THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23DS301T	Mathematics for Data Science	4	-	-	4	30	70	100

Course Objectives	Course Outcomes
This course is intended • To familiarize the students with concepts of logic & sets. • To introduce the essential concepts of vector spaces • To derive the inference using concepts of descriptive and inferential Statistics	**Students will be able to** • Recognize when Logic, sets, functions are appropriate to formulate & solve real world problems • Apply the concepts of vector spaces to Data Science. • Use the concepts of sampling & estimation theory in the field of data science. • Learn the techniques of testing hypothesis and apply it to test the significance of various data samples • Use statistical methods and tools in engineering problems

Unit I **[8Hrs]**

Mathematical logic & Set theory: Review of propositions and logical operations, Review of sets, Types and operations on sets, Inclusion Exclusion Principle
Relations and functions: Ordered pairs and n-tuples, Types of relations, Composite relation, Definition of function, Composition of functions, Types of functions.

Unit II **[8Hrs]**

Vector Spaces: Definition, Sub spaces, Basis, dimension, Range Space and Rank; Null Space and Nullity; Rank nullity theorem. Linear transformation; Matrix Representation of a linear transformation Linear Operators on R^n and their representation as square matrices Invertible linear operator, Inverse of non-singular matrices.

Unit III **[8Hrs]**

Sampling & Estimation Theory: Population and sample, Statistical inference, Sampling with and without replacement, Population parameters, sample statistics, Sampling distribution of means, Sampling distribution of proportions. Unbiased and efficient estimates, Point estimates and interval estimates, Confidence interval for means, Confidence interval for proportions.

Unit IV **[8Hrs]**

Hypothesis testing: Introduction, Level of significance, Confidence limits,, Hypothesis, Null hypothesis, Alternative hypothesis, Type-I and Type-II errors, , Testing a hypothesis,, t-Test, Z-test, F-test, chi-square test.

Unit V **[8Hrs]**

Statistics: Mean, Median, Mode, Mean deviation, Standard deviation, Quartile, Decile, Percentiles, Residual MSE and MAE, , Root Mean Square error, Coefficient of determination R^2.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Discrete Mathematical Structures with Applications to Computer Science (TMH)	Tremblay and Manohar	35th	Tata McGraw Hill
2	Linear Algebra And Its Applications	Gilbert Strang	5th	Nelson Engineering (2007)
3	Theory & problems of Probability and Statistics	Murray R. Spiegel	4th	Schaum Series

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Discrete Mathematical Structures	Kolman, Busby & Ross	3rd	PHI
2	Linear Algebra	Seymour Lipschutz et al:	3rd	Schaum outline series.
3	Higher Engineering Mathematics	by B.S. Grewal	, 40th	Khanna Publication
4	Advanced Engineering Mathematics	Erwin Kreysizig	8th Edition,	Wiley India

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23DS302T	Object Oriented Programming	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended ● To provide understanding of Object Oriented Programming concepts ● To enable students to think in terms of object oriented paradigm and apply concepts to develop programs To develop an application using error handling techniques and I/O streams	**Students will be able to** • Analyze and think in terms of object oriented paradigm during development of application • Apply the concept object initialization and destroy using constructors and destructors. • Develop application using the concept of inheritance and evaluate the usefulness. • classify & demonstrate the use of different data structures linked list, trees & graphs along with related algorithms. • create applications with the usage of different data structures using object oriented programming concept

Unit I **[8Hrs]**

Introduction to object oriented programming paradigm, procedure oriented programming vs OOP, features of OOP, benefits of OOP, Concept of a class, Access control of members of a class, instantiating a class, constructor UML diagrams to represent class, objects and various relationships.

Unit II **[8Hrs]**

Functions in OOP, function overloading, friendly functions, Passing & returning Objects, pointers to members, constructors and destructors, copy constructor, operator overloading. Access specifiers and packages, Exception Handling: Benefits of exception handling, Throwing an exception, The try block, Catching an exception.

Unit III **[8Hrs]**

Inheritance: Defining a class hierarchy, Defining the Base and Derived classes, Different forms of inheritance, Access to the base class members, Base and Derived class constructors & Destructors, Virtual base class. Abstract classes.
Polymorphism: Function Overloading, Constructor Overloading, Static and Dynamic binding, Virtual functions, Dynamic binding through virtual functions, Virtual function call mechanism, Pure virtual functions, Virtual destructors, Copy constructor.

Unit IV **[8Hrs]**

Data Structures : Singly linked list, Implementation of linked list using static and dynamic memory allocation, operations on linked list, polynomial representations and manipulations are using linked list, circular linked list, doubly linked list, Generalized list, sparse matrix,

Unit V **[8Hrs]**

Trees: Basic Terminology, Basic trees, Binary tree representations, threaded storage representation, binary tree traversals, binary search trees, Application of trees. Preliminary treatment of AVL Trees, B- Trees.
Graphs: Definition & terminology, Graph representation: matrix representation of Graph, Breadth First Search, Depth First Search, **The concepts should be practiced using Java.**

Text Books

S.N	Title	Authors	Edition	Publisher
1	Object oriented programming with java	M. T. Somashekara, d. S. Guru, k. S. Manjunatha		PHI
2	Object Oriented Programming In Java	Dr. G.T.Thampi		Dreamtech
3	The Complete Reference JAVA	Herbert Schildt	4th Edition	Tata McGraw Hill
4	Data structure and Algorithm	Lafore		BPB Publication

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Data Structures , Algorithms, And Applications In Java	Sartaj Sahni	2	Universities Press
2	Data Structures Using Java	D. S. Malik, Premchand S. Nair		Thomson

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23DS302P	Object Oriented Programming Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
The objective of this course is to provide students with a strong foundation in Object-Oriented Programming (OOP), enabling them to design and implement software solutions using core OOP principles Students will gain proficiency in programming languages like C++ or Java, develop problem-solving skills relevant to engineering applications, and learn to create modular, reusable, and maintainable code.	1. Realize the difference between the top-down and bottom-up approach along with thinking in terms of objects. 2. Students will be able to implement Linear and Non-Linear data structures. 3. Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.

Expt. No.	Title of the experiment
1	Program to implement concept of class and object
2	Program to implement constructor & destructor
3	Program to implement inheritance
4	Program to implement polymorphism
5	Program to implement abstract class
6	Implement a Menu driven program for Sorting methods and analyze their performances.
7	Implement a Program to demonstrate the working of a stack.
8	Implement a Program to demonstrate the working of a Queue
9	Implement a Program to apply the concepts of linked list
10	To Implement the nonlinear data structure binary tree

Text Books

S.N	Title	Authors	Edition	Publisher
1	Object Oriented Programming with C++	E.Balaguruswamy	6th	TMH
2	The Complete Reference C++	Herbert Schildt	4th	Tata McGraw Hill
3	Fundamentals of Data Structure by	Horowitz and Sahani		CBS Publications

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Let us C++	Yashavant Kanetkar		BPB Publications
2.	Schaum's outline: Date Structures	Seymour Lipschutz		Tata Mc Graw Hill

		JULY 2024	1	Applicable for 2024-25
Chairman - BoS	Dean – Academics	Date of Release	Version	

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23DS303T	Digital Circuits & Computer Architecture	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended- 1. Understand the foundations of decimal number systems and the metho23DS used to convert them. 2. Know Boolean algebra and use it to represent digital circuits. 3. Understand the basic structure of computers that store programs. 4. To provide insight into the problems associated with control unit design. 5 To impart knowledge about computer architecture and organization design	Students will be able to-1. Students will confidently work with different number systems, like binary and hexadecimal. 2. Adeptly apply Boolean algebra and combinational logic principles to design and analyze basic logic circuits 3. To understand how computers operate, from retrieving instructions to carrying them out. 4. Solve various computer arithmetic problems 5. Analyze and describe different computer architectures

Unit I **[8Hrs]**

Number system and codes:Binary, octal, hexadecimal and decimal Number systems and theirinter conversion, BCD numbers (8421-2421),gray code, excess-3 code, cyclic code, code conversion, ASCII, EBCDIC codes. 1's and 2's complement

Unit II **[8Hrs]**

Boolean Algebra: Basic logic circuits: Logic gates (AND, OR, NOT, NAND, NOR, Ex-OR, ExNOR and their truth tables, Universal Gates, Laws of Boolean algebra, De-Morgan's theorem, Combinational Logic: The Half adder, the full adder, subtractor circuit, Multiplxer demultiplexer, decorder,

Unit III **[8Hrs]**

Basic organization of the stored program computer and operation sequence for execution of a program. Role of operating systems and compiler/assembler. Fetch, decode and execute cycle, Concept of operator, operand, registers and storage, Instruction format

UNIT IV **[8Hrs]**

Design of ALU, Fixed point multiplication -Booth's algorithm, Fixed point division - Restoring and non-restoring algorithms, Floating point - IEEE 754 standard. Fixed and floating point representation of numbers.

Unit V **[8Hrs]**

Central Processing Unit organization: General Register Organization, Stack organization,Instruction formats, Addressing modes, Data Transfer and Manipulation, Program Control, CISC and RISC processors, Control unit design: Design approaches, Control memory, Address sequencing.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Computer Organization & Architecture	William stalkings	8th edition	Prentice Hall
2	"Digital Fundamentals"	Thomas L. Floyd	11th Edition	Pearson

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Computer Organization	J. P. Hayes,	5th Edition	Tata McGraw-Hill
2	Digital Design	M. Morris believe	6th Edition	Prentice Hall

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23DS304P	Digital circuits & Internet of Things Lab	-	-	4	2	25	25	50

Course Objectives	Course Outcomes
This course is intended- • To provide students with a comprehensive understanding of digital logic design principles • the practical implementation of embedded systems using platforms such as Arduino and Raspberry Pi. • Through hands-on experimentation, students will develop the necessary skills to design, simulate, and implement digital circuits and embedded systems.	Students will be able to- • Understand the principles of digital logic and circuit design • Interface various sensors and actuators with microcontrollers or IoT devices.

Expt . No.	Title of the experiment
1	To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Ex-OR, Ex-NOR.
2	Design and implement combinational logic circuits for basic functions such as addition, subtraction, and comparison
3	Build and test half adder and full adder circuits using logic gates.
4	Build flip-flops (e.g., D flip-flop, JK flip-flop) using logic gates and demonstrate their behavior
5	To Study the Arduino and Raspberry Pi.
6	Write code to control the LED and SSD.
7	Write code to read temperature values from the sensor.
8	Test and evaluate the functionality of the sensor interface for real-time environmental monitorinG
9	Understand how LDR (Light Dependent Resistor) sensors work.
10	Write code to establish a Bluetooth connection and control devices wirelessly.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Digital Design Principal and Practices	John F. Wakerly	6	Pearson Education Practices"
2	Internet of things	Rajkumar	6	Morgan

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23DS305P	Data Science Lab - I	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended • Explore Different Python Language Constructs • Install Jupyter Notebook and Use It for Writing Python Programs • Perform Python documentation • Create and Manipulate Data in Pytho	• Explore Different Python Language Constructs • Install Jupyter Notebook and Use It for Writing Python Programs • Perform Python documentation • Create and Manipulate Data in Python

Expt. No.	Title of the experiment
1	Study of various data structures required for the data science tools.
2	To implement single and multidimensional arrays and frames using numpy library.
3	To implement the concept of data manipulation using series and dataframes with pandas library.
4	To perform data processing on real time dataset
5	To implement the statistical functions required for data science applications.
6	To perform the data visualization on real time dataset.
7	To perform the data preprocessing on the real time dataset using Python language.

Text books

S.N	Title	Authors	Edition	Publisher
1	Python for Data Analysis	Wes McKinney	3rd Edition	O'Reilly Media
2	Python Data Science Handbook: Essential Tools for Working with Data	Jake VanderPlas	1st Edition	O'Reilly Media

Reference Books

S. N	Title	Authors	Edition	Publisher
3.	Introduction to Data Science: Data Analysis and Prediction Algorithms with R	Alexander Dmitrienko and David L. Poole	1st Edition	Springer
4.	Practical Statistics for Data Scientists: 50 Essential Concepts	Peter Bruce and Andrew Bruce	2nd Edition	O'Reilly Media

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23DS306P	Web Technologies Lab			4	2	25	25	50

Course Objectives	Course Outcomes
This course is intended ● To develop an ability to design and implement static and dynamic website ● Use JavaScript for dynamic effects and to prepare PHP scripts	**Students will be able to** ● Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's ● Create web pages using HTML and Cascading Styles sheets ● Analyze a web page and identify its elements and attributes ● Create dynamic web pages using JavaScript ● Build web applications using PHP .

Expt. No.	Title of the experiment
1	To design the static web pages required for an online book store web site.
2	Write JavaScript to validate the fiel23DS of the Registration page.
3	Develop and demonstrate the usage of inline, internal and external style sheet using CSS
4	Develop and demonstrate JavaScript with POP-UP boxes and functions.
5	Develop HTML page that contains a selection box with a list of 5 countries.
6	Develop an HTML page including any required JavaScript that takes a number from text field in the range of 0 to 999 and shows it in wor23DS
7	Write a PHP Script to find out the Sum of the Individual Digits.
8	Write a PHP Script to check whether the given number is Palindrome or not.

Text Books

S.N	Title	Authors	Edition	Publisher
1	A beginner's guide to HTML, CSS, Javascript, and Web Graphics,	Jennifer Niederst Robbins		PHI

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23ES301T	Value Education Course - I	2	-	-	2	15	35	50

Course Objectives	Course Outcomes
This course is intended ● To develop a holistic perspective through self-exploration and development of clarity about harmony between self, family, society and nature.	**Students will be able to** ● demonstrate awareness about concepts like self exploration & natural acceptance. ● understand concepts of aspirations and happiness. ● develop clarity of harmony and health in human being. ● discuss concepts of conservation of nature and harmony in nature/existence and re-usability.

Unit I : Introduction to Self-Exploration **[6Hrs]**

Purpose & motivation for studying universal human values, Self-Exploration–what is it? - Its content and process, 'Natural Acceptance' and Experiential Validation- as the process for self-exploration.

Unit II: Understanding Happiness and Prosperity **[6Hrs]**

Understanding Happiness and Prosperity correctly, Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility, Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Unit III: Understanding Harmony in human being **[6Hrs]**

Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - happiness and physical facility, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Health.

Unit IV: Co-existing with nature **[6Hrs]**

Understanding the harmony in Nature, Interconnection and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Coexistence of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence, Pollution, depletion of resources and role of technology.

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Human Values and Professional Ethics	Gaur, Sangal, Bagaria	2010	Excel Books, New Delhi

Reference Books

Sr.No.	Title	Authors	Edition	Publisher
1	Jeevan Vidya: Ek Parichaya	A. Nagaraj	1999	Jeevan Vidya Prakashan, Amarkantak
2	Human Values	A.N. Tripathi	2004	New Age Intl. Publishers, New Delhi
3	The Story of My Experiments with Truth	M.K.Gandhi	2009	Fingerprint! Publishers

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23DS331M	MDM-I Data Analytics with Excel	2	-	-	2	15	35	50

Course Objectives	Course Outcomes
This course is intended to provide ● students with introductory knowledge of several excel techniques that can be used for data analysis.	Student will be able to: ● Understand basic functions in excel for data analysis ● Perform data visualization in excel ● Analyze data and draw inferences from data ● Make use of Hypothesis testing

Unit I **[5Hrs]**

Reading Data into Excel, Basic Data Manipulation in Excel, Arithmetic Manipulation in Excel, Basic Functions in Excel.

Basic Excel Formulas, Structuring Data in Excel, Intermediate Excel Functions, Descriptive Statistics.

Unit II **[5Hrs]**

Introduction to Visualizations and Pie Charts, Histograms, Bar Charts, Line Charts, Box and Whisker, Radial Charts, Combo Charts, Scatter Plots, Conditional Formatting, Sparklines, Control Charts.

Unit III **[5Hrs]**

Introduction to Pivot Tables, Root Cause Analysis, Comparative Analysis, Pivot Charts and Slicers

Unit IV **[5Hrs]**

Types of Data, Fundamentals of Sampling, Distributions, Introduction to Hypothesis Testing, T-tests, Chi-Squared Test Part 1

Test for Normality, ANOVA, Simple Regression

Text Books

S.N	Title	Authors	Edition	Publisher
1	Modern Data Analytics in Excel	George Mount		O'Reilly home

Reference Books

S.N	Title	Authors	Edition	Publisher
1	DATA ANALYSIS AND BUSINESS MODELLING USING MICROSOFT EXCEL	MANOHAR, HANSA LYSANDER		PHI