Language Use Appropriate use of tenses, adjectives and adverbs in professional contexts. Technical vocabulary and appropriate use of jargon; abbreviations in technical communication. Editing mechanics: punctuation, proofreading, language accuracy, clarity and coherence.	7

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

Module No.	Syllabus Description	Contact Hours
	Professional Communication Professional and business correspondence; job application letter, resume and statement of purpose, with emphasis on engineering-specific and role-targeted formats. ATS (Applicant Tracking System) optimisation techniques, LinkedIn profile writing, and cover-letter drafting. Professional writing for engineering and workplace contexts. Task-Based Activities Editing and proofreading exercises; professional correspondence; ATS-optimised resume tailored to a specific engineering job posting; cover-letter and LinkedIn-summary drafting; peer recruiter-style resume review; context-based language exercises.	
2	Research, Information Analysis and Technical Writing Research and Analysis Analysing and synthesising technical information from newspapers, magazines, articles and electronic content. Writing an introduction and literature review based on relevant technical information. Organisation of Information Systematic organisation of objective-oriented information for different technical reports. Questionnaire preparation for collection of relevant information. Data Interpretation and Visual Communication Interpretation of data presented through graphs, tables, charts, imagery and infographics. Converting information between textual and visual forms. Task-Based Activities Analysis of technical information; introduction and literature-review writing; questionnaire preparation; data interpretation and transcoding exercises.	7
3	Technical Report Preparation and Documentation	8

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

Module No.	Syllabus Description	Contact Hours
	Fundamentals of Technical Reports Purpose, characteristics and major types of reports. organization of reports: title, preface, acknowledgement, abstract/summary, introduction, materials and methods, results, discussion, conclusion and suggestions/recommendations. Report Preparation Collection of information, preparation of an outline, organisation of content and drafting of technical reports. Supplementary components: appendix, index, glossary, references, bibliography and notes. Review of reports for structure, content, style, layout, clarity, coherence and referencing. Task-Based Activities Identification of report types and structure; drafting sections of technical reports; organisation of supplementary material; review and editing of completed reports.	
4	Team, Leadership and Professional Presentation Team and Leadership Communication Advanced workplace communication: negotiation strategies, leadership styles, and conflict de-escalation in professional contexts. Collaborative interaction and cross-functional team management in engineering workplaces. Professional Interaction Participation in professional meetings and structured group interaction. Advanced interview communication in professional and technical contexts, including panel interviews and combined technical-HR interview formats. Technical Presentation Planning, organising and digitally presenting technical reports and professional information. Effective presentation of technical content and response to audience interaction. Task-Based Activities Negotiation role-play between cross-functional teams; conflict de-escalation simulation; leadership-rotation task within group projects; cross-functional meeting simulation; panel-style mock interview combining technical and HR	8

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

Module No.	Syllabus Description	Contact Hours
	rounds; video-recorded self-review of interview performance; planning and digital presentation of a technical report.	

Course Assessment Method (CIE: 50 Marks)

Assignments / Quiz / Language & Editing Tasks	Professional / Research Writing Activities	Technical Report Preparation	Professional Interaction / Presentation	Total
10	10	15	15	50

Course Outcomes (COs)

At the end of the course, students will be able to:

CO No.	Description	Blooms Knowledge Level (KL)
CO1	Apply appropriate language, editing, and professional communication practices in engineering and workplace contexts.	K3
CO2	Apply technical writing practices to organize technical information, interpret data, and communicate information in textual and visual forms.	K3
CO3	Apply appropriate content organization, documentation and referencing conventions in technical report preparation	K3
CO4	Demonstrate effective communication in teamwork, leadership, negotiation and professional interactions, and deliver clear digital presentations of technical reports.	K3

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

Note: K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, and
 K6 – Create

CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO11
CO 1	1				1		2		3		1
CO 2	2	2		1	2		1		3		2
CO 3	1	1		1	1		1		3		2
CO 4					2		2	3	3	1	1

Mapping level: 1 – Low, 2 – Moderate, 3 – High

Reference Books

Sl. No.	Title of the Book	Name of the Author(s)	Name of the Publisher
1	Technical Communication: Principles and Practice	Meenakshi Raman & Sangeeta Sharma	Oxford University Press
2	Effective Technical Communication	M. Ashraf Rizvi	McGraw Hill Education
3	Practical English Usage	Michael Swan	Oxford University Press

SEMESTER S3

ENVIRONMENTAL SCIENCE

Course Code	G25EST307	CIE Marks	40
Teaching Hours/Week (L:T:P:R)	1:0:0:0	ESE Marks	60
Credits	1	Exam Hours	2 Hrs. and 30 Mins.
Prerequisites (if any)	G25MCT105	Course Type	Theory

Course Objective:

1. To understand environmental systems, biodiversity, natural resources, pollution, and their conservation and management.
2. To develop awareness of sustainability, climate change, renewable energy, green technologies, and sustainable development practices.

SYLLABUS

Module No.	Description	Contact Hours
1	Environment, ecosystem structure and functions, energy flow, food chains, food webs, ecological pyramids, biogeochemical cycles, ecosystem services, biodiversity, threats, in-situ and ex-situ conservation.	6
2	Causes and Effects of Water, Soil, Air and Noise Pollutions, Environmental Quality Standards	6

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

	Solid Waste, Hazardous Waste, and E-Waste Management; Cleaner Production Techniques	
3	Sustainability: Concept, Need, and Challenges; Economic, Social, and Environmental Dimensions of Sustainability; Transition from Unsustainable to Sustainable Development; Sustainable Development Goals (SDGs) – Targets, Indicators, and Intervention Areas. Climate change- Global, Regional and local environmental issues and possible solutions Concept of Carbon Credit and Carbon Footprint.	6
4	Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy Cycles- carbon cycle, emission and sequestration. Green Engineering: Sustainable urbanization- Socio-economic and technological change.	6

Course Assessment Method
(CIE: 40 Marks, ESE: 60 Marks)

Continuous Internal Evaluation Marks (CIE):

Assignment (Activity based)	Assignment (Activity based)	Internal Examination-I (Written)	Internal Examination-II (Written)	Internal Examination-III (Written)	Total
10	10	30	30	30	
		Average of three convert to 20			40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions.

Part A	Part B	Total
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CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

2 questions from each module. - Total of 8 questions, each carrying 3 marks (8 x 3 = 24 Marks)	- Each question carries 9 marks. - Two question from each module - questions will be given from each module, out of which 1 question should be answered. - Each question can have a maximum of 3 sub divisions. (4 x 9 = 36 Marks)	60
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Course Outcomes (Cos)

At the end of the course students should be able to:

CO No.	Description	Blooms Knowledge Level (KL)
CO1	Explain the fundamental concepts of environment, ecosystems, biodiversity, and ecological processes, and evaluate the importance of biodiversity conservation.	2
CO2	Identify the causes and effects of environmental pollution and waste management practices, and interpret relevant environmental regulations.	2, 3
CO3	Apply the principles of sustainability, climate change mitigation, carbon management, and environmental management to support sustainable development goals.	2,3
CO4	Apply the principles of circular economy, environmental impact assessment, green technologies, sustainable energy, and sustainable urbanization for environmental protection and resource conservation.	2,3

Note: K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, and K6 –Create

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2					3								
CO2	2					3								

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

CO3	2					3								
CO4	2					3								

Text Books

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Perspectives in Environmental Studies	Anubha Kaushik, C.P. Kaushik	New Age International Publishers	7 th Edition, 2024
2	Environmental Science and Engineering	Benny Joseph	McGraw Hill Education India	3 rd Edition, 2017
3	Introduction to Environmental Engineering and Science	Gilbert M. Masters, Wendell P. Ela	Pearson Education	3 rd Edition, 2008

Reference Books

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Sustainability Engineering: Concepts, Design and Case Studies	David T. Allen, David R. Shonnard	Pearson / Prentice Hall	2nd Edition, 2011
2	Engineering Applications in Sustainable Design and Development	Bradley A.S., Adebayo A.O., Maria P.	Cengage Learning	1st Edition, 2015
3	Environmental Impact Assessment Notification and Guidelines	Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India	Government of India	Latest Amendment Version
4	Basic Concepts in Environmental Management	Kenneth M. Mackenthun	Lewis Publishers	Reprint Edition
5	Environmental Science: A Global Concern	William P. Cunningham, Mary Ann Cunningham	McGraw Hill Education	15th Edition, 2021

Video Links (NPTEL, SWAYAM, etc.)

Module No.	Link
1	https://nptel.ac.in/courses/105105157
2	https://nptel.ac.in/courses/102104001

SEMESTER S3

DATA STRUCTURES LAB

Course Code	R25DSP308	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	0:0:3:0	ESE Marks	60
Credits	2	Exam Hours	3 Hrs
Prerequisites (if any)	G25PCE206	Course Type	Lab

Course Objectives:

To give practical experience for learners on implementing different linear and non linear data structures, and algorithms for searching and sorting.

Expt. No.	Experiments
1	Find the sum of two sparse polynomials using arrays**
2	Find the transpose of a sparse matrix and sum of two sparse matrices.**
3	Convert infix expression to postfix (or prefix) and then evaluate using stack.**

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

4	Implement Stack, Queue, DEQUEUE, and Circular Queue using arrays.**
5	Implementation of various linked list operations.**
6	Implement addition and multiplication of polynomials using singly linked lists.**
7	Implementation of binary trees using linked lists and arrays- creations, insertion, deletion and traversal.**
8	Implementation of binary search trees – creation, insertion, deletion, search
9	Implementation of searching algorithms – linear search, binary search**
10	Implement Bubble sort, Insertion Sort, Radix sort, Quick Sort, and Merge Sort and compare the number of steps involved.**
11	The General post office wishes to give preferential treatment to its customers. They have identified the customer categories as Defence personnel, Differently abled, Senior citizen, Ordinary. The customers are to be given preference in the decreasing order - Differently abled, Senior citizen, Defence personnel, Normal person. Generate the possible sequence of completion.
12	Implement a spell checker using a hash table to store a dictionary of words for fast lookup. Implement functions to check if a word is valid and to suggest corrections for misspelled words.
13	Representation of graphs and computing various parameters (in degree, out degree etc.) - adjacency list, adjacency matrix.**
14	Implementation of BFS and DFS for each graph representations.**
	Implementation of hash table using your own mapping functions and observe collisions

15	and overflow resolving schemes.**
16	Simulation of first-fit, best-fit and worst-fit allocations.
17	Simulation of a basic memory allocator and garbage collector using doubly linked list.**
18	The CSE dept is organizing a tech fest with so many exciting events. By participating in an event, you can claim for activity points as stipulated by University. Each event i gives you $A[i]$ activity points where A is an array. If you are not allowed to participate in more than k events, what's the max number of points that you can earn?
19	Merge K sorted lists into a single sorted list using a heap. Use a min-heap to keep track of the smallest element from each list. Repeatedly extract the smallest element and insert the next element from the corresponding list into the heap until all lists are merged.

****Mandatory Questions**

Expt. No.	Practice Questions
1	Write a program to verify whether a given pop sequence can result from a series of push and pop operations performed on an initially empty stack, and if valid, display one possible sequence of operations.
2	Find the sum of the largest k elements from an unsorted array.
3	Implement the enqueue and dequeue operations of a queue where priority customers are allowed limited reordering during insertion.
4	Given head, the head of a linked list, determine if the linked list has a cycle in it. There is a cycle in a linked list if there is some node in the list that can be reached again by continuously following the next pointer. Internally, pos is used to denote the index of the node that tail's next pointer is connected to. Note that pos is not passed as a parameter. Return true if there is a cycle in the linked list. Otherwise, return false.

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

5	Find the middle element of a singly linked list in a single traversal.
6	Remove duplicates from a sorted linked list.
7	Find the first and last occurrence of a given element in a sorted array using binary search.
8	Construct a Binary Search Tree (BST) and find the kth smallest element in it.
9	Books in a library are stored in a Binary Search Tree (BST) based on book ID. Write a program to insert, search, and display books in sorted order.
10	In a social media platform, users are represented as nodes in a graph, and friendships are edges. Write a program to use Breadth First Search (BFS) to find all friends connected to a particular user.

Continuous Internal Evaluation Marks (CIE):

Preparation/Pre-Lab Work experiments, Viva and Timely completion of Lab Reports / Record (Continuous Assessment)	Internal Examination	Total
20	20	40

Continuous Assessment (20 Marks)

1. Preparation and Pre-Lab Work (4 Marks)

- Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.
- Understanding of Theory: Evaluation based on students' preparation and understanding of the theoretical background related to the experiments.

2. Conduct of Experiments (6 Marks)

- Procedure and Execution: Adherence to correct procedures, accurate execution of experiments, and following safety protocols.
- Skill Proficiency: Proficiency in handling equipment, accuracy in observations, and troubleshooting skills during the experiments.

- Teamwork: Collaboration and participation in group experiments.

3. Lab Reports and Record Keeping (4 Marks)

- Quality of Reports: Clarity, completeness and accuracy of lab reports. Proper documentation of experiments, data analysis and conclusions.
- Timely Submission: Adhering to deadlines for submitting lab reports/rough record and maintaining a well-organized fair record.

4. Viva Voce (6 Marks)

- Oral Examination: Ability to explain the experiment, results and underlying principles during a viva voce session.

Final Marks Averaging: The final marks for preparation, conduct of experiments, viva, and record are the average of all the specified experiments in the syllabus.

End Semester Examination Marks (ESE):

Procedure/ Preparatory work/Design/ Algorithm	Conduct of experiment/ Execution of work/ troubleshooting/ Programming	Result with valid inference/ Quality of Output	Viva voce	Record	Total
10	20	10	15	5	60

- *Submission of Record: Students shall be allowed for the end semester examination only upon submitting the duly certified record.*
- *Endorsement by External Examiner: The external examiner shall endorse the record*

Evaluation Pattern for End Semester Examination (60 Marks)

1. Procedure/Preliminary Work/Design/Algorithm (10 Marks)

- Procedure Understanding and Description: Clarity in explaining the procedure and understanding each step involved.
- Preliminary Work and Planning: Thoroughness in planning and organizing materials/equipment.
- Algorithm Development: Correctness and efficiency of the algorithm related to the experiment.
- Creativity and logic in algorithm or experimental design.

2. Conduct of Experiment/Execution of Work/Programming (20 Marks)

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

- Setup and Execution: Proper setup and accurate execution of the experiment or programming task.

3. Result with Valid Inference/Quality of Output (10 Marks)

- Accuracy of Results: Precision and correctness of the obtained results.
- Analysis and Interpretation: Validity of inferences drawn from the experiment or quality of program output.

4. Viva Voce (15 Marks)

- Ability to explain the experiment, procedure results and answer related questions
- Proficiency in answering questions related to theoretical and practical aspects of the subject.

5. Record (5 Marks)

- Completeness, clarity, and accuracy of the lab record submitted

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Implement and analyze various linear data structures such as arrays, stacks, queues, and linked lists to solve real-world problems.	K3
CO2	Construct and manipulate non-linear data structures including trees and graphs, and apply traversal and searching algorithms to solve hierarchical and network-based problems.	K3
CO3	Implement and compare various sorting and searching algorithms, analyzing their efficiency and applicability.	K3
CO4	Apply advanced data structures such as heaps and hash tables to design efficient solutions for practical problems, including memory management and spell checking.	K3

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

CO5	Design optimized data structure solutions for real-world problems that promote sustainable computing by reducing memory usage and improving computational efficiency.	K3
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Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO- PO Mapping (Mapping of Course Outcomes with Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	3	1	2	2	2					2	3	3
CO2	2	3	1	2	2	2					2	3	3
CO3	2	3	2	2	2	2					2	3	3
CO4	2	3	2	2	2	2					2	3	3
CO5	2	3	3	2	2	3	3	2	2		3	3	3

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Fundamentals of Data Structures in C	Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed,	Universities Press,	2/e, 2007
2	Introduction to Algorithms	Thomas H Cormen, Charles Leiserson, Ronald L Rivest, Clifford Stein	PHI	3/e, 2009

Reference Books

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Classic Data Structures	Samanta D.	Prentice Hall India.	2/e, 2018
2	Data Structures and Algorithms	Aho A. V., J. E. Hopcroft and J. D. Ullman	Pearson Publication.	1/e, 2003
3	Introduction to Data Structures with Applications	Tremblay J. P., P. G. Sorenson	Tata McGraw Hill.	2/e, 2017
4	Theory and Problems of Data Structures	Lipschutz S.	Schaum's Series	2/e, 2014

Video Links (NPTEL, SWAYAM...)	
No.	Link ID
1	https://nptel.ac.in/courses/106102064
2	https://ocw.mit.edu/courses/6-851-advanced-data-structures-spring-2012/

SEMESTER S3
ENGINEERING DESIGN AND INNOVATION STUDIO - II

Course Code	A25EDR359	CIE Marks	50
Teaching Hours/Week (L:P)	0:2	ESE Marks	–
Credits	1	Exam Hours	2 Hrs (Lab Exam)
Prerequisites (if any)	NIL	Course Type	Project-Based / Skill Enhancement

Course Objectives:

1. To develop practical competence in building IoT systems using ESP8266/ESP32, applying real-time sensor data transmission via MQTT and cloud integration for remote monitoring and control.
2. To introduce system modelling and dynamic simulation using MATLAB/Simulink and Simscape for the analysis of physical and engineering systems.
3. To enable students to design, simulate, and critically evaluate engineering systems by comparing simulation outputs with expected theoretical behaviour.

4. To build interdisciplinary prototyping skills by integrating IoT hardware, cloud services, and computational simulation tools into a coherent micro-project.
5. To build fundamental skills in conducting and documenting a structured engineering literature survey to identify research gaps and technical solutions in interdisciplinary domains.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	MODULE I: Internet of Things – Sensing, Connectivity & Cloud Integration Lab Sessions (minimum 4 must be completed and recorded): • Lab 1 – Real-Time Environmental Data Acquisition and MQTT Streaming • Lab 2 – I2C Master–Slave Communication: Establish I2C between two ESP boards; master reads sensor data via slave • Lab 3 – Cloud Integration (ThingSpeak / Firebase): Connect ESP8266 to ThingSpeak/Firebase; plot live sensor graph on cloud dashboard; set threshold alert. • Lab 4 – IoT Dashboard for Remote Monitoring and Control: Create a multi-widget dashboard (gauge, graph, switch) on ThingSpeak or Node RED; control an LED/relay remotely from dashboard. • Lab 5 – Assistive Elder-Care Emergency Beacon System using ESP32, Bluetooth-BLE and cloud. • Lab 6 - Real-Time Industrial system Monitoring for Predictive Maintenance via Zigbee Mesh Network • Lab 7 – GPS Location Logger: Interface NEO-6M GPS with ESP32 over UART and post latitude/longitude to ThingSpeak/Firebase.	10 P

2	MODULE II: System Modelling and Analysis using MATLAB/Simulink & Simscape Lab Sessions (minimum 4 must be completed and recorded): • Lab 1 – Statistical Analysis of Real-World Dataset: Load a CSV dataset (e.g. student scores / weather data) into MATLAB; compute descriptive statistics, plot histogram and box plot, and perform a basic hypothesis test (t test) • Lab 2 – Smart Parking System Modelling • Lab 3– Temperature Control System • Lab 4 – Image Processing Basics • Lab 5 – Automatic Traffic Light Controller • Lab 6 – Cyber-Physical Security: Simulating and Detecting Man-in-the Middle (MitM) Attacks • Lab 7 - Machine Learning Classification and MATLAB Apps	10 P
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Course Assessment Method

1. Integrated Lab Performance Report (10 Marks):

Students must maintain a structured laboratory log for both Module I and Module II. A comprehensive performance report covering a minimum of 8 experiments (at least 4 from IoT and 4 from MATLAB/Simulink) must be submitted at the end of the term. The assessment criteria include: (i) complete schematic/block diagrams, (ii) clean data tables with accurate readings, (iii) comparative analysis of simulated/observed outputs and (iv) qualitative engineering discussions.

2. Literature Survey Report (10 Marks):

Conducted in teams of three (3) students. Each group will select a contemporary problem statement at the intersection of IoT, automation, and dynamic physical systems. Deliverables include a formal A4 PDF report (max 8 pages) comprising: (i) abstract, (ii) taxonomy of existing technical solutions, (iii) rigorous comparative matrix of previous implementations, (iv) identification of specific research or technology gaps, and (v) complete bibliography indexed in a standard formatting style (e.g., IEEE).

Continuous Internal Evaluation (CIE: 50 Marks)

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

Assignment I	Assignment II	Micro-Project	Lab Examination	Total
Integrated Lab Performance Report:	Literature Survey Submission: (Submitted by a team of 3 students).	Integrated IoT/ Simulation prototype with report, schematic and demonstration (Submitted by a team of 3 students).	On-spot lab task: IoT wiring/cloud , Simulink modelling – completed in 2 hrs	50 Marks
10 Marks	10 Marks	15 Marks	15 Marks	50 Marks

Christ College of Engineering (Autonomous)

Micro-Project Guidelines

Group size: 2–3 students. The micro-project must integrate at least one IoT hardware element (ESP32/ESP8266 with sensor and cloud connectivity).

Deliverables and Marks Distribution (15 Marks):

- Working prototype / simulation model (hardware + Simulink): 5 Marks
- Technical report (problem statement, design, results, conclusion, references): 4 Marks
- Live demonstration and Q&A (lab viva): 6 Marks

Course Outcomes (COs)

At the end of the course, students should be able to:

CO No	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Implement a complete IoT system using ESP32/ESP8266 by interfacing sensors, applying MQTT/cloud protocols, and designing a remote monitoring dashboard for real-time data acquisition and actuation.	K3 (Apply)

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

CO2	Analyse the dynamic behaviour of real world engineering systems by building mathematical models in MATLAB/Simulink and Simscape, and interpreting simulation results against theoretical expectations.	K4 (Analyse)
CO3	Design and evaluate an integrated micro-project that combines IoT hardware demonstrating functional performance, critical analysis of results, and professional documentation.	K5 (Evaluate)

CO-PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	2	3	2	3	1	--	--	2	2	2
CO2	3	3	3	3	2	1	--	--	2	1	2
CO3	3	3	3	3	3	2	--	2	3	3	3

Text Books

Sl. No.	Title of the Book	Name of the Author/s	Publisher	Edition and Year
1	Internet of Things: A Hands-On Approach	Arshdeep Bahga & Vijay Madisetti	Universities Press	1e, 2014

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

2	MATLAB/Simulink for Dynamic System Analysis and Control	William J. Palm III	McGraw-Hill	4e, 2019
3	System Simulation and Scientific Computing with MATLAB® and Simulink®. Cyberis.	Xue, D., Chen, Y., & Atherton, D. P	Wiley	2007

Reference Books

Sl. No.	Title of the Book	Name of the Author/s	Publisher	Edition and Year
1	Designing the Internet of Things	Adrian McEwen & Hakim Cassimally	Wiley	1e, 2013
2	Introduction to IoT	Sudip Misra, Anandarup Mukherjee, Arijit Roy	Cambridge University Press	2021
3	MATLAB Machine Learning Recipes: A Problem-Solution Approach	Michael Paluszek, Stephanie Thomas	Apress	3rd Edition, 2024

Video Links (NPTEL, SWAYAM, etc.)

Module	Resource	Link
I	NPTEL – Introduction to Internet of Things (IIT Kharagpur)	https://nptel.ac.in/courses/106105166
I	NPTEL – Cloud Computing (IIT Kharagpur)	https://nptel.ac.in/courses/106105143

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

I	IoT Virtual Lab – Experiments (MQTT, I2C, Cloud, Dashboard)	https://iotvirtuallab.github.io/vlab/Experiments/index.html
I	Random Nerd Tutorials – ESP32/ESP8266 Projects & Protocols	https://randomnerdtutorials.com
II	NPTEL – Modelling and Simulation of Dynamic Systems (IIT Bombay)	https://nptel.ac.in/courses/112101010
II	MathWorks MATLAB/Simulink Onramp (Free Official Training)	https://matlabacademy.mathworks.com/details/simulink-onramp/simulink
II	MathWorks Simscape Physical Modelling Series	https://www.mathworks.com/videos/series/simscape-multi-body-fundamentals.html
II	MATLAB Classification Learner App – Official Tutorial	https://www.mathworks.com/help/stats/classificationlearner-app.html

SEMESTER 3

PYTHON AND STATISTICAL MODELING LAB

Course Code	D25PSP310	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	0:0:3:0	ESE Marks	60
Credits	2	Exam Hours	3 Hrs.
Prerequisites (if any)	None	Course Type	Lab

Course Objectives:

1. The course aims to familiarize students with basic Python concepts and data structures, model graphical representation of data, measures of central tendency and measures of dispersion. The course will also introduce students to use python in solving problems based on statistical distributions, regression analysis and correlation tests

Expt. No.	Experiments
1.	Write a program to find the largest of three numbers. (removed)
	Load a CSV file using Pandas and find outliers or the maximum value in a feature column. (newly added)
2.	Write a program to print the multiplication table of a number n. (removed) Generate Normal probability distributions using NumPy/SciPy loops. (newly added)
3.	Write a program to find Surface area and volume of a cylinder using function.
4.	Write a program to replace a word by another word in a sentence.
5.	Write a program to confirm the validity of an email id by verifying its format.
6.	Write a program to remove every occurrence of a number from a list.
7.	Write a program to add two matrices. (removed)

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

	Perform matrix multiplication, inversion, and transpose operations using NumPy (newly added)																		
8.	Write a program to read a tuple of numbers and print even tuple and odd tuple.																		
9.	Create a dictionary with a set of book title and corresponding stock. Write a program to update the stock and to add or delete books.																		
10.	A set of numbers are stored in a file. Write a program to print the prime numbers among them.																		
11.	Write a program to count the number of words, sentences, upper case letters, lowercase letters and special symbols in a text stored in file.																		
12.	Plot a graph $y = f(x)$																		
13.	The areas of the various continents of the world (in millions of square miles) are as follows: 11.7 for Africa; 10.4 for Asia; 1.9 for Europe; 9.4 for North America; 3.3 Oceania; 6.9 South America; 7.9 Soviet Union. Draw a bar chart representing the given data.																		
14.	Draw the histogram of the following data: <table><tr><td>Height of student(m)</td><td>135 - 140</td><td>140 - 145</td><td>145-150</td><td>150-155</td></tr><tr><td>No.of students</td><td>4</td><td>12</td><td>16</td><td>8</td></tr></table>	Height of student(m)	135 - 140	140 - 145	145-150	150-155	No.of students	4	12	16	8								
Height of student(m)	135 - 140	140 - 145	145-150	150-155															
No.of students	4	12	16	8															
15.	Table contains population and murder rates (in units of murders per 100,000 people per year) for different states. Compute the mean, median and variance for the population. <table><tr><td>State</td><td>Population</td><td>Murder</td></tr><tr><td>Alabama</td><td>4,779,736</td><td>5.7</td></tr><tr><td>Alaska</td><td>710231</td><td>5.6</td></tr><tr><td>Arizona</td><td>6,392,017</td><td>4.7</td></tr><tr><td>Arkansas</td><td>2,915,918</td><td>5.6</td></tr><tr><td>California</td><td>37,253,956</td><td>4.4</td></tr></table>	State	Population	Murder	Alabama	4,779,736	5.7	Alaska	710231	5.6	Arizona	6,392,017	4.7	Arkansas	2,915,918	5.6	California	37,253,956	4.4
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	<table><tr><td>Colorado</td><td>5,029,196</td><td>2.8</td></tr><tr><td>Connecticut</td><td>3,574,097</td><td>2.4</td></tr><tr><td>Delaware</td><td>89,924</td><td>5.8</td></tr></table>	Colorado	5,029,196	2.8	Connecticut	3,574,097	2.4	Delaware	89,924	5.8															
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16.	Calculate the S.D. and coefficient of variation (C.V.) for the following table: <table><tr><td>Class:0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td><td>60-70</td><td>70-80</td></tr><tr><td>Frequency:5</td><td>10</td><td>20</td><td>40</td><td>30</td><td>20</td><td>10</td><td>5</td></tr></table>	Class:0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	Frequency:5	10	20	40	30	20	10	5								
Class:0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80																		
Frequency:5	10	20	40	30	20	10	5																		
17.	If X is binomially distributed with 6 trials and a probability of success equal to 0.25 at each attempt, what is the probability of: a) exactly 4 successes b) at least one success																								
18.	If the random variable X follows a Poisson distribution with mean 3.4, find $P(X=6)$.																								
19.	A random sample of 395 people were surveyed and each person was asked to report the highest education level they obtained. The data that resulted from the survey is summarized in the following table. Are gender and education level dependent at 5% level of significance? <table><tr><td></td><td>High School</td><td>Bachelors</td><td>Masters</td><td>Ph.D</td><td>Total</td></tr><tr><td>Female</td><td>60</td><td>54</td><td>46</td><td>41</td><td>201</td></tr><tr><td>Male</td><td>40</td><td>44</td><td>53</td><td>57</td><td>194</td></tr><tr><td>Total</td><td>100</td><td>98</td><td>99</td><td>98</td><td>395</td></tr></table>		High School	Bachelors	Masters	Ph.D	Total	Female	60	54	46	41	201	Male	40	44	53	57	194	Total	100	98	99	98	395
	High School	Bachelors	Masters	Ph.D	Total																				
Female	60	54	46	41	201																				
Male	40	44	53	57	194																				
Total	100	98	99	98	395																				
20.	Calculate the correlation coefficient of the two variables shown in the table below <table><tr><td>Pers on</td><td>Hand</td><td>Heig ht</td></tr><tr><td>A</td><td>17</td><td>150</td></tr><tr><td>B</td><td>15</td><td>154</td></tr></table>	Pers on	Hand	Heig ht	A	17	150	B	15	154															
Pers on	Hand	Heig ht																							
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	<table><tr><td>C</td><td>19</td><td>169</td></tr><tr><td>D</td><td>17</td><td>172</td></tr><tr><td>E</td><td>21</td><td>175</td></tr></table>	C	19	169	D	17	172	E	21	175							
C	19	169															
D	17	172															
E	21	175															
21.	Suppose a sample of 16 light trucks is randomly selected off the assembly line. The trucks are driven 1000 miles and the fuel mileage (MPG) of each truck is recorded. It is found that the mean MPG is 22 with a SD equal to 3. The previous model of the light truck got 20 MPG. Conduct a t- test of the null hypothesis at $p = 0.05$.																
22.	The mean productivity rating for all employees at a company was 3.8 on a five- point scale last year. This year you get ratings from a representative sample of fifteen employees from the Human Research Management. Do the data from this sample provide evidence that employee productivity in the department of Human Resource Management is significantly higher than in the company as a whole? Write the null and alternative hypotheses for this problem. Use statistical analysis software to test the null hypothesis stated above																
23.	Obtain the regression equation for predicting systolic blood pressure from job statistical analysis software. If one knows that a subject in the future has a score on job satisfaction of 15, what is their systolic blood pressure predicted to be? What is the standard error of estimate? <table><tr><td>Job Satisfaction</td><td>Systolic BP</td></tr><tr><td>34</td><td>124</td></tr><tr><td>23</td><td>128</td></tr><tr><td>19</td><td>157</td></tr><tr><td>43</td><td>133</td></tr><tr><td>56</td><td>116</td></tr><tr><td>47</td><td>125</td></tr><tr><td>32</td><td>147</td></tr></table>	Job Satisfaction	Systolic BP	34	124	23	128	19	157	43	133	56	116	47	125	32	147
Job Satisfaction	Systolic BP																
34	124																
23	128																
19	157																
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47	125																
32	147																

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

	<table border="1"> <tr> <td>16</td><td>167</td></tr> <tr> <td>55</td><td>110</td></tr> <tr> <td>25</td><td>156</td></tr> </table>	16	167	55	110	25	156
16	167						
55	110						
25	156						
24.	Load a standard dataset and perform the following exploratory data visualizations using Matplotlib and Seaborn: 1. Plot a Histogram with a Kernel Density Estimate (KDE) curve to analyse the distribution and skewness of a continuous feature. 2. Create a Box Plot to compare a continuous variable across different categorical groups and explicitly identify any statistical outliers. 3. Generate a Violin Plot for the same variables used in the box plot. (newly added)						

Course Assessment Method (CIE:40 Marks, ESE:60 Marks)

Continuous Internal Evaluation Marks (CIE):

Preparation/Pre-Lab Work experiments, Viva and Timely completion of Lab Reports / Record (Continuous Assessment)	Internal Examination	Total
20	20	40

End Semester Examination Marks (ESE):

Procedure/ Preparatory work/Design/ Algorithm	Conduct of experiment/ Execution of work/ troubleshooting/ Programming	Result with valid inference/ Quality of Output	Viva voce	Recor d	Total
10	20	10	10	10	60

Course Outcomes (COs)

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

Course Outcome		Bloom's Knowledge Level (KL)
CO 1	Apply programming concepts such as iteration, functions, strings, lists, tuples, dictionaries, and file operations to solve computational problems.	K3
CO 2	Construct graphical representations of data and compute measures of central tendency and dispersion for effective data analysis.	K3
CO 3	Solve statistical problems using Binomial distribution, Poisson distribution, sampling techniques, and regression analysis	K3
CO 4	Apply correlation tests and utilize statistical analysis software to interpret, analyze, and draw conclusions from datasets.	K3

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO- PO Mapping (Mapping of Course Outcomes with Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	2		2						1
CO2	2	2	2		3						1
CO3	2	3		2	2						1
CO4	2	3		3	3						1

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year

1	Probability and Statistics for Engineering and the Sciences	Jay L Devore	Cengage Learning India	9/e, 2020
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Continuous Assessment (20 Marks)

1. Preparation and Pre-Lab Work (5 Marks)

- Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.
- Understanding of Theory: Evaluation based on students' preparation and understanding of the theoretical background related to the experiments.

2. Conduct of Experiments (5 Marks)

- Procedure and Execution: Adherence to correct procedures, accurate execution of experiments, and following safety protocols.
- Skill Proficiency: Proficiency in handling equipment, accuracy in observations, and troubleshooting skills during the experiments.
- Teamwork: Collaboration and participation in group experiments.

2. Lab Reports and Record Keeping (5 Marks)

- Quality of Reports: Clarity, completeness and accuracy of lab reports. Proper documentation of experiments, data analysis and conclusions.
- Timely Submission: Adhering to deadlines for submitting lab reports/rough record and maintaining a well-organized fair record.

4. Viva Voce (5 Marks)

- Oral Examination: Ability to explain the experiment, results and underlying principles during a viva voce session.

Final Marks Averaging: The final marks for preparation, conduct of experiments, viva, and record are the average of all the specified experiments in the syllabus.

Evaluation Pattern for End Semester Examination (60 Marks)

1. Procedure/Preliminary Work/Design/Algorithm (10 Marks)

- Procedure Understanding and Description: Clarity in explaining the procedure and understanding each step involved.

- Preliminary Work and Planning: Thoroughness in planning and organizing materials/equipment.
- Algorithm Development: Correctness and efficiency of the algorithm related to the experiment.
- Creativity and logic in algorithm or experimental design.

2. Conduct of Experiment/Execution of Work/Programming (20 Marks)

- Setup and Execution: Proper setup and accurate execution of the experiment or programming task.

2. Result with Valid Inference/Quality of Output (10 Marks)

- Accuracy of Results: Precision and correctness of the obtained results.
- Analysis and Interpretation: Validity of inferences drawn from the experiment or quality of program output.

4. Viva Voce (10 Marks)

- Ability to explain the experiment, procedure results and answer related questions
- Proficiency in answering questions related to theoretical and practical aspects of the subject.

5. Record (10 Marks)

- Completeness, clarity, and accuracy of the lab record submitted

SEMESTER S3

UNIVERSAL HUMAN VALUES AND PROFESSIONAL ETHICS

Course Code	A25UHE311	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	2:0:1:0	ESE Marks	60
Credits	Pass/Fail	Exam Hours	2.5
Prerequisites (if any)		Course Type	Theory

Course Objectives

1. Enable students to critically examine their aspirations, beliefs, and life choices.
2. Develop harmony in self, relationships, and society through value-based understanding.
3. Strengthen ethical reasoning in academic, digital, and professional contexts.
4. Prepare students to act responsibly as engineers and citizens

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	MODULE 1: Self, Identity, and Human Aspirations (UHV – I) Universal Human Values: relevance in contemporary technical education, Self-exploration as inquiry: understanding beliefs, assumptions, and choices, Identity vs achievement: beyond grades, roles, and social validation, Happiness, success, and	4

**CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME**

	well-being: modern contradictions, Inner coherence: alignment of thought, emotion, and action.	
2	MODULE 2: Relationships, Society, and Responsibility (UHV – II) Human relationships: trust, respect, empathy, and care, Communication, conflict, and emotional intelligence, Power, boundaries, and gender sensitivity, Social responsibility and ethical citizenship, Harmony with nature and sustainable living (introductory perspective).	4
3	MODULE 3: Ethics in Academic and Digital Life (Professional Ethics I) Professional ethics: meaning, scope, and relevance, Ethics, morals, values, and law-distinctions, Academic integrity: plagiarism, collaboration, and fairness, Ethical challenges in the digital age (AI use, data, authorship), Intent vs impact in ethical decision-making.	4
4	MODULE 4: Ethics, Technology, and the Engineering Profession (Professional Ethics – II) Engineer's responsibility to society, safety, and environment, Workplace ethics: teamwork, inclusivity, respect, accountability, Ethics in emerging technologies and sustainability, Ethical leadership and professional courage, Long-term consequences of ethical and unethical decisions.	3

Universal Human Values (UHV) – Practical / Lab (7 Hours)

Professional Ethics(PE) – Practical / Lab (8 Hours)

Total Practical Hours

15 Hours

**CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME**

Lab– UHV 1	Title: Who Am I Becoming?	Guided self-exploration and value clarification exercises. Reflection on identity beyond grades, roles, and external validation. Digital life audit: ambition, comparison, and well-being. Reflective writing (300–400 words): “The person I am becoming and the life I want to lead.”	(3 Hours)
Lab– UHV 2	Title: Relationships, Boundaries, and Social Responsibility	Activities: Case discussions on trust, respect, empathy, and care. Role-play on communication, disagreement, consent, and boundary-setting. Reflection on gender sensitivity and power dynamics. Journal entry: One relationship or social situation I want to handle differently.	(4 Hours)
Lab– PE 1	Title: Ethical Grey Zones in Academic and Digital Life	1. Analysis of ethical dilemmas faced by students 2. Application of structured ethical decision-making models 3. Debate and discussion on ethical use of AI, data, and authorship 4. Short reflective response on personal ethical standpoint	(4 Hours)
Lab– PE 2	Title: If You Were the Decision-Maker	Activities: Mini-project on a real-world ethical issue in engineering or technology. Group presentation / poster / creative format. Peer questioning and ethical justification of decision	(4 Hours)

Final reflection: My non-negotiable values as a future professional.

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcomes	Bloom’s level	SDG
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CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

CO1	Explain the concepts of self-exploration, identity, human aspirations, happiness, and well-being in the context of personal and professional life.	K2	SDG 3 – Good Health and Well-being SDG 16 – Peace, Justice and Strong Institutions
CO2	Analyze the role of trust, respect, empathy, social responsibility, and sustainable living in fostering harmonious relationships and society.	K4	
CO3	Apply ethical principles and academic integrity practices to address ethical challenges in academic and digital environments.	K3	
CO4	Examine the ethical responsibilities of engineers towards society, safety, environment, and sustainable technological development.	K4	
CO5	Evaluate ethical dilemmas and formulate responsible decisions demonstrating professional integrity, leadership, and commitment to societal welfare.	K5	

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	2	2	-	-	-	3
CO2	-	1	-	-	-	3	3	2	2	-	2
CO3	-	2	-	-	1	1	3	1	2	-	2
CO4	-	2	1	-	-	3	3	2	1	1	2
CO5	-	2	2	-	-	3	3	2	3	1	3

Text Books

**CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME**

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Universal Human Values: Foundation, Theory and Practice	R.R. Gaur, R.P. Narang, G.S. Sangal	Excel Books	
2	Human Values and Professional ethics	R. Subramanian	Oxford University Press	
3	Engineering Ethics	Harris Jr., Pritchard, Rabins Cengage		
4	Ethics in Engineering Practice and Research	Caroline Whitbeck	Cambridge University Press	

Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Human Values: Lectures and Reflections	A.N. Tripathi	New Age International Publishers,	Latest Edition
2	Ethics in Engineering Practice and Research	Caroline Whitbeck	Cambridge University Press	
3	Ethics & Values for Engineers	B. Dakshina Murthy & A. Rangarajan	PHI Learning,	

Course Assessment Method (CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE)

CHRIST COLLEGE OF ENGINEERING (AUTONOMOUS) – CSE(DS)
S3 CURRICULUM AND SYLLABUS – 2025 SCHEME

Continuous Assessment (Lab)	Internal Examination -1 (Written)	Internal Examination-2 (Written)	Internal Examination-3 (Written)	Lab Examination	Total
10	30	30	30	10	40
	A total of 90 marks will be converted to 20				

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered, and in Part B, each student can choose any one full question out of two full questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks (8x3 =24marks)	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 subdivisions. (4x9 = 36 marks)	60