

FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

SCHEME OF INSTRUCTION & SYLLABI

Programme:-Computer Science & Engineering (Data Science)

Semester-III (w.e.f. A.Y.2025-26)

								EXAM SCHEME					
Sr. No.	Course Category	Course Code	Course Title	L	Т	Р	Course Credits	ISE	MSE	ESE	INT	OE/ POE	TOTAL
1	PCC	CSDS24-211	Discrete Mathematical Structure(DMS)	3	-	-	3	20	30	50	-	-	100
2	PCC	CSDS24-212	Controller & Processor	3	-	2	4	20	30	50	25	-	125
3	PCC	CSDS24-213	Programming Lab-II(Java)	2	-	2	3	-	-	-	50	50	100
4	CEP	CSDS24-214	Prototype Development	-	-	4	2	-	-	-	50	25	75
5	MDM-1	CSDS24- 215MDM1	Fundamentals of Data Science	2	-	-	2	20	-	30	-	-	50
6	VEC	CSDS24-216	Environmental Studies(ES)	2	-	-	2	-	-	50	-	-	50
7	OEC-1 (ODL Only)	CSDS24217-OE1	Data Science for Engineering	3	1	-	4	20	30	50	25	-	125
8	HSSM	CSDS24-218	Economics and Management for IT	2	-	-	2	-	-	50	-	-	50
	Non Credit mandatory Course												
9	MC	CSDS24-219	Finishing School Training I	I	1	2*	NC	-	-	-	50		Grade
10	CCA	CSDS24-2120	Liberal Learning	3*	-	-	NC	-	-	-	50		Grade
Total			17	01	08	22	80	90	280	150	75	675	

Course Scheme Abbreviations: -1. L-Lecture2.T-Tutorial 3.P-Practical 4.MSE-Mid Semester Examination 5.ISE- In Semester Evaluation 6. ESE-End SemesterExamination7. INT-Internal Assessment based on Laboratory Work/Practical Work/Tutorial/ Mini-Project.

Course category: -BSC- Basic Sciences, ESC- Engineering Sciences, VSEC- Vocational Skill

Enhancement Course, AEC- Ability Enhancement Course, CCA-Co-Curricular Activity, PCC-

Program Core Course, MC-Mandatory Course, NC - Non Credit



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

ester:- III
lits : 3
Marks: 50 marks

Prior Knowledge of:	Basic Knowledge of Mathematics
---------------------	--------------------------------

Course Objectives:

1	Apply basic concepts of set theory, logic, proof techniques, graphs and trees.
2	Analyze the basic concepts of relations and functions.
3	Learn the concepts of algebraic system & groups.

Curriculum Details

Course Contents	Duration
Unit I Mathematical Logic	
Introduction, statements and notations, connectives, Statement formulas and truth	
tables, well-formed	8 Hrs
Formulas, Tautologies, Equivalence of formulas, Duality law, Tautological	01115
implications, other connectives, Normal Forms, Theory of Inference for statement	
calculus – validity-using truth table, rules of inference.	
Unit-II Set Theory & Binary Relations	
Basic concepts of set theory, types of operations on sets, ordered pairs, Cartesian	
Product, relation, properties	7 Hrs
of binary relations, matrix and graph representation, partition and covering of set,	7 1113
equivalence relation, composition, POSET and Hasse diagram, Function – types,	
composition of functions.	
Unit-III Algebraic Structures	
Algebraic Systems, Semigroups and Monoids, Homomorphism, Groups: Definition and	8 Hrs
examples, subgroupsand homomorphism.	
Unit-IV Lattices & Boolean Algebra	
Lattice as POSETs, definition, examples and properties, Lattice as algebraic systems,	6 Hrs
Special lattices, Boolean algebra definition and examples, Boolean functions,	0 1115
representation and minimization of Boolean functions.	
Unit-V Graph Theory	
Basic concepts of graph theory, Complete, Regular and Bipartite Graphs, Graph	8 Hrs
Coloring, Storage representation and manipulation of Graphs, PERT and related	0 1115
techniques.	
Unit VI Permutation & Combination	
Basics of Counting, Counting Principle, Rule of Sum & Product, Pigeonhole Principle,	8 Hrs
Permutations and Combinations, Inclusion-Exclusion Principle, Discrete Probability	0 111 5
Theory.	



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT, (An Autonomous Institute)

EMENT,

Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Outcomes (COs): After successful completion of the course, students will be able to:

Statements
Solve the problems based on binary relations & logical reasoning.
Describe the different terminologies in algebraic structures
Evaluate the problems based on Boolean functions.
Solve different graph problems like PERT graph, tree traversal, counting principle, permutation & combinations.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
2	3	3	2	-	-	-	-	-	-	-	-	-	-	2	2
3	2	2	-	-	-	-	-	-	-	-	-	-	-	2	2
4	3	3	2	-	-	-	-	-	-	-	-	-	-	2	2

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Discrete Mathematical Structures with Application to Computer Science		J. P. Tremblay & R. Manohar	MGH International	
2	Elements of Discrete Mathematics		C. L. Liu and D. P. Mohapatra	Tata McGraw- Hill	

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Discrete Mathematics and its		Kenneth H.	AT&T Bell	
	Applications		Rosen	Labs	
			Semyour	MGH,	
2	Discrete Mathematics		Lipschutz,	Schaum's	
			MarcLipson	outlines	



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Controller & Processor	
Course Code:- CSDS24-212	Semester:- III
Teaching Scheme L-T-P : 3-0-2	Credits : 4
Evaluation Scheme: ISE-I (10 Marks), MSE (30 Marks), ISE-II (10 Marks),INT(25 Marks)	ESE Marks: 50 marks

Prior Knowledge of:

Fundamental of Electronics and Basic Computer

Course Objectives:

1	To learn the Architecture of Microprocessor and Microcontrollers.
2	To learn different microcontroller development platforms.
3	To understand memory and instruction execution process.
4	To interface different peripherals to Microcontrollers.

Curriculum Details

Course Contents	Duration
Unit-I Microprocessor:	
Architecture of 8085, Addressing modes, memory interfacing, Instruction set of 8085,	7 Hrs
Interrupts in 8085.	
Unit-II Microcontroller:	
Introduction to 8051 microcontroller, block diagram of microcontroller, comparison of	
microprocessor and microcontroller, Arduino Uno: A Microcontroller-Introduction,	8 Hrs
software, hardware, features of Microcontroller, Different types of microcontrollers,	
concept of interfacing	
Unit-III Microcontroller based development boards:	6 Hrs
Study of Raspberry Pi, Arduino platforms	0 III 5
Unit-IV Programming Microcontrollers:	
Learning Arduino code basics: Arduino C- Arduino Program Structure, variables,	8 Hrs
Using Mathematical Operators, using Arduino String Functionality, Repeating a	0 1115
Sequence of Statements,	
Unit-V Interfacing:	
Interfacing digital inputs and outputs, Flashing LED Lights with Raspberry Pi and	0.11
Arduino, Connecting and Using LED, interfacing 7 segment display, Interfacing	8 Hrs
keypad, Measuring Distance using IR sensor, Detecting Light using LDR	
Unit-VI Interrupt, Timer and Communication:	
Arduino interrupts – interrupt example, Internal Timer of Arduino, Detecting Light,	
ADC interfacing Measuring Temperature, Arduino – Communication, Serial	8 Hrs
Communications-Introduction, Types of Serial Communications, Sending and	
Receiving Serial Data from/to Arduino.	



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

NGINEERING& FACULTYOFMANAGEMENT, (An Autonomous Institute)



Department of CSE(Data Science) Engineering S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
1	Describe the Architecture of 8085 microprocessors and microcontroller
2	Implement simple interfacing experiments on Arduino
3	Understand ADC and interfacing mechanism
4	Develop simple applications using microcontrollers

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 1
1	2	2	1	-	-	-	-	-	-	-	-	-	-	-	1
2	2	3	3	1	-	-	-	-	-	-	-	-	-	1	2
3	2	1	2	-	-	-	-	-	-	-	-	-	-	1	2
4	2	2	1	1	-	-	-	-	-	-	-	-	-	1	2

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	The INTEL Microprocessors ; Architecture, Programming and Interfacing	8 TH	Barry B Brey	The INTEL Microprocessors	
2	Microprocessors and Microcontrollers-		N. Senthi Kumar, M, Saravanam And S Jeevananthan	Oxford University Press	

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Microprocessor Architecture ,Programming and Application with 8085		Ramesg Gaonkar		



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Programming Lab – I(JAVA)						
Course Code:- CSDS24-213	Semester:- III					
Teaching Scheme L-T-P : 2-0-2	Credits : 3					
Evaluation Scheme: INT- (50Marks), POE (50 Marks)	ESE Marks:					

Prior Knowledge of:	Object Oriented Programming using C++ Lab (OOP Concepts)Basic Networking Concepts, Basic Database Concepts
---------------------	---

Course Objectives:

1	To explain fundamental and object oriented concepts of Java.
2	To distinguish OOP concepts implementation in Java compared to C++.
3	To expose students to advanced features in Java.
4	To develop GUI applications using Java such as chatting server, student management
	system etc.

Curriculum Details

Course Contents	Duration
Unit1:Fundamental Programming in Java: The Java Buzzwords, The Java Programming Environment-JVM, JIT Compiler, Byte Code Concept, Hot Spot, A Simple Java Program, Source File Declaration Rules, Comments, Data	
Types, Variables, Operators, Strings, Input and Output, Control Flow, Big Numbers, Arrays, Jagged Array. Objects and Classes: Object- Oriented Programming Concepts, Declaring Classes, Declaring Member Variables, Defining Methods, Constructor, Passing Information to a Method or a Constructor, Creating and using objects, Controlling Access to Class Members, Static Fields and Methods, this keyword, Object Cloning, Class Design Hints.	08 Hrs
Unit 2: Interface, Inheritance and Packaging : Interfaces: Defining an Interface,	
Implementing an Interface, Using an Interface as a Type, Evolving Interfaces, Default Methods. Inheritance: Definition, Super classes and Subclasses, Overriding and Hiding Methods, Polymorphism, Inheritance Hierarchies, Super keyword, Final Classes and Final Methods, Abstract Classes and Abstract Methods, casting, Design Hints for Inheritance, Nested classes & Inner Classes, finalization and garbage collection. Packages: Class importing, Creating a Package, Naming a Package, Using Package Members, Managing Source and Class Files. Developing and deploying (executable) Jar File.	07 Hrs
Unit 3:Exception and I/O Streams: Exception: Definition, Dealing with Errors, The Classification of Exceptions, Declaring Checked Exceptions, Throw an Exception, Creating Exception Classes, Catching Exceptions, Catching Multiple Exceptions, Re-throwing and Chaining Exceptions, finally clause, Advantages of Exceptions, Tips for Using Exceptions. I/O Streams: Byte Stream – InputStream, OutputStream, DataInputStream, DataOutputStream, FileInputStream, FileOutputStream, CharacterStreams, BufferedStream, Scanner, File, RandomAccesFile.	08 Hrs
Unit 4: Graphical User Interfaces using Swing: Introduction to the Swing, Swing features, Swing Top Level Containers-Creating a Frame, Positioning a Frame, Displaying Information in a Panel, The JComponent Class. Layout Management: Introduction to Layout Management, APIs for Border Layout, Flow Layout, Grid Layout Event Handling: Basics of Event Handling, The AWT Event Hierarchy, Semantic and Low-Level Events in the AWT, Low-Level Event Types User Interface Components: Text Input, Choice Components, Menus, DialogBoxes Setting the Look and Feel of UI	07Hrs



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT, (An Autonomous Institute)

(3.25 CGPA) HARC CYCLE 7:

Department of CSE(Data Science) Engineering S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
1	Use knowledge of fundamental and OOP concepts for programming.
2	Apply knowledge of advanced features in Java.
3	Apply knowledge of various concepts of computer science and design solutions for different subjects like threading, networking, and database.
4	Develop simple applications. Example: Developing application to maintain student's basic profile.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	2	3	2	2	-	-	I	-	-	-	-	2	-	-	1
2	2	3	3	3	-	-	-	-	-	-	-	1	-	1	2
3	2	3	3	3	-	-	-	-	-	-	-	2	1	1	2
4	3	3	3	2	-	-	-	-	-	-	-	2	1	1	2

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Core Java- Volume I		Cay Horstmann	Pearson	
1	Fundamentals		and Gary Cornell	i carson	
2	Core Java- Volume II Advanced	Oth adition	Cay Horstmann	Deemoon	
	Features	stil edition	and Gary Cornell	Pearson	

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	The Java Tutorial: A Short Course on the Basics	6th Edition	Raymond Gallardo, Scott Hommel, Sowmya Kannan	Addison- Wesley Professiona 1	
2	JAVA-The Complete Reference	9 th Edition	Herbert Schildt	OraclePress, McgrawHill	
3	A Programmer's guide to JAVA SCJP Certification	3 rd Edition	Khaleed Mughal and Rolf W. Rasmussen	Addison Wesley	

Useful Link /Web Resources:

- 1. The Java Tutorials From ORACLE Java Documentation
- 2. URL:<u>http://docs.oracle.com/javase/tutorial/(</u>Refer For All Units)



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(An Autonomous Institute)



Department of CSE(Data Science) Engineering S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

List of Experiments-

Exp. No	Title of Experiments	Duration
01	Develop a Java Program to implement class and create its objects.	2 Hrs
02	Create Separate Engine, Tyre and Door Class. Create a Car class as parent class of these classes. And show functionality of each component in the car.	2 Hrs
03	Developing Java program with interface inheritance.	2 Hrs
04	Develop a mathematical package for Statistical operations like Mean, Median, Average, Standard deviation. Create a sub package in the math package-convert. In "convert" package provide classes to convert decimal to octal, binary, hex and vice-versa. Develop application program to use this package, and build executable iar file of it.	2 Hrs
05	Develop a class Expr to create and evaluate given expression. Constructor accepts the expression as String. For example, $Expr("x^2")$ or Expr("sin(x)+3*x"). If the parameter in the constructor call does not represent a legal expression, then the constructor throws an IllegalArgumentException. The message in the exception describes the error. Provide eval(double num) and eval(int num) method to evaluate given expression and return evaluated answer. For example, if Expr represents the expression $3*x+1$, then func. value(5) is $3*5+1$, or 16. Finally, get Definition() returns the definition of the expression. This is just the string that was used in the constructor that created the expression object.	2 Hrs
06	Write a class to represent Roman numerals. The class should have two constructors. One constructs a Roman numeral from a string such as "XVII" or "MCMXCV". It should throw a NumberFormatException if the string is not a legal Roman numeral. The other constructor constructs a Roman numeral from an int. It should throw a NumberFormatException if the int is outside the range 1 to 3999. In addition, the class should have two instance methods. The method to String() returns the string that represents the Roman numeral. The method toInt() returns the value of the Roman numeral as an int.	2 Hrs
07	Take file name as input to your program, If file exists then open and display contents of the file. After displaying contents of file ask user – do you want to add the data at the end of file. If a user gives yes as response, then accept data from user and append it to file. If file does not exist then create a fresh new file and store user data in to it. User should type exit on new line to stop the program.	2 Hrs
08	Take Student information such as name, age, weight, height, city, phone from user and store it in the file using DataOutputStream and FileOutputStream and Retrieve data using DataInputStream and FileInputStream and display the result.	2 Hrs
09	Develop a Swing GUI based standard calculator program.	2 Hrs
10	Write a program that bounces a blue ball inside a JPanel. The ball should begin moving with a mouse Pressed event. When the ball hits the edge of the JPanel, it should bounce off the edge and continue in the opposite direction.	2 Hrs



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(An Autonomous Institute) Department of CSE(Data Science) Engineering



S.Y. B. Tech. Curriculum (Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Exp. No	Title of Experiments	Duration
	The ball should be updated using a Runnable.	
11	Write a Swing GUI based network server program. The program is a simple file server that makes a collection of files available for transmission to clients. When the server starts up, it needs to know the name of the directory that contains the collection of files. Specify this directory name through JFileChooserDialog. You can assume that the directory contains only regular files (that is, it does not contain any sub-directories). When a client connects to the server, the server first reads a one-line command from the client. The command can be the string "index". In this case, the server responds by sending a list of names of all the files that are available on the server. Or the command can be of the form "get ", where is a file name. The server checks whether the requested file actually exists. If so, it first sends the word "ok" as a message to the client. Then it sends the contents of the file and closes the connection.	2 Hrs
12	Write a GUI based program to create a student registration and Login. Store Registration data in Database and take Login information from Database.	2 Hrs



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Prototype Development	
Course Code:- CSDS24-214	Semester:- III
Teaching Scheme L-T-P : 0-4-0	Credits : 2
Evaluation Scheme: INT- (50Marks)	POE: Marks: 25 marks

Prior Knowledge of: Software Engineering Concepts, Object Oriented Concepts

Course Objectives:

1	To expose the students to use engineering approach to solve domain specific real time problem.
2	To use the appropriate and newer technologies while developing the project.
3	To learn the skills of team building and team work.

Curriculum Details

Course Contents

The Project should be undertaken preferably by a group of 3-4 students who will jointly work and implement the project. The group will select a project with the approval from the domain expert panel and submit the name of the project with a synopsis. The Project should consist of defining the problem and analysing it, designing the solution and implementing it using a suitable programming language. A presentation and demonstration based on the above work is to be given by the group for ISE. The work will be jointly assessed twice in a semester by an internal domain expert panel. A hard copy of project report of the work done is to be submitted along with the softcopy of the project during ESE. Project topics may be selected from following domains:

- 1) Real world applications in Data Analytics
- 2) Probability and Statistics
- 3) Data Pre-processing
- 4) Web Page design
- 5) Web Scrapping
- 6) Healthcare Analytics
- 7) Analytics using modern tools & techniques.

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
1	Identify specific problem statement from a selected domain.
2	Analyze the problem and prepare SRS and design document.
3	Write code and carry out testing.
4	Write a report covering details of the project and give presentation on a project.



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(3.25 CGPA) NAAC CYCLE 71

(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum (Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	2	3	1	1	1	-	-	1	2	3	3	2	2	2	2
2	2	3	2	2	1	1	-	1	2	3	3	2	2	2	2
3	2	3	2	2	1	1	-	1	2	3	3	2	2	2	2
4	2	3	2	2	1	1	-	1	2	3	3	2	2	2	2

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Fundamentals of Data Science	
Course Code:- CSDS24-215MDM1	Semester:- III
Teaching Scheme L-T-P : 2-0-0	Credits : 3
Evaluation Scheme: ISE1- (10Marks), ISE2- (10Marks), INT (30Marks)	ESE Marks:

Prior Knowledge of: - Ma

- Mathematics, MS-Excel

Course Objectives:

1	To provide the students with the basic knowledge of Data Science and its processes.
2	To make the students to visualize the data using Data visualization tools.
3	To make the students to understand different statistical methods for data analysis.

Curriculum Details

Course Contents	Duration
Unit-I Data Science and its scope	
What is Data Science, A Brief History, Difference between Data Science and Data	8Hrs
Analytics, Knowledge and Skills for Data Science Professionals, Some Technologies	01115
used in Data Science, Benefits and uses of Data Science, Facets of Data.	
Unit-II Data Science Process	
Overview, Defining research goals and creating a project charter, Retrieving data,	7Hrs
Cleansing, integrating, and transforming data, Exploratory data analysis, Build the	/1115
models, Presenting findings and building applications on top of them.	
Unit-III Data Visualization	
Introduction to data visualization, Visual encoding, Data visualization software, Data	
visualization libraries, Basic data visualization tools, Specialized data visualization tools,	7 Hrs
Advanced data visualization tools, Visualization of geospatial data, Data visualization	
types	
Unit-IV Statistical Data Analysis	
Role of statistics in data science, Kinds of statistics - Descriptive statistics, Inferential	8 Hrs
statistics, Probability theory - Random variables, Independence, Sample space, Odds and	0 1115
risks, Expected values, Standard errors, Bayesian probability, Probability distribution	

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
1	Summarize the basic concepts in data science.
2	Identify the data science process for the problem solving.
3	Choose the appropriate data visualization technique for the given problem.
4	Use different statistical methods for data analysis.



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum (Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

				11	0							0			,
POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
3	3	2	2	-	-	2	-	-	-	-	-	-	-	-	2
4	3	2	2	1	-	-	-	-	-	-	-	-	-	2	2

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Introducing Data Science		Davy Cielen, Arno D. B. Meysman, Mohamed Ali,	Manning Publications. [Unit 1 & 2]	
2	Data Science Fundamentals and Practical Approaches,		DR. Gypsi Nandi, DR. Rupam Kumar Sharma.	BPB Publications, India	

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Essentials of Data Science and		DR. Amar	O'REILLY	
	Analytics		Sahay	Publication	
2	Fundamentals of Data Science	4th Edition	Sanjeev Wagh, Manisha Bhende & Anuradha Thakare	Springer Publication	

Useful Link /Web Resources:

1. https://onlinecourses.nptel.ac.in/noc21_cs23/preview



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Environmental Studies					
Course Code:- CSDS24-216	Semester:- III				
Teaching Scheme L-T-P : 2-0-0	Credits : 2				
Evaluation Scheme	ESE Marks: 50 marks				

Prior Knowledge of:	- Understa
---------------------	------------

Inderstanding of Environmental Education course

Course Objectives:

1.	Understand the scope and importance of Environmental Studies and sustainable development.
2.	Understand connection between environmental health and developmental activities.
3	Understand the importance of Environmental Management for its protection through technical and legislative point of view.
4.	Acquire problem solving skills through visits to different locations, identifying the Environmental problems and proposing solution for societal benefits.

Curriculum Details

Course Contents	Duration
UNIT I: Our Environment Introduction to Environment, Scope of Environmental studies, importance of environmental awareness. Concept of sustainability, Sustainable Development- history and Goals, environmental ethics, Sustainability ethics. Population growth of world and reduced health content of the environment.	04Hrs
UNIT II: Development and Environmental Health Natural resources - Types (renewable and non-renewable), developmental benefits, Forest- Benefits, problems (Deforestation), Biodiversity - importance, threats, conservation, Ecosystems- importance, problem associated with major ecosystems, ecological restoration, Air- Benefits, problems (Pollution, climate change), Water- Benefits, problems (Depletion, pollution). Soil/ Land- Benefits, problems (Degradation, loss of fertility, desertification), Mineral- Benefits, problems (Mining, over exploitation, depletion, pollution), Energy resources- Benefits, problems (depletion, energy crisis) Urbanization and Environmental health - Urban problems, Solid waste- Effects of MSW, Plastic waste, Hazardous waste, E- waste	10 Hrs
UNIT III Environmental Management Renewable energy technologies - current, new (Bio gas, Bio fuel, hydrogen, etc.), Pollution abetment – 5R, ZLD, carbon credit, bio remedies, Soil/ land reclamation, Sustainable agriculture, Concept of EIA, Environmental audit, ISO certification (ISO 14001), Role of CPCB and MPCB in Environmental protection of India. Emerging technologies for environmental management- GIS, Remote sensing, Smart bin, IoT integration, Waste-to-Energy Technologies, Recycling Automation, Advanced Data Analytics, Circular Economy Practices, Sustainable Packaging Solutions, Community Engagement and Education, Decentralized Waste Treatment, Zero-Waste Initiatives, Legislative and Regulatory Changes. Environmental legislation - Environmental Protection Act, Air Act, Water Act, Solid waste Management Act, Hazardous waste Management Rule, E- Waste (Management) Rules, 2022	10 Hrs



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute)

Department of CSE(Data Science) Engineering S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course ContentsDurationUNIT IV: Field Project Work
Case studies based on site visit (Each candidate has to go for field visit and complete a
project work on Environmental issues and probable solutions)06 Hrs

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
1	Summarize natural resources, importance of ecosystem and conservation of
1	biodiversity with respect to multiple disciplines
2	Explain causes, effects, solutions for various pollution problems and its minimization
2	strategies.
2	Interpret environmental ethics and their implementation for betterment of environment
3	and human life.
4	Outline the requirements of laws and regulations for environmental conservation and
	applicability of legislations in society and industries.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO 2
1	2	-	-	-	-	-	1	3	2	-	-	-	-	-
2	2	-	-	-	-	-	1	3	1	-	-	-	-	-
3	2	-	-	-	-	-	1	3	1	-	-	-	-	-
4	2	-	-	-	-	-	2	3	1	-	-	-	-	-

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Handbook of Environmental		Dr. G. R.	Satyam Publishers	
1	Studies		Parihar	and Distributors	
2				New Age	
	Environmental Studies,		Anubha Kaushik	International Private	
				Limited	

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Environmental Science		Miller T.G. Jr	Wadsworth Publications Co.(TB).	
2	Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. I and II		Trivedi R.K	Environmental Media (R)	



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Data Science for Everyone	
Course Code:- CSDS24-215MDM1	Semester:- III
Teaching Scheme L-T-P : 3-0-1	Credits : 4
Evaluation Scheme: ISE1- (10Marks), MSE (30Marks) ISE2- (10Marks),INT (25 Marks)	ESE Marks:50

Prior Knowledge of: -

- Mathematics, MS-Excel

Course Objectives:

1	To provide strong foundation for data science and application area related to it. ϖ To
2	understand the underlying core concepts and emerging technologies in data science.

Curriculum Details

Course Contents	Duration
Unit-I Introduction to Data Science	
Overview of Data Science- Definition and significance, Applications in various	
industries, The Data Science Process, Steps in a data science project: data collection,	8 Hrs
cleaning, analysis, and interpretation, Tools and Technologies- Introduction to tools like	
Python, R, Jupyter Notebook.	
Unit-II Data Collection and Data Wrangling	
Types of Data- Structured vs. unstructured data, Databases and data sources, Data	7 Hrs
Collection Methods, APIs, web scraping, databases, Data Cleaning, Handling missing	7 1115
values, Data formatting and transformation.	
Unit-III Exploratory Data Analysis (EDA)	
Descriptive Statistics- Mean, median, mode, variance, standard deviation, Data	6 Hrs
Visualization, Introduction to Matplotlib, Seaborn, and Plotly, creating basic plots:	0 1115
histograms, bar charts, scatter plots, Identifying Patterns and Outliers.	
Unit-IV Introduction to Probability and Statistics	
Basic Probability Concepts- Probability distributions (normal, binomial, etc.), Statistical	8 Hrs
Inference- Hypothesis testing, Confidence intervals.	
Unit-V Introduction to Machine Learning	
Supervised vs. Unsupervised Learning, Basic Algorithms- Linear Regression,	8 Hrs
Classification (e.g., Decision Trees, k-NN), Clustering (e.g., K-means).	
Unit-VI	
Tableau, Microsoft Power Bl	
Case Studies:	7 Hrs
1) Dd	
2)	



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(An Autonomous Institute) Department of CSE(Data Science) Engineering S.Y. B. Tech. Curriculum



(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
1	Understand the fundamental principles of data science and introduction to modern
	tools used in the era of data science
2	Describe the basic data manipulation and analysis techniques
2	Explain the importance of data science tools and programming languages & use of
3	probability and statistics in the field of data science.
4	Understand basic machine learning algorithms and its use in real-world problem
	solving

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	2	3	-	-	-	1	-	-	-	-	-	-	-	-	-
2	2	2	-	-	-	1	-	-	-	-	-	-	-	-	2
3	2	3	1	-	-	2	-	-	-	-	-	-	-	2	2
4	2	2	-	1	-	-	-	-	-	-	-	-	-	2	2

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Doing Data Science,	1st Edition	Cathy O'Neil and Rachel Schutt	O'Reilly Media	
2	Data Science from Scratch: First Principles with Python	1st Edition	Joel Grus	O'Reilly Media	2015

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Doing Data Science, Straight Talk		Cathy O'Neil,	O'Reilly Media	2013
	from the Frontline		Rachel Schutt	,	
2	Pattern Recognition and Machine	4th	Christopher M.	Springer	
2	Learning	Edition	Bishop	Publication	

Useful Link /Web Resources:

- 1) https://www.youtube.com/watch?v=XohgKT13FKY&list=PLqICp9VkFcbEWeZ0Q 6gsHCRaqe5eyf
- 2) https://www.youtube.com/watch?v=fn1rKKNLuzk&list=PL15FRvx6P0OWTINBS_93NHG2hIn9cy

Tutorials:

At list 6 tutorials should be conducted.



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Economics and Management for IT						
Course Code:- CSDS24-218	Semester:- III					
Teaching Scheme L-T-P : 2-0-0	Credits : 3					
Evaluation Scheme:	ESE Marks: 50 marks					

Prior Knowledge of: - Basics knowledge of Computer

Course Objectives:

1	To get the overview of system development management life cycle.
2	To understand scope and objective of management information system.
3	To enhance management decision making.
4	To make the engineering students aware about different corporate case studies.

Curriculum Details

Course Contents	Duration
Unit-I Management Information System Conceptual foundations of information systems; Information theory; Information resource management; Types of information systems; Systems development - Overview of systems and design; System development management life-cycle, designing for online and distributed environments; Implementation and control of project.	8 Hrs
Unit-II Scope and Objectives of MIS MIS meaning and role, MIS concepts, Management science structure, Information flow in management, MIS for management support, Planning with MIS, control with MIS. Problem solving & decision making, Development of MIS, strategic & project planning for MIS.	8 Hrs
Unit-III Enhancing Management Decision Making Decision support systems (DSS) – understanding DSS, characteristics components, major DSS applications. Group decision support systems (GDSS), - elements, characteristics, how GDSS can enhance group decision - making? Executive support systems (ESS) – role of ESS in the organization, developing ESS, benefits of ESS.	8 Hrs
Unit-IV Case Studies Web Publishing: types of websites, Web surfing, E- commerce, B2B, B2C, C2C, E-commerce security issues, Ethical issues.	6 Hrs



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(An Autonomous Institute)



Department of CSE(Data Science) Engineering S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
1	Comprehend systematic methodologies of SDLC (Software Development Life Cycle)
2	Prepare SRS document for a project
3	Apply software design and development techniques
4	Understand testing methods at each phase of SDLC

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	2	2				-	-	-	-	-	-	2	1		
2	2	2				-	-	-	-	-	-	2	1	-	-
3	2	2				-	-	-	-	-	-	2	1	2	-
4	2	2				-	-	-	-	-	-	1	1	2	2

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Management of Information systems		Gordon B. Davis & Margreth H. Olson	Pearson Edition.	

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	MIS Concepts & Design, Robert C.		Ugrasen Suman	Cenage	
	Murdik, PHI 2nd Edition		Ograsen Suman	Learning	
2	Engineering Economics,	Edition	Behforooz &	Outond Indian	
	R.Paneerselvam, PHI publication	1st	Hudson	Oxford: Indian	
3	Madara Francesia Theory		Dr. K. K. Dewett	Dr. K. K. Dewett	
	Modern Economic Theory		& M. H. Navalur	& M. H. Navalur	

Useful Link /Web Resources:

- 1. https://onlinecourses.swayam2.ac.in/cec21_ge05/preview
- 2. https://www.coursera.org/courses?query=management%20information%20systems



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Liberal Learning						
Course Code:- CSDS24-220	Semester:- III					
Teaching Scheme L-T-P : 1-3-0	Credits : NC					
Evaluation Scheme: INT- (50Marks),	ESE Marks:					

List of Clubs Available at Department:

1. Data Analytics Club:

Aim: The primary aim of a Data Analytics Club is to create a collaborative and dynamic environment where students can enhance their knowledge, skills, and practical experience in data analytics. This involves fostering a community that promotes learning, innovation, and professional growth in the field of data analytics. The club seeks to bridge the gap between academic knowledge and real-world application, preparing members for successful careers in data analytics by providing resources, networking opportunities, and hands-on experiences. Objectives: • Skill Development: • Technical Skills: Provide training and workshops on data analytics tools and technologies such as Python, R, SQL, Tableau, Power BI, and machine learning.

• Soft Skills: Enhance communication, teamwork, problem-solving, and project management skills through collaborative projects and presentations.

- Knowledge Expansion:
 - Guest Lectures: Invite industry professionals to speak about current trends, best practices, and real-world applications of data analytics.
 - Industry Trends: Keep members informed about the latest developments in data analytics, including new tools, techniques, and methodologies.

• Hands-on Experience:

- Projects: Offer opportunities to work on real-world data projects, either individually or in teams, to apply theoretical knowledge in practical scenarios.
- Competitions: Organize and participate in data analytics competitions and hackathons to foster a competitive and innovative spirit.
- Networking:
- Industry Connections: Facilitate connections with professionals and alumni working in the field of data analytics.
- Peer Networking: Create a community where students can collaborate, share knowledge, and support each other's learning journeys.

Career Preparation:

- Internship Opportunities: Provide information about internships and job openings in the field of data analytics.
- Resume Building: Offer workshops on resume writing, LinkedIn profile optimization, and interview preparation specific to data analytics roles.
- Research & Innovation:
 - Research Projects: Encourage and support members in conducting research projects and publishing their findings in academic or industry journals.
 - Innovation: Foster a culture of innovation by encouraging members to explore new ideas and approaches in data analytics. Outcomes:
 - Enhanced Skill Set: Members will develop a strong foundation in data analytics tools and techniques, making them more competitive in the job market.
 - Practical Experience: Participation in real-world projects and competitions will provide practical experience, helping members to apply theoretical knowledge in practical scenarios.



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(An Autonomous Institute) Department of CSE(Data Science) Engineering



S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

	List of Clubs Available at Department:
Outcomes:	 Processional chown, Networking opportunities with industry professionals and alumni will help members build valuable connections and gain insights into the industry. Career Readiness: Members will be better prepared for careers in data analytics through exposure to job opportunities, resume workshops, and interview preparation sessions. Research Contributions: Members will have opportunities to contribute to the field through research projects and publications. Community Building: The club will create a supportive community where students can share knowledge, collaborate on projects, and help each other grow. Innovation and Creativity: Members will be encouraged to think creatively and innovate, leading to new ideas and approaches in data analytics. Increased Confidence: Through presentations, workshops, and networking events, members will gain confidence in their abilities to communicate and apply data analytics concepts. Enhanced Skill Set: Members will develop a strong foundation in data analytics tools and techniques, making them more competitive in the job market. Practical Experience: Participation in real-world projects and competitions will provide practical experience, helping members to apply theoretical knowledge in practical scenarios. Professional Growth: Networking opportunities with industry professionals and alumni will help members build valuable connections and gain insights into the industry. Career Readiness: Members will be better prepared for careers in data analytics through exposure to job opportunities, resume workshops, and interview preparation sessions. Research Contributions: Members will have opportunities to contribute to the field through nesearch projects and publications. Community Building: The club will create a supportive community where students can share knowledge, collaborate on projects, and help each other grow. Innovation and Creativity: Members will be
Aim: The passionate and contr knowledg mind set r in technol Objective	e primary aim of an Open Source Student Club is to foster a community of students who are e about open source software and collaboration. The club seeks to promote the use, development, ribution to open source projects, encouraging members to learn, innovate, and share their e with the wider community. By doing so, the club aims to empower students with the skills and needed to contribute meaningfully to the open source ecosystem and to prepare them for careers ogy and software development. s:
• Educa • Project 1	 tion & Skill Development: Technical Workshops: Provide training on various open source technologies, programming languages, and development tools. Best Practices: Teach best practices for contributing to open source projects, including version control, code reviews, and collaboration techniques. Involvement:
	• Contributions: Encourage and guide members to contribute to existing open source projects.



D.Y.PATIL TECHNICALCAMPUS

FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(An Autonomous Institute)



Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum (Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

List of Clubs Available at Department:
• Initiate Projects: Support members in starting and maintaining their own open source projects.
• Community Engagement:
• Collaboration: Foster a collaborative environment where members can work together on projects and share knowledge. Outreach: Engage with the wider open source community through events, meetups, and online platforms.
• Networking:
 Industry Connections: Facilitate connections with professionals, open source contributors, and organizations in the open source community. Peer Networking: Create opportunities for members to network with each other and build lasting professional relationships.
• Career Preparation:
• Internship and Job Opportunities: Provide information about internships, job openings, and career paths in open source development. Professional Development: Offer workshops on resume building, portfolio creation, and interview preparation specific to open source careers.
Outcomes:
 Enhanced Technical Skills: Members will develop proficiency in open source tools and technologies, improving their coding and development skills. Practical Experience: Participation in real-world open source projects will provide handson experience and a deeper understanding of software development. Community Contribution: Members will make meaningful contributions to open source projects, helping to advance the open source ecosystem. Professional Growth: Networking opportunities with industry professionals and active contributors will help members build valuable connections and gain insights into the industry. Career Readiness: Members will be better prepared for careers in open source development through exposure to job opportunities, portfolio building, and interview preparation sessions. Innovation & Creativity: Members will be encouraged to innovate and explore new ideas, leading to the development of new open source projects and solutions. Increased Confidence: Through workshops, presentations, and collaboration, members will gain confidence in their abilities to contribute to open source projects and communities. Community Building: The club will create a supportive and collaborative community where students can share knowledge, work on projects together, and help each other grow.
Evaluation: Evaluation of individual student will be carried out based on following criteria - 1. Knowledge & Understanding 2. Critical Thinking 3. Communication Skills 4. Ethical Reasoning 5. Cultural Awareness and Diversity 6. Interdisciplinary Connections 7. Creativity and Innovation 8. Collaboration and Teamwork



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(3.25 CGPA) PLAAC CYCLE 7:

(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

SCHEME OF INSTRUCTION & SYLLABI

Programme: -Computer Science & Engineering (Data Science)

Semester-IV (w.e.f.A.Y.2025-26)

Sr.	Course	Course	Course Title	т	т	D	Course			EXAM	SCHEM	ſE	
No.	Category	Code	Course Thie	L	1	Р	Credits	ISE	MSE	ESE	INT	OE/POE	TOTAL
1	PCC	CSDS24- 221	Software Engineering(SE)	3	-	-	3	20	30	50	-	-	100
2	PCC	CSDS24- 222	Design & Analysis of Algorithm(DAA)	3	-	-	3	20	30	50	-	-	100
3	PCC	CSDS24- 223	Operating System(OS)	3	-	2	4	20	30	50	25	25	150
4	MDM-2	CSDS24- 224MDM 2	Data Analytics-I	2	I	I	2	20	-	-	30	-	50
5	OEC-II	CSDS24- 225OE2	Data Base Engineering(DBE)	2	-	-	2	-	-	50	-	-	50
6	AEC	CSCSDS2 4-226	Programming in Python	1	-	2	2	-	-	-	25	25	50
7	VSEC	CSDS24- 227	Web Application Development – I	1	I	2	2	20	30	-	I	-	50
8	VEC	CSDS24- 228	Human Values and Ethics	2	-	-	2	20	30	-	-	-	50
9	HSSM	CSDS24- 229	Programming Ethics	2	I	I	2	-	-	50	I	-	50
	-	-	Non	Cree	lit N	lanc	latory C	Course					
14	MC	CSDS242 -1210	Finishing School Training I	3	-	2	NC	-	-	-	50	-	Grade
15	CCA	CSDS242 -211	Liberal Learning	1	3	-	NC	-	-	-	50	-	Grade
Total						06	22	120	150	250	80	50	650
16	HC/DM	CSDS24- 22HC1/ CSDS24- 22DM1	Honors Paper- II (ODL)/ DM Paper- II (ODL)	3	-	2	4	20	30	50	25	-	125
	Total						4	20	30	50	25	-	125

Course Scheme Abbreviations: - 1.L-Lecture2.T-Tutorial 3.P-Practical 4.MSE-Mid Semester Examination 5.ISE- In Semester Evaluation 6. ESE-End SemesterExamination7. INT-Internal Assessment based on Laboratory Work/Practical Work/Tutorial/Mini-Project.

Course category: -BSC- Basic Sciences, ESC- Engineering Sciences, VSEC- Vocational Skill Enhancement Course, AEC- Ability Enhancement Course, CCA-Co-Curricular Activity, PCC-Program Core Course, MC-Mandatory Course, NC – Non Credit



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Software Engineering						
Course Code:- CSDS24-221	Semester:- III					
Teaching Scheme L-T-P : 3-0-0	Credits : 3					
Evaluation Scheme: ISE- (10Marks), MSE (30 Marks), ISE-II (10 Marks)	ESE Marks: 50 marks					

Prior Knowledge of: Management, MIS

Course Objectives:

1	To expose the students to basic concepts & principles of software engineering.
2	To make the student aware of the importance of SDLC in their project development work.
3	To expose the students to software testing techniques and software quality management.

Curriculum Details

Course Contents	Duration
Unit-I The Software Problem	
Cost, Schedule & Quality, Scale and Change, Software Processes: Process &	8 Hrs
Project, Component Software Processes, Software Development process Models,	01115
Project Management Process.	
Unit-II Software Requirements Analysis & specification	
Value of Good SRS, Requirement Process, Requirements Specification, Other	7 Hrs
Approaches for Analysis, Validation	
Unit-III Software Planning & Scheduling	
Responsibilities of Software Project Man agent, Project Planning, Project	8 Hrs
Scheduling, Project Staffing, People CMM, Risk Management	
Unit-IV Design	
Design Concepts, Function Oriented Design, Object Oriented Design, Detail Design,	6 Hrs
Verification, Metrics	
Unit-V Coding & Testing	
Coding & Code Review, Testing, Unit Testing, Black Box Testing, White Box	8 Hrs
Testing, Program Analysis Tools, Integration Testing, System Testing	
Unit-VI Software Reliability & Quality Management	
Reliability, Software Quality, Software Quality Management System, ISO 9000, SEI	0.11
capability Maturity Model, Six Sigma, Agile Software Development & Extreme	8 Hrs
Programming, Agile Project Management	

Course Outcomes (COs): After successful completion of the course, students will be able to:

СО	Statements
1	Comprehend systematic methodologies of SDLC (Software Development Life Cycle)
2	Prepare SRS document for a project
3	Apply software design and development techniques
4	Understand testing methods at each phase of SDLC



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	2	3	2	2	-	-	-	-	-	-	-	-	-	-	1
2	2	-	3	2	-	-	-	-	-	-	-	-	3	-	1
3	3	-	2	3	3	-	-	-	-	-	-	-	-	-	1
4	3	-	3	3	3	-	-	-	-	-	-	2	-	1	1

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Software Engineering: A precise Approach (Unit 1,2,4)		Pankaj Jalote	- (Wiley India)	
2	Fundamentals of Software Engineering – (Unit 5, 6).	3rd Edition	Rajib Mall	Dreamtech Press(PHI)	
3	Software Engineering(Unit 6, 7 & 6.8).	9th Edition	Jan Sommerville	Pearson	
4	Software Engineering Principles & Practices by ITLESL () (Unit 3).	2nd Edition	Rohit Khurana	Vikas Publishing House Pvt. Ltd.	

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Software Engineering - Concepts & Practices		Ugrasen Suman	Cenage Learning	
2	Software Engineering Fundamentals	Edition 1st	Behforooz & Hudson	Oxford: Indian	

Useful Link /Web Resources:

- 1. DELNET- http://www.delnet.in
- 2. NDL-http://ndl.iitkgp.ac.in
- 3. https://nptel.ac.in/courses/106/105/106105082/



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Design and Analysis of Algorithm						
Course Code:- CSDS24-222 Semester:- IV						
Teaching Scheme L-T-P : 3-0-0	Credits : 3					
Evaluation Scheme: ISE- (10Marks), MSE (30 Marks), ISE-II (10 Marks)	ESE Marks: 50 marks					

Drian Unavelador of	Data Structures, Discrete Mathematics, Engineering Mathematics,
Thor Knowledge of.	Programming Concepts.

Course Objectives:

1	To introduce algorithm design methods / techniques with analysis.
2	To devise algorithm for given problem statement.
3	To introduce complex computational problems.
4	Introducing parallel algorithms.

Curriculum Details

Course Contents	Duration
Unit-I Divide and Conquer:	
What is algorithm, Algorithm Specification, Recurrence relations, Performance	
Analysis, Randomized Algorithms. Divide and Conquer: The general method,	10 Hrs
Binary search, Finding the maximum and minimum, Merge sort, Quick sort, DC	
Selection Algorithm, analysis of Divide and Conquer algorithms.	
Unit-II The Greedy Method:	
The general method, Knapsack problem, Job sequencing with deadlines, minimum-	7 Ura
cost spanning trees – Prim's and Kruskal's Algorithms, Optimal storage on tapes,	/ 1115
Optimal merge Patterns, Single source shortest paths.	
Unit-III Dynamic Programming:	
The general method, Multistage graphs, All pair shortest paths, 0/1 knapsack,	7 Hrs
Reliability design, Traveling Sales person problem.	
Unit- Basic Traversal and Search Techniques and Backtracking:	
Techniques for Binary Trees, Game Tree; Techniques for Graphs – Breadth First	
Search & Traversal, Depth First Search & Traversal, AND/OR graphs; Connected	12 Hrs
components and Spanning Trees; Bi-connected components and depth first search.	12 1115
Backtracking - The general method, 8-queen problem, sum of subsets, Knapsack	
Problem, Hamiltonian Cycle, and Graph Coloring.	
Unit-V NP Hard and NP Complete Problems:	4 IIma
Basic Concepts, Introduction to NP Hard Graph Problems.	4 ПГS
Unit-VI Introduction to Parallel Algorithm:	
Computational Model and Fundamental Techniques and Algorithms – PRAM,	5 Hrs
MESH and HYPERCUBE.	



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(An Autonomous Institute)

Department of CSE(Data Science) Engineering



S.Y. B. Tech. Curriculum (Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
1	Understand and demonstrate algorithm design methods with analysis
2	Devise algorithm for given problem statement and analyze its space and time
2	complexity by using recurrence relation
3	Categorize the problem to determine polynomial and non-polynomial based on its
5	nature
4	Understand and demonstrate basic concepts of parallel algorithms

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

				11								U		(,
POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
1	2	2	2	3	1									-	-
2	2	2	2	3	2								1	1	-
3	3	2	2	3	2								1	1	1
4	3	2	2	3	2								2	1	1

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
			Ellis Horowitz,		
1	Fundamentals of Computer		Satraj Sahani,	Pearson	
1	Algorithms		Saguthevar	Education	
			Rajasejaran		

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Fundamentals of Algorithmics		Gilles Brassard,	Cenage	
1	Fundamentals of Algorithmics		Paul Bratley	Learning	
	Computer Algorithms Introduction		Sara Baase,	Boarson	
2	to Design and Analysis		Allen Van	Education	
	to Design and Analysis		Gelder	Euucation	

Useful Link /Web Resources:

1. http://personal.kent.edu/~rmuhamma/Algorithms/algorithm.html

2. https://www.ics.uci.edu/~goodrich/teach/cs260P/notes/



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute)

Department of CSE(Data Science) Engineering S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Operating System	
Course Code:- CSDS24-223	Semester:- IV
Teaching Scheme L-T-P : 3-0-2	Credits : 4
Evaluation Scheme: ISE-I (10 Marks), MSE (30 Marks), ISE-II (10 Marks)	ESE Marks: 50 marks

Prior Knowledge of:	Microprocessor and Microcontrollers
---------------------	-------------------------------------

Course Objectives:

1	To make the students understand basic concepts of operating system
2	To expose the students to various functions of the Operating system and their usage
3	To give hands on exposure to Linux commands and system calls

Curriculum Details

Course Contents	Duration
Unit-I Overview of OS Abstract view of an operating system, Fundamental principles of OS operations, OS interaction with the computer and user programs, Efficiency ,system performance and user service, Batch Processing System, Multiprogramming System, The Time Sharing System, The Real Time Operating System, Distributed operating system, Operation of OS, Operating system with monolithic structure, Virtual machine operating system, Kernel based operating system, Microkernel based operating system	8 Hrs
Unit-II Processes, Threads and Synchronization Processes and programs, Implementing processes, Threads, Process synchronization, Race condition, Critical Section, Synchronization approaches, Classic process synchronization problems, Semaphores, Monitors	8 Hrs
Unit-III Process Scheduling: Scheduling terminology and concepts, Non preemptive scheduling policies, Preemptive scheduling policies, Long, Medium and short term scheduling	7 Hrs
Unit-IV Deadlock What is deadlock, Deadlock in resource allocation, Handling Deadlocks : Deadlock Detection and Resolution, Deadlock prevention, Deadlock avoidance	6 Hrs
Unit-V Memory Management: Managing the memory hierarchy, Static and Dynamic Memory Allocation, Heap Management, Contiguous Memory Allocation and Non Contiguous Allocation, Segmentation and Segmentation with paging, Virtual memory basics, Demand paging, Page replacement policies	8 Hrs
Unit-v rite systems and 1/O systems:	ð Hrs



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



Duration

(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Contents

Overview of file processing, Files and file operations, Fundamental file organizations and access methods, Layers of the Input Output control system, Overview of I/O system.

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
1	Understand operating systems functions
2	Write simple systems calls using fork()
3	Remember Concept of dead locks
4	Understand memory & file management concepts

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

PQs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
2	2	3	3	1	-	3	-	-	-	-	-	-	-	-	1
3	2	1	2	-	-	2	-	-	-	-	-	-	-	1	1
4	2	2	1	1	-	2	-	-	-	-	-	-	-	1	1

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Operating Systems -A Concept Based approach	3rd	Dhananjay M Dhamdhere	TMGH	
2	Operating System Concepts		Abraham Silberschatz	Wiley	

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Unix Concepts and Applications		Sumitabha Das	TMGH	
2	Operating System: Concepts and Design		Milan Milenkovic	TMGH	



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute)

Department of CSE(Data Science) Engineering S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

List of Experiments-

Exp. No	Title of Experiments	Duration
01	Installation of Windows operating System and Linux operating System	2 Hrs
02	Execute general purpose utilities in Linux.	2 Hrs
03	Execute process, file & directory related commands in Linux.	2 Hrs
04	To study of various UNIX editors such as vi, ed, ex and EMACS.	2 Hrs
05	Write C programs to simulate Producer – Consumer Problem.	2 Hrs
06	Write C programs to simulate CPU scheduling algorithms: FCFS, SJF, and Round Robin.	2 Hrs
07	Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.	2 Hrs
08	Write a C program to simulate page replacement algorithms.	2 Hrs
09	Write a C program to simulate the following memory allocation techniques a) Worst-fit b) Best-fit c) First-fit	2 Hrs
10	Write a C program to simulate the following file organization techniques a) Single level directory b) Two level directory c) Hierarchical	2 Hrs



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Data Analytics-I	
Course Code:- CSDS24-224MDM2	Semester:- IV
Teaching Scheme L-T-P : 2-0-0	Credits : 2
Evaluation Scheme: ISE-I (10 Marks), MSE (30 Marks), ISE-II (10 Marks)	ESE Marks:

Prior Knowledge of:	Probability Theory, Statistics
---------------------	--------------------------------

Course Objectives:

1	To understand classification algorithms to classify multivariate data.
2	To understand machine learning algorithms & concepts

Curriculum Details

Course Contents	Duration
Unit I Introduction to Machine Learning	
History and Evolution, Artificial Intelligence Evolution, Different Forms, Machine	6 Hrs
Learning Categories, Frameworks for Building Machine Learning Systems, Machine	0 111 5
Learning Python Packages, Data Analysis Packages, Machine Learning Core Libraries.	
Unit-II Fundamentals of Machine Learning	
Machine Learning Perspective of Data, Scales of Measurement, Feature Engineering,	6 Hrs
Exploratory Data Analysis (EDA), Supervised Learning–Regression	
Unit-III Supervised Learning	
Regression: Correlation and Causation, Fitting a Slope, How Good Is Your Model?,	
Polynomial Regression, Multivariate Regression, Multicollinearity and Variation	
Inflation Factor (VIF), Interpreting the OLS Regression Results, Regression Diagnosis,	
Regularization, Nonlinear Regression.	6 Hrs
Classification: Logistic Regression, Evaluating a Classification Model Performance,	
ROC Curve, Fitting Line, Stochastic Gradient Descent, Regularization, Multiclass	
Logistic Regression, Generalized Linear Models, Decision Trees, Support Vector	
Machine (SVM), k Nearest Neighbors (kNN), Time-Series Forecasting.	
Unit-IV Unsupervised Learning	
Unsupervised Learning Process Flow – Clustering, K-means, Finding Value of k,	6 Hrs
Hierarchical Clustering, Principal Component Analysis (PCA)	

~		
	CO	Statements
	1	Describe the different machine learning terminologies.
	2	Explain the different linear regression concepts.
	3	Explain the different logistic regression concepts.
	4	Describe different supervised and unsupervised algorithms.

Course Outcomes (COs): After successful completion of the course, students will be able to:



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum (Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
1	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
3	2	2	2	-	-	-	-	-	-	-	-	-	-	1	1
4	2	2	2	-	-	-	-	-	-	-	-	-	-	1	1

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Yea r
1	Mastering Machine Learning with Python in Six Steps		Manohar Swamynathan	Apress Publication	

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Machine Learning Tom M.		Tom M.	McGraw Hill	
1	Mitchell	Mitchell	Education.		
2	Machine Learning		Anuradha Srinivasara ghavan, and Vincy Joseph	MGH, Schaum's outlines	
3	Introduction to Machine	Second	Ethem	Prentice Hall	
3	Learning,	Edition	Alpaydin	of India	



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Introduction to Data Engineering	
Course Code:- CSDS24-225OE2	Semester:- IV
Teaching Scheme L-T-P : 2-0-0	Credits : 2
Evaluation Scheme:	ESE Marks: 50

Prior Knowledge of: Fundamental of Data Science

Course Objectives:

1	To make students to learn the basic principles, foundation and building blocks of Data Engineering.
2	To understand the data engineering lifecycle and ETL model.
3	To understand the need of basic architecture in data engineering.

Curriculum Details

Course Contents	Duration
Unit I Foundation and Building Blocks of Data Engineering	
What is Data Engineering - Data Engineering Defined, Data Engineering Lifecycle,	
Evolution of the Data Engineer, Data Engineering and Data Science. Data Engineering	
Skills and Activities - Data Maturity and the Data Engineer, The Background and Skills	7 Hrs
of a Data Engineer, Business Responsibilities, Technical Responsibilities. Data	/ 1115
Engineers Inside an Organization - Internal-Facing Versus External-Facing Data	
Engineers, Data Engineers and Other Technical Roles, Data Engineers and Business	
Leadership	
Unit-II The Data Engineering Life Cycle	
What is data engineering life cycle - The data lifecycle vs the data engineering	
lifecycle, source systems, storage, ingestion, Batch vs streaming, push vs pull,	
Transformation, serving Data, Analytics, Machine Learning, Reverse ETL. Major	7 Hrs
undercurrents across the Data Engineering Lifecycle - Security, data Management,	
Data modelling and Design, Data Lineage, Data Integration and interoperability, Data	
Lifecycle management, DataOps	
Unit-III Designing good data architecture	
What is data architecture, enterprise architecture, Good data architecture, principles of	8 Hrs
good data architecture, Major architecture concepts, tight vs loose coupling, examples	01115
and types of Data architecture	
Unit-IV Choosing technologies across Data Engineering Lifecycle	
Team size and capabilities, Speed to market, Interoperability, Cost optimization and	
business value, Today versus the future: immutable versus transitory technologies,	8 Hrs
Location (cloud, on premises, hybrid cloud, multi cloud), Build versus buy, Monolith	0 111 5
versus modular, Serverless versus servers, Optimization, performance and the	
benchmark wars, The undercurrents of the data engineering lifecycle	



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(An Autonomous Institute)

Department of CSE(Data Science) Engineering



S.Y. B. Tech. Curriculum (Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
1	Describe the basic principles, foundation and building blocks of Data Engineering.
2	Define the data engineering lifecycle and ETL model.
3	Explain the need of basic architecture in data engineering.
4	Summarize the technologies used for implementation of data engineering lifecycle.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
2	3	2	1	-	-	-	-	-	-	-	-	-	1	-
2	2	2	1	-	-	-	-	-	-	-	-	-	1	-
2	2	2	1	-	-	-	-	-	-	-	-	-	1	-
2	1	1	1	-	-	-	-	-	-	-	-	-	1	_
	BTL 2 2 2 2 2	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	BTL 1 2 3 2 3 2 1 2 2 2 1 2 2 2 1 2 2 2 1 2 1 1 1	BTL 1 2 3 4 2 3 2 1 $ 2$ 2 2 1 $ 2$ 2 2 1 $ 2$ 2 2 1 $ 2$ 1 1 1 $ 2$ 1 1 1 $-$	BTL 1 2 3 4 5 2 3 2 1 $ 2$ 2 2 1 $ 2$ 2 2 1 $ 2$ 2 2 1 $ 2$ 1 1 1 $ 2$ 1 1 1 $ -$	BTL 1 2 3 4 5 6 2 3 2 1 - - - 2 2 2 1 - - - 2 2 2 1 - - - 2 2 2 1 - - - 2 1 1 1 - - -	BTL 1 2 3 4 5 6 7 2 3 2 1 $ 2$ 2 2 1 $ 2$ 2 2 1 $ 2$ 2 2 1 $ 2$ 2 2 1 $ 2$ 1 1 1 $ -$	BTL 1 2 3 4 5 6 7 8 2 3 2 1 - - - - - 2 2 2 1 - - - - - 2 2 2 1 - - - - - 2 2 2 1 - - - - 2 1 1 1 - - - - 2 1 1 1 - - - -	BTL 1 2 3 4 5 6 7 8 9 2 3 2 1 - - - - - - 2 2 2 1 - - - - - - 2 2 2 1 - - - - - 2 2 2 1 - - - - - 2 1 1 1 - - - - - 2 1 1 - - - - - -	BTL 1 2 3 4 5 6 7 8 9 10 2 3 2 1 - - - - - - 2 2 2 1 - - - - - - 2 2 2 1 - - - - - - 2 2 2 1 - - - - - - 2 1 1 - - - - - - 2 1 1 - - - - - -	BTL 1 2 3 4 5 6 7 8 9 10 11 2 3 2 1 - </td <td>BTL 1 2 3 4 5 6 7 8 9 10 11 12 2 3 2 1 -<</td> <td>BTL 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 2 1 - - - - - - 1 2 3 2 1 - - - - - - 1 2 2 2 1 - - - - - 1 2 2 2 1 - - - - - 1 2 2 2 1 - - - - - 1 2 2 2 1 - - - - - 1 2 1 1 1 - - - - - 1 1</td>	BTL 1 2 3 4 5 6 7 8 9 10 11 12 2 3 2 1 -<	BTL 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 2 1 - - - - - - 1 2 3 2 1 - - - - - - 1 2 2 2 1 - - - - - 1 2 2 2 1 - - - - - 1 2 2 2 1 - - - - - 1 2 2 2 1 - - - - - 1 2 1 1 1 - - - - - 1 1

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Yea r
1	Fundamentals of Data Engineering	6th Edition	Joe Reis &Matt Housley	O'REILLY.	

Reference Books:

Sr. No	Title	Author(s)	Publisher	Year	
1	Designing Data-Intensive Applications	5th Edition	Martin Kleppmann	O'REILLY.	1997
2	Data Engineering with Python	4th Edition,	Paul Crickard	Packt Publication	2020

Useful Links:

- 1. <u>https://www.javatpoint.com/machine-learning</u>
- 2. <u>https://onlinecourses.nptel.ac.in/noc23_cs18/preview</u>



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Python Programming								
Course Code:- CSDS24-227	Semester:- III							
Teaching Scheme L-T-P : 2-0-4	Credits : 4							
Evaluation Scheme: INT- (50Marks), POE (75 Marks)	ESE Marks:							

Prior Knowledge of:

_

Course Objectives:

1	To explain fundamental and object oriented concepts of Java.
2	To distinguish OOP concepts implementation in Java compared to C++.
3	To expose students to advanced features in Java.

Curriculum Details

Course Contents	Duration
 Unit-I Introduction to Python & Functions Why Python? - Essential Python libraries, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language. Control Flow Statements: if statement, if-else statement, ifelifelse, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement. Data Structures: List, Tuple, Set, Dictionary Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments 	8Hrs
Unit-II Object Oriented Programing & Files & Numpy & Scipy with pandas Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism. Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, NumPy & SciPy with Python, Pandas.	7Hrs

CO	Statements
1	Apply Python programming concepts to solve a variety of computational problems
2	Exhibit competence in implementing and manipulating fundamental data structures
2	such as lists, tuples, sets, dictionaries (
3	Design an application with user-defined modules and packages using OOP concept
4	Understand commonly used Python libraries and frameworks such as JSON, XML,
4	NumPy, pandas

Course Outcomes (COs): After successful completion of the course, students will be able to:



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(3.25 CGPA) NAAC CYCLE 7"

(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	3	3	2	2	-	-	-	-	-	-	-	-	-	-	-
2	3	3	3	2	-	-	-	-	-	-	-	-	-	1	1
3	3	3	2	3	3	-	-	-	-	-	-	2	2	1	1
4	3	3	3	3	3	-	-	-	-	-	-	2	2	1	1

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title Edition		Author(s)	Publisher	Year
1	Introduction to Programming using Python		Y. Daniel Liang	Pearson	2012
2	Fundamentals of Software Engineering – (Unit 5, 6).	3rd Edition	Rajib Mall	Dreamtech Press(PHI)	

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Core Python Programming		Wesley J. Chun	Prentice Hall	2006
2	Learning Python	4th Edition	Mark Lutz	O'Reilly	2009

Useful Link /Web Resources:

- 1) <u>https://www.w3schools.com/python/</u>
- 2) <u>https://www.programiz.com/python-programming</u>



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute)

Department of CSE(Data Science) Engineering S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

List of Experiments-

Exp. No	Title of Experiments					
01	Installation and Environment set up of Python & Programs on Data types	2 Hrs				
02	Programs on Standard I/O, Operators and Expressions	2 Hrs				
03	Programs on Functions	2 Hrs				
04	Programs on lists and Tuples	2 Hrs				
05	Programs on Dictionaries	2 Hrs				
06	Programs on Strings and string operations	2 Hrs				
07	Programs on Regular Expressions.	2 Hrs				
08	Programs on Inheritance and Polymorphism	2 Hrs				
09	Programs on Exception Handling	2 Hrs				
10	Demonstration of Numpy Package	2 Hrs				
11	Demonstration of Pandas Package	2 Hrs				
12	Programs on JSON and XML.	2 Hrs				



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Web Application Development - I	
Course Code:- CSDS24-227	Semester:- IV
Teaching Scheme L-T-P : 1-0-2	Credits : 2
Evaluation Scheme: ISE1	ESE Marks:

Prior Knowledge of:	Basic Knowledge of Computer
---------------------	-----------------------------

Course Objectives:

1	To expose students to emerging web technologies and related tools.
2	To introduce client-side technologies required for development of web applications

Curriculum Details

Course Contents	Duration
Unit I HTML & CSS	
HTML: HTML Structure, Block Elements, Inline Elements, Class and ID Attributes,	
HTML Whitespaces.	5 Hrs
CSS SELECTOR: Type, Class and ID Selector, Position and Group Selectors, Attribute	5 1115
Selectors, Pseudoelement Selectors, Pseudoclass Selectors.	
Box Model: Display, Box Model, Inline Box, Inline-Block Box.	
Unit-II Responsive Web Designing	
Responsive Web Designing: Introduction, Viewport, Grid View, Image, Video, Media	
Queries, RWD frameworks.	5 Hrs
Twitter Bootstrap : Grid Basics, Typography, Tables, Images, Alerts, Button, Button	0 1115
Group, Borders, Labels, Progress bar, Pagination, Tabs, Navbar, Forms, Inputs, Input	
sizing, Carousel, Scrollspy.	
Unit-III JavaScript	
Introduction, Data types and Variables, Operators, Expressions and Statements,	3 Hrs
Functions and Scope, Document Object Model, Event Handling, Form handling and	5 111 5
validations.	
Unit-IV jQuery	
Introducing jQuery, jQuery selector, Animation effects, Event handling, DOM, jQuery	3 Hrs
DOM traversing, DOM manipulation.	

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
1	Develop static web pages as per the requirement.
2	Create responsive web pages as per the requirement.
3	Write functionalities to make dynamic web pages



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum (Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

				-						,		0			. ,
POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	6	2	2	2	-	2	-	-	-	-	-	-	-	-	-
2	6	2	2	2	-	2	-	-	-	-	-	-	-	1	1
3	6	2	2	2	-	2	-	-	-	-	-	-	-	1	1
~					~				~			- ~			

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
			Michael		
	Pro HTMI 5 and CSS2 Design		Bowers,		
1	Pittorns		Dionysios	Apress edition.	
	Fatterns		Synodinos and		
			Victor Sumner		
C	Twitter Poetstren Development		David Cookran	Packt	
Z	I while Bootstrap Development		David Cociliali	Publication	
2	JavaScript: The Definitive		David	O'Dailly Madia	
3	Guide		Flanagan	O Kenny Media	
4	iQuary in Action		Poor Dibooult	Manning	
	JQuery III Action		Deal Dibeault	Publication	

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Beginning with HTML5 and CSS3 The Web Evolved		Murphy	Apress.	
2	JavaScript: The Complete Reference		Thomas A Powell, Fritz Schneider	Tata McGraw Hill	
3	Head First jQuery		Ryan Benedetti	O'reilly Publication	



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(An Autonomous Institute)



Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Expt.	Experiment	S/O	Uouro
No.	Experiment	3/0	Hours
1	Create Web Page structure using HTML5.	0	2
2	Create Web Pages with Class and ID attributes using HTML5.	0	2
3	Apply CSS to web pages created after developing the HTML5 pages.	0	2
4	Apply different CSS selectors to HTML5 web pages.	0	2
5	Create a responsive web page using media queries.	0	2
6	Create a responsive web page using bootstrap.	0	2
7	Write a JavaScript to compute mathematical operations on client side.	0	2
8	Write a JavaScript to handle event generated by client.	0	2
9	Write a JavaScript to perform form validation.	0	2
10	Write a jQuery script to provide animations effects in web pages.	0	2
11	Write a jQuery script to handle event generated by client.	0	2
12	Write a jQuery script to manipulate DOM	0	2



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Human Values & Ethics	
Course Code:- CSDS24-228	Semester:- IV
Teaching Scheme L-T-P : 2-0-0	Credits : 2
Evaluation Scheme: ISE-I (10 Marks) MSE (30 Marks) ISE-I(10 Marks)	ESE Marks:

Prior Knowledge of:

Course Objectives:

1	To create an awareness on Engineering Ethics and Human Values.
2	To understand social responsibility of an engineer
3	To appreciate ethical dilemma while discharging duties in professional life.

Curriculum Details

Course Contents	Duration
Unit I Introduction to Value Education Value Education - Definition, Concept and Need for Value Education. The Content and Process of Value Education - Basic Guidelines for Value Education, Self-exploration as a means of Value Education, Happiness and Prosperity as parts of Value Education.	6 Hrs
Unit-II Harmony in the Human Being Human Being is more than just the Body. Harmony of the Self ('I') with the Body. Understanding Myself as Co-existence of the Self and the Body. Understanding Needs of the Self and the needs of the Body.Understanding the activities in the Self and the activities in the Body.	6 Hrs
Unit-III Harmony in the Family, Society and in the Nature Family as a basic unit of Human Interaction and Values in Relationships. The Basics for Respect and today's Crisis: Affection, e, Guidance, Reverence, Glory, Gratitude and Love. Comprehensive Human Goal: The Five Dimensions of Human Endeavour. Harmony in Nature: The Four Orders in Nature. The Holistic Perception of Harmony in Existence.	6 Hrs
Unit-IV Social & Professional Ethics The Basics for Ethical Human Conduct. Defects in Ethical Human Conduct. Holistic Alternative and Universal Order. Universal Human Order and Ethical Conduct. Human Rights violation and Social Disparities. Value based Life and Profession. Professional Ethics and Right Understanding. Competence in Professional Ethics. Issues in Professional Ethics – The Current Scenario. Vision for Holistic Technologies, Production System and Management Models.	6 Hrs

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
1	Understand the significance of value inputs in a classroom and start applying them in their life and profession.



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(An Autonomous Institute) **Department of CSE(Data Science) Engineering** S.Y. B. Tech. Curriculum



(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

2	Distinguish between values and skills, happiness and accumulation of physical
2	facilities, the Self and
	the Body, Intention and Competence of an individual, etc
3	Understand the role of a human being in ensuring harmony in society and nature.
1	Distinguish between ethical and unethical practices, and start working out the
4	strategy to actualize a harmonious environment wherever they work.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	2	-	-	-	-	-	1	-	3	2	2	-	2	-	-
2	2	-	-	-	-	-	2	-	3	2	2	-	2	-	-
3	2	-	-	-	-	-	2	2	3	2	2	-	2	-	-
4	2	-	-	-	-	-	2	2	3	2	2	2	2	-	-

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Human Values	3rd	A. N. Tripathy	New Age International Publishers	2003
2	Indian Ethos and Modern Management		Bajpai. B. L.,	New Royal Book Co, Lucknow	
3	Human Society in Ethics & Politics		Bertrand Russell	Routledge London	

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	The Philosophy of Humanism		Corliss	Humanist	
1	The Thirdsophy of Humanishi		Lamont	Press	
C	A Foundation Course in Value		Cour D D	G.P, Excel	2000
2	Education		Gaul. K.K.	Books	2009
2	Introduction to Ethic	Second	William Lilly	Allied	
5	Infoduction to Ethic	Edition	william Liny	Publisher	



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Programming Ethics	
Course Code:- CSDS24-229	Semester:- IV
Teaching Scheme L-T-P : 2-0-0	Credits : 2
Evaluation Scheme:	ESE Marks: 50

Prior Knowledge of:	Basic Knowledge of Computer
---------------------	-----------------------------

Course Objectives:

1	To understand the ethical theories & principles of programming.
2	To analyze ethical issues of programming.
3	To develop ethical responsibilities in project.
4	To apply ethical frameworks in development.

Curriculum Details

Course Contents	Duration
Unit I Introduction to Programming Ethics Overview of ethical theories and principles, Ethical considerations in programming: privacy, security, fairness, and transparency. Case studies: Ethical dilemmas in software development	5 Hrs
Unit-II Privacy and Security with Bias and Fairness Ethical implications of data collection and surveillance, protecting user privacy in software design, Addressing security vulnerabilities. Understanding bias in algorithms and data Mitigating bias in machine learning and AI systems. Ensuring fairness and equity in programming practice.	5 Hrs
Unit-III Intellectual Property, Open Source and Professional Responsibility Copyright, patents, and licensing in software development, Ethical considerations in open source projects, Balancing innovation and intellectual property rights, Codes of ethics and conduct for programmers, Ethical decision-making frameworks, Ethical responsibilities in project management and team collaboration.	3 Hrs
Unit-IVSocial Impact of TechnologyTechnology and inequality: Digital divide, access, and exclusion.Environmental impact of technology: Sustainability and green computing, Ethicalconsiderations in technology for social good and humanitarian projects	3 Hrs

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
1	Understand ethical theories and principles relevant to programming.
2	Analyze ethical issues in programming, including privacy, security, bias, and social impact.
3	Develop critical thinking skills to evaluate the ethical implications of programming decisions.
4	Apply ethical frameworks to programming practices and project development



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(3.25 CGPA) NAAC CYCLE JY

(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	3	-	-	-	-	-	2	1	3	1	2	-	-	1	-
2	3	-	-	-	-	-	2	1	3	1	2	-	-	1	-
3	3	-	-	-	-	-	2	1	3	1	2	-	-	1	-
4	3	-	-	-	-	-	2	1	3	1	2		-	1	-

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Ethics in Computing: A Concise Module		John R,	Magnifico.	
2	Ethics for the information edge		Michael J. Quinn		

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Ethics and Technology		Herman	Wiley	
			Tavani	Publication.	
2	Professional Codes of Conduct		Martin C and	Computers and	
Z	and Computer Ethics Education		Martin D	Society	

Useful Links

1. https://onlinecourses.nptel.ac.in/noc22_mg54/preview

2. http://www.cwru/affil/wwwethics/home.html



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,



(An Autonomous Institute) Department of CSE(Data Science) Engineering

S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Title :- Liberal Learning					
Course Code:- CSDS242-211	Semester:- IV				
Teaching Scheme L-T-P : 1-3-0	Credits : 2				
Evaluation Scheme: INT 50	ESE Marks:				

Curriculum Details

Course Contents

1. Data Analytics Club:

Aim:

The primary aim of a Data Analytics Club is to create a collaborative and dynamic environment where students can enhance their knowledge, skills, and practical experience in data analytics. This involves fostering a community that promotes learning, innovation, and professional growth in the field of data analytics. The club seeks to bridge the gap between academic knowledge and real-world application, preparing members for successful careers in data analytics by providing resources, networking opportunities, and hands-on experiences.

Objectives:

Skill Development:

Technical Skills: Provide training and workshops on data analytics tools and technologies such as Python, R, SQL, Tableau, Power BI, and machine learning.

Soft Skills: Enhance communication, teamwork, problem-solving, and project management skills through collaborative projects and presentations.

Knowledge Expansion:

Guest Lectures: Invite industry professionals to speak about current trends, best practices, and real-world applications of data analytics.

Industry Trends: Keep members informed about the latest developments in data analytics, including new tools, techniques, and methodologies.

Hands-on Experience:

Projects: Offer opportunities to work on real-world data projects, either individually or in teams, to apply theoretical knowledge in practical scenarios.

Competitions: Organize and participate in data analytics competitions and hackathons to foster a competitive and innovative spirit.

Networking:

Industry Connections: Facilitate connections with professionals and alumni working in the field of data analytics.

Peer Networking: Create a community where students can collaborate, share knowledge, and support each other's learning journeys.

Career Preparation:

Internship Opportunities: Provide information about internships and job openings in the field of data analytics

Resume Building: Offer workshops on resume writing, LinkedIn profile optimization, and interview preparation specific to data analytics roles.

Research & Innovation:

Research Projects: Encourage and support members in conducting research projects and publishing their findings in academic or industry journals.

Innovation: Foster a culture of innovation by encouraging members to explore new ideas and approaches in data analytics.



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(An Autonomous Institute) Department of CSE(Data Science) Engineering



S.Y. B. Tech. Curriculum (Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Contents

Outcomes:

Enhanced Skill Set: Members will develop a strong foundation in data analytics tools and techniques, making them more competitive in the job market.

Practical Experience: Participation in real-world projects and competitions will provide practical experience, helping members to apply theoretical knowledge in practical scenarios. Professional Growth: Networking opportunities with industry professionals and alumni will help members build valuable connections and gain insights into the industry.

Career Readiness: Members will be better prepared for careers in data analytics through exposure to job opportunities, resume workshops, and interview preparation sessions.

Research Contributions: Members will have opportunities to contribute to the field through research projects and publications.

Community Building: The club will create a supportive community where students can share knowledge, collaborate on projects, and help each other grow.

Innovation and Creativity: Members will be encouraged to think creatively and innovate, leading to new ideas and approaches in data analytics.

Increased Confidence: Through presentations, workshops, and networking events, members will gain confidence in their abilities to communicate and apply data analytics concepts.

2. Open Source Software Developers Club:

Aim:

The primary aim of an Open Source Student Club is to foster a community of students who are passionate about open source software and collaboration. The club seeks to promote the use, development, and contribution to open source projects, encouraging members to learn, innovate, and share their knowledge with the wider community. By doing so, the club aims to empower students with the skills and mindset needed to contribute meaningfully to the open source ecosystem and to prepare them for careers in technology and software development.

Objectives:

Education & Skill Development:

Technical Workshops: Provide training on various open source technologies, programming languages, and development tools.

Best Practices: Teach best practices for contributing to open source projects, including version control, code reviews, and collaboration techniques.

Project Involvement:

Contributions: Encourage and guide members to contribute to existing open source projects. Initiate Projects: Support members in starting and maintaining their own open source projects

Community Engagement:

Collaboration: Foster a collaborative environment where members can work together on projects and share knowledge.

Outreach: Engage with the wider open source community through events, meetups, and online platforms.

Networking:

Industry Connections: Facilitate connections with professionals, open source contributors, and organizations in the open source community.

Peer Networking: Create opportunities for members to network with each other and build lasting professional relationships.

Career Preparation:

Internship and Job Opportunities: Provide information about internships, job openings, and



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT, (An Autonomous Institute)

Department of CSE(Data Science) Engineering S.Y. B. Tech. Curriculum



(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Contents

career paths in open source development.

Professional Development: Offer workshops on resume building, portfolio creation, and interview preparation specific to open source careers.

Outcomes:

Enhanced Technical Skills: Members will develop proficiency in open source tools and technologies, improving their coding and development skills.

Practical Experience: Participation in real-world open source projects will provide hands-on experience and a deeper understanding of software development.

Community Contribution: Members will make meaningful contributions to open source projects, helping to advance the open source ecosystem.

Professional Growth: Networking opportunities with industry professionals and active contributors will help members build valuable connections and gain insights into the industry. Career Readiness: Members will be better prepared for careers in open source development through exposure to job opportunities, portfolio building, and interview preparation sessions. Innovation & Creativity: Members will be encouraged to innovate and explore new ideas, leading to the development of new open source projects and solutions.

Increased Confidence: Through workshops, presentations, and collaboration, members will gain confidence in their abilities to contribute to open source projects and communities.

Community Building: The club will create a supportive and collaborative community where students can share knowledge, work on projects together, and help each other grow.

3. Rational Programmers Club:

Aim:

The primary aim of a Rational Programmers Club within the Data Science Department is to cultivate a community where students can enhance their coding skills, apply their knowledge to solve real-world problems, and prepare for careers in data science and related fields. The club seeks to create

an environment that encourages continuous learning, collaboration, and innovation in coding, particularly as it applies to data science.

Objectives:

Skill Development:

Programming Efficiency: Provide training in various programming languages commonly used in data science, such as Python, R, SQL, and Java.

Data Science Tools: Teach members how to use data science tools and libraries, such as pandas, NumPy, scikit-learn, TensorFlow, and more.

Practical Applications:

Projects: Encourage members to participate in or initiate coding projects that solve real-world data science problems.

Hackathons: Organize and participate in hackathons and coding competitions to foster a spirit of innovation and problem-solving.

Knowledge Sharing:

Workshops & Seminars: Conduct workshops, seminars, and coding boot camps to share knowledge and best practices in coding and data science.

Peer Learning: Promote peer-to-peer learning through study groups, code reviews, and collaborative projects.

Career Preparation:

Portfolio Building: Help members build a portfolio of coding projects that demonstrate their



FACULTYOFENGINEERING& FACULTYOFMANAGEMENT,

(An Autonomous Institute)



Department of CSE(Data Science) Engineering S.Y. B. Tech. Curriculum

(Programme-CSE(Data Science)) w. e. f. A.Y. 2025-2026

Course Contents skills and knowledge in data science. Career Guidance: Provide guidance on career paths in data science, including resume building, interview preparation, and internship/job search strategies. Networking: Industry Connections: Facilitate connections with data science professionals, alumni, and industry partners. Community Building: Create a supportive community where members can network, collaborate, and share resources. Innovation & Research: Cutting-edge Topics: Explore and work on cutting-edge topics in data science, such as machine learning, artificial intelligence, big data analytics, and more. Research Projects: Encourage members to participate in or initiate research projects and publish their findings. **Outcomes:** Enhanced Coding Skills: Members will develop strong programming skills and a deep understanding of data science tools and techniques. Practical Experience: Participation in real-world projects and hackathons will provide handson experience, enabling members to apply their knowledge practically. Professional Growth: Networking with industry professionals and peers will help members build valuable connections and gain insights into the data science industry. Career Readiness: Members will be better prepared for careers in data science through portfolio building, resume workshops, and interview preparation sessions. Community Contributions: The club will create a collaborative community where members can share knowledge, support each other's learning, and contribute to the field of data science. Innovation & Research Contributions: Members will have opportunities to work on innovative projects and research, contributing to advancements in data science. Increased Confidence: Through coding challenges, presentations, and collaborative projects, members will gain confidence in their abilities to code and solve complex data science problems. Lifelong Learning: The club will instill a mindset of continuous learning and curiosity, encouraging members to stay updated with the latest developments in coding and data science. **Evaluation:** Evaluation of individual student will be carried out based on following criteria -1. Knowledge & Understanding 2. Critical Thinking **3.** Communication Skills 4. Ethical Reasoning 5. Cultural Awareness and Diversity 6. Interdisciplinary Connections 7. Creativity and Innovation

8. Collaboration and Teamwork