AC NO. 24.06.2024

Bunts Sangha's
S.M. Shetty College of Science, Commerce and Management Studies (Autonomous)
Hiranandani Gardens, Powai

Bachelor of Science

B. Sc.(Data Science)
(Programme Code: SMSUGDS07)

First Year Course Structure

First Year Syllabus

New Education Policy (NEP) 2020

(To be implemented from the Academic Year 2024-2025)

Approved in the Academic Council Meeting held on 24.06.2024

INTRODUCTION OF THE PROGRAMME

The Bachelor of Science in Data Science (BSc Data Science) program is meticulously designed to equip students with the skills and knowledge required to excel in the rapidly growing field of Data Science. Combining a robust theoretical foundation with practical applications, our curriculum ensures that graduates are proficient in data analysis, statistical modeling, machine learning, and data-driven decision-making.

Our mission is to provide a comprehensive education that not only covers the technical aspects of data science but also emphasizes critical thinking, ethical considerations, and effective communication. We strive to create a learning environment that encourages innovation and problem-solving, preparing students to tackle real-world challenges using data-driven approaches. Our vision is to be recognized as a leading program in data science education, known for our commitment to excellence, research, and community engagement.

The BSc Data Science curriculum includes a diverse range of courses that cover essential topics such as data mining, big data analytics, predictive modeling, and data visualization. Students gain hands-on experience through state-of-the-art laboratories and collaborative projects, which foster teamwork and practical skills. Additionally, our program integrates emerging technologies and current industry practices to ensure that students are well-prepared for the future.

Our faculty comprises experienced professionals and researchers who are experts in various domains of data science. They are dedicated to mentoring students and providing guidance to help them achieve their academic and professional goals. The program also offers numerous opportunities for internships, industry partnerships, and participation in data science competitions, enhancing the overall learning experience and preparing students for successful careers.

Graduates of the BSc Data Science program are well-equipped to pursue a variety of career paths, including roles as data analysts, data engineers, machine learning engineers, and data scientists. We are proud of our alumni who have gone on to make significant contributions in various sectors, including technology, healthcare, finance, and government. By joining our BSc Data Science program, you will become part of a vibrant and supportive community committed to advancing the field of data science and making a positive impact on society.

PROGRAMME OUTCOME
B.Sc.DS

	Programme Outcome
PO1	Graduates will demonstrate proficiency in collecting, cleaning, analyzing, and interpreting large and complex datasets using a variety of statistical and machine learning techniques.
PO2	Graduates will be able to develop and implement predictive models to forecast trends, identify patterns, and make data-driven predictions in various domains, including business, healthcare, finance, and marketing.
PO3	Graduates will be skilled in visualizing data effectively and communicating insights to diverse stakeholders using appropriate data visualization techniques and storytelling methods.
PO4	Graduates will understand the ethical and legal considerations surrounding data collection, storage, and usage. They will adhere to ethical guidelines and privacy regulations while handling sensitive data.
PO5	Graduates will recognize the importance of continuous learning and professional development in the rapidly evolving field of data science. They will be adaptable to new technologies, methodologies, and industry trends, maintaining their relevance and expertise throughout their careers.

B.ScDS

FIRST YEAR SEMESTER I

COURSE STRUCTURE

COURSE CODE	COURSE TITLE	COURSE CREDIT
MAJOR MANDATORY (CORE) VERTICAL A		
UDS1.1	Python for Data Science	2
UDS1.2	Database Management Systems	2
UDS1.3	Python for Data Science and Database Management Systems Practical	2
OPEN/ GENERIC ELECTIVE (OE/GE) VERTICAL B		
UOE1.1	Principles of Management	2
UOE1.4	Introduction to Financial Market	2
VSC (VOCATIONAL SKILL COURSES) VERTICAL C		
UDS1.4	Online Design Tools	2
SEC (SKILL ENHANCEMENT COURSE) VERTICAL D		
UDS1.5	Advanced Spreadsheets	2
AEC (ABILITY ENHANCEMENT COURSE) VERTICAL E		
UDS1.6	Effective Communication in English	2
	IKS (INDIAN KNOWLEDGE SYSTEM) VERTICAL E	
UDS1.8	Computing Science in Ancient India	2
VEC (VALUE EDUCATION COURSE) VERTICAL E		
UDS1.7	Green Computing	2
CO-CURRICULAR (CC) VERTICAL F		
UCC1.1	Cultural/Sports/Yoga/Gender Sensitistion	2
TOTAL CREDITS		**22**

B.ScDS

FIRST YEAR SEMESTER II

COURSE STRUCTURE

COURSE CODE	COURSE TITLE	COURSE CREDIT
MAJOR MANDATORY (CORE) VERTICAL A		
UDS2.1	R-Programming	2
UDS2.2	Web Data Presentation	2
UDS2.3	R-Programming and Web Data Presentation Practical	2
	MINOR VERTICAL B	
UDS2.4	Pre-calculus	2
OPEN/ GENERIC ELECTIVE (OE/GE) VERTICAL C		
UOE2.7	Organizational Behaviors	2
UOE2.10	Basics of Accounting	2
VSC (VOCATIONAL SKILL COURSES) VERTICAL D		
UDS2.5	Robotics Process Automation	2
SEC (SKILL ENHANCEMENT COURSE) VERTICAL E		
UDS2.6	Prompt Engineering	2
AEC (ABILITY ENHANCEMENT COURSE) VERTICAL E		
UDS2.7	English Technical Writing Skills	2
VEC (VALUE EDUCATION COURSE) VERTICAL E		
UDS2.8	Lifestyle for Holistic Health	2
CO-CURRICULAR (CC) VERTICAL F		
UCC1.2	Cultural/Sports/Yoga/Gender Sensitistion	2
TOTAL CREDITS		**22**

Semester I

Course Code	**UDS1.1**					
Name of the Course	**Python for Data Science**					
Name of Board of Studies	**Information Technology and Data Science**					
Semester	**I**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	To learn Python programming language, including its features, execution process, and installation.
LOC2	To make use of concepts such as functions, operators in Python
LOC3	To utilize NumPy and Pandas libraries for data manipulation and analysis.

Learning Outcomes of the Course

Sr.No.	Outcomes
CO1	Learners will be able to Python programming, including writing, executing, and debugging Python programs.
CO2	Learners will be able to analyze data efficiently using Python's built-in functions and control structures.
CO3	Learners will develop advanced data analysis abilities using NumPy and Pandas libraries.

Module. No	Details	No. of Lectures
1	**Module 1: Introduction, Data Types, Variables and Control Statements**	**10**
	Introduction to Python Language: Overview, Features of Python, Execution of a Python Program, Python Interpreter, Installing Python, Writing & Executing, IDLE. **Data Types, Variables And Other Basic Elements**: Comments, Data types-Numeric, Compound, Boolean, Dictionary, Sets. **Control Statements**: Control Statements- Loop Statement, The if-else Suite, break Statement, continue Statement, pass Statement.	
2	**Module 2: Functions, Operators, Lists, Tuple and Dictionaries**	**10**

	Functions: Defining & Calling a Function, Returning Results, Returning Multiple Values, Built-in Functions, Parameters and Arguments, Recursive Functions. **Operators**: Arithmetic operators, Assignment operators, Unary minus operator, Relational operators, Logical operators, Bitwise operators, Membership operators. **Lists and Tuples**: Lists, List Functions and Methods, List Operations, Tuples. **Dictionaries**: Creating a Dictionary, Operators in Dictionary, Dictionary Methods, Using for Loop with Dictionaries, Operations on Dictionaries, Ordered Dictionaries.	
3	**Module 3: NumPy and Pandas**	**10**
	Introduction to NumPy: Understanding Data Types in Python, The Basics of NumPy Arrays, Computation on NumPy Arrays, Universal Functions, **Aggregations**: Min, Max, and Everything In Between, Computation on **Arrays**: Broadcasting, Comparisons, Masks, and Boolean Logic, Fancy Indexing, Sorting Arrays. **Data Manipulation with Pandas**: Introducing Pandas Objects, Data Indexing and Selection, Operating on Data in Pandas, Handling Missing Data, Hierarchical Indexing, Combining Datasets: Concat and Append, Combining Datasets: Merge and Join, Aggregation and Grouping.	
	TOTAL	**30 Lectures**

Reference Books:

1. Programming through Python, M. T. Savaliya, R.K Maurya, G.M Magar, 2020
2. Python Data Science Handbook, Jake VanderPlas, O'Reilly Media, 2016
3. Let Us Python Y. Kanetkar, BPB, 6th Edition, 2023.
4. Programming in Python 3 Mark Summerfield Pearson Education, 2nd Edition, 2010
5. Learning Python Lutz M O'Reilly Shroff, 5th Edition, 2013

Course Code	**UDS1.2**					
Name of the Course	**Database Management Systems**					
Name of Board of Studies	**Information Technology and Data Science**					
Semester	**I**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	To present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve information efficiently and effectively from a DBMS.
LOC2	To design different Data Models.
LOC3	To understand SQL to retrieve data and the concept of redundancy.

Learning Outcomes of the Course

Sr. No.	Outcomes
CO1	Learners will be able to understand relational data model and Entity Relationship Model.
CO2	Learners will be able to evaluate various SQL commands for Data Manipulation in DataBase.
CO3	Learners will be able to apply normalization techniques and transaction management and concurrency control mechanisms.

Module. No	Details	No. of Lectures
1	**Module 1: Introduction to DBMS**	**10**
	Database System concept and Architecture: Data versus Information, Introducing the Database, Role and Advantages of the DBMS, Relational Model, Evolution of File System Data Processing, Problems with File System Data Processing, Database Systems, Degrees of Data Abstraction **Conceptual modeling and database design:** Data modeling using the Entity Relationship model (ER).The enhanced entity relationship model. Relational database design by ER and EER model. Practical database design methodology and use of UML diagrams.	
2	**Module 2: SQL**	**10**

	Structured Query Language(SQL): Introduction to SQL, Basic SELECT Queries, SELECT Statement, FROM Clause, ORDERBY Clause, WHERE Clause, Aggregate Functions, Subqueries, SQL Functions, Relational Set Operators, Keys and its types, Constraints and its types. **Advanced SQL:** Data Definition Commands, Creating Table Structures, Altering Table Structures, Data Manipulation Commands, Virtual Tables: Creating and using Views, triggers, joining database tables and schema modification.	
3	**Module 3:Data Redundancy and Transaction Management**	**10**
	Normalization of Database Tables: Database Tables and Normalization, The Need for Normalization, The Normalization Process, Normal Forms, Surrogate Key Considerations. **Transaction management and concurrency control and recovery:** Introduction to transaction processing concepts and theory. Concurrency control technique. Database recovery technique.	
	TOTAL	**30 Lectures**

Reference Books:

1. Database Management Systems, Ramakrishnan, Gehrke, McGraw- Hill, 3rd Edition, 2007
2. Database System Concepts, Silberschatz, Korth, Sudarshan, McGraw Hill, 5th Edition, 2006
3. Database Systems: Design implementation and management., Carlos Coronel, Steven Morris, Peter Rob, Cengage Learning, 9th Edition, 2010
4. Fundamentals of Database Systems, Ramez Elmasri, Shamkant B Navathe , Pearson, 6th Edition , 2010
5. Murach's MySQL, Joel Murach, Murach, 3rd Edition, 2012

Course Code	**UDS1.3**					
Name of the Course	**Python for Data Science and Database Management Systems Practical**					
Name of Board of Studies	**Information Technology and Data Science**					
Semester	**I**					
Number of Credits	**04**					
Number of Lectures	**60**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Sr. No.	Objectives
LOC1	To Understand the process of designing and implementing relational database schemas based on given requirements.
LOC2	To Develop the ability to write SQL queries to perform CRUD operations on databases.
LOC3	Learners will be able to Python programming, including writing, executing, and debugging Python programs.
LOC4	Learners will be able to analyze data efficiently using Python's built-in functions and control structures.
LOC5	Learners will develop advanced data analysis abilities using NumPy and Pandas libraries.

Sr. No.	Outcomes
CO1	Learners will be able to construct databases, tables, views, indexes, and manage database objects effectively.
CO2	Learners will be able to Demonstrate proficiency in writing SQL queries to retrieve, manipulate, and manage data stored in a database, basic CRUD operations (Create, Read, Update, Delete), as well as complex queries involving joins, subqueries, and aggregate functions.
CO3	Learners will be able to Python programming, including writing, executing, and debugging Python programs.
CO4	Learners will be able to analyze data efficiently using Python's built-in functions and control structures.
CO5	Learners will develop advanced data analysis abilities using NumPy and Pandas libraries.

Module No	Details	No. of Lectures
	Module 1	**30**
1	**Draw E-R diagram and convert entities and relationships to relation table for a given scenario** a. Bank	

	b. College	
2	**Write SQL query for given problem statement:** a. Viewing all databases b. Creating a Database c. Viewing all Tables in a Database	
3	**Perform the following Operations:** a. Using CREATE statement b. Using INSERT statement c. Using SELECT statement	
4	**Perform the following Operations:** a. Using UPDATE statement b. Using ALTER statement c. Using RENAME statement d. Using Where Clause	
5	**Perform the following Operations:** a. Using DROP statement b. Using DELETE statement c. Using TRUNCATE statement	
6	**Creating table with constraints:** a. NOTNULL b. UNIQUE c. PRIMARY KEY d. FOREIGN KEY	
7	**Restricting and sorting data** a. Using DISTINCT, IN, AS, SORT,LIKE,ISNULL, OR b. Using Group By, Having clause, Order By clause	
8	**Aggregate and Mathematical functions:** a. AVG,MIN,MAX,SUM,COUNT b. Math Functions	
9	**Working with SQL Functions** a. Date Functions b. String Functions	
10	**Subqueries** a. With IN clause b. With EXISTS clause c. Handling NULL values	
11	**Views** a. Creating view b. Dropping view c. Selecting from a view	
12	**Retrieving Data from Multiple Table:**	

	a. Joining Tables b. Aliases for Table Name	
13	**TCL Statements:** a. Using COMMIT statement b. Using ROLLBACK statement c. Creating SAVEPOINTS	
14	**Database Trigger** a. Using CREATE or REPLACE TRIGGER	
15	**Perform the following** a. DCL Statement- Granting And Revoking Permissions b. Backing up / Restoring Database	
	Module 2	**30**
1	Practical based on **Introduction to Python Language:** a. Open the Python interpreter and perform simple arithmetic calculations (e.g., addition, subtraction, multiplication, division). b. Write a Python script that prompts the user to enter their name and age, then prints a greeting message with their name and age.	
2	a. Open IDLE and create a new Python file. Write a simple Python program to calculate the area of a circle given its radius and display the result. b. Write a Python program to Convert temperature from Celsius to Fahrenheit using variables.	
3	Write a Python program to create variables of different data types (numeric, string, list, tuple, dictionary) and perform basic operations on them.	
4	a. Write a Python program that checks if a given number is even or odd and prints the result. b. Implement a Python program to find the sum of all numbers between 1 and 100 using a loop statement.	
5	a. Write a Python program that prompts the user to enter their age. If the age is greater than or equal to 18, print "You are an adult." Otherwise, print "You are a minor." b. Implement a Python program to find the largest among three numbers using if-else statements.	
6	**Functions, Operators, Lists and Tuples and Dictionaries:** a. Write a Python program to create a function called add_numbers that takes two parameters a and b and returns their sum. b. Implement a function called factorial to compute the factorial of a given number using recursion.	
7	a. Write a Python program to perform bitwise AND, OR, and XOR operations on two integers provided by the user.	

	b. Write a Python program that calculates the sum, difference, product, and quotient of two numbers entered by the user.	
8	a. Write a Python program to find the sum and average of numbers in a given list. b. Write a Python program to create a list of numbers and calculate their sum, average, minimum, and maximum values.	
9	a. Write a Python program to create a Python dictionary to store information about a person (e.g., name, age, email). Print each piece of information separately. b. Write a Python program to create a dictionary containing student names and their corresponding marks. Calculate the average marks of the students.	
10	**NumPy and Pandas:** a. Write a Python program to remove a key-value pair from a dictionary based on the key provided by the user. b. Write a Python program to count the occurrences of each element in a list and store the result in a dictionary.	
11	a. Write a Python program to perform arithmetic operations (addition, subtraction, multiplication, division) on two NumPy arrays. b. Write a Python program to calculate the mean, median, and standard deviation of elements in a NumPy array.	
12	a. Write a Python program to Use broadcasting to add a scalar value to each element of a NumPy array. b. Write a Python program to create a mask array to filter elements of a NumPy array based on a condition.	
13	a. Write a Python program to use fancy indexing to select specific elements from a NumPy array. b. Write a Python program to create a Pandas Series from a Python list and display its data type. c. Write a Python program to create a Pandas DataFrame from a dictionary and display its contents.	
14	a. Write a Python program to perform arithmetic operations on columns of a Pandas DataFrame. b. Write a Python program to replace missing values in a Pandas DataFrame with a specified value.	
15	a. Write a Python program to create a hierarchical index in a Pandas DataFrame and access data using it. b. Write a Python program to perform aggregation operations (sum, mean, max, min) on a Pandas DataFrame.	
	Total	**60 Lectures**

Course Code	**UOE1.1**					
Name of the Course	**Principles of Management**					
Name of Board of Studies	**Management**					
Semester	**I**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	To comprehend the core principles of management, enabling efficient organization of resources and attainment of organizational goals.
LOC2	To comprehend the development of critical thinking skills for evaluating management practices and making informed decisions in diverse business environments.

Learning Outcomes of the Course

Sr.No.	Outcomes
CO1	Learners will be able to understand the application of fundamental management principles by effectively organizing resources and contributing to the attainment of organizational goals.
CO2	Learners will be able to apply the critical thinking skills, enabling the evaluation and implementation of management practices conducive to success in diverse business contexts.
CO3	Learners will be able to demonstrate the ability to analyze complex business challenges through the application of strategic management principles, fostering innovative solutions and contributing to organizational growth and competitiveness.

Module. No	Details	No. of Lectures
1	**Module 1: Foundations of Management**	**10**
	● Management Concept, Significance, Role & Skills, Levels of Management. ● **Planning:** Meaning, Importance, Elements, Process. ● **Decision Making:** Meaning, Importance, Process, Techniques of Decision Making.	
2	**Module 2:Structuring Organizations**	**10**

	● **Organizing:** Concepts, Meaning, Advantages and Limitations. ● **Departmentation:** Meaning, Basis and Significance ● **Span of Control:** Meaning, Factors affecting span of control, Centralization vs Decentralization	
3	**Module 3:Managing Operations**	**10**
	● **Directing**: Meaning, Definition, Process, and importance of direction. ● **Leadership**: Meaning, Styles, and Qualities of a Good Leader. ● **Coordination:** Meaning, Definition, and importance of coordination, ● **Controlling**: Meaning, Process, and Techniques of Controlling. ● **Groups**: Types & Process of formation	
	TOTAL	**30 Lectures**

Reference Books:

1. Principles of Management, Tripathi Reddy, Tata Mc. Grew Hill, 2015
2. Management Text and Cases, VSP Rao, Excel Books, Delhi, 2009
3. Management concepts and OB, P.S Rao and N.V Shah, Ajab Pustakalaya, 2015
4. Essentials of Management, Koontz II & W, Mc. Grew Hill, New York, 2020
5. Principles of Management Text and Cases, Dr. M Sakthivel Murugan, New Age Publications, 2008

Course Code	**UOE1.4**					
Name of the Course	**Introduction to Financial Market**					
Name of Board of Studies	**Accountancy and Finance**					
Semester	**I**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	Understand the structure and functioning of financial markets,
LOC2	Understand the significance and instrument of Money Market and Capital market and concept of Financial services.

Learning Outcomes of the Course

Sr.No.	Outcomes
CO1	Learners will be able to understand the structure and importance of the Indian financial system
CO2	Learners will be able to apply the knowledge of the Money Market and Capital Market structure and instrument in work.
CO3	Learners will be able to analyze types of financial services and problem of Indian financial services

Module. No	Details	No. of Lectures
1	**Module 1:Indian Financial System**	**10**
	Functions of Financial System. Financial concepts Meaning and Characteristics of Financial Markets, types, structure and function of Financial markets, role of financial market in Economic Development	
2	**Module 2:Money Market and Capital Market**	**10**
	Introduction, Meaning, Structure & Characteristics of the Indian Money Market and Capital Market, instruments of Money Market and Capital Market, Role of RBI and SEBI in financial markets.	
3	**Module 3:Indian Financial Services**	**10**
	Meaning, Objectives of financial services, types of financial services, importance, characteristics, problems in financial services sector in India, Framework of Financial institutions in India.	
	TOTAL	**30 Lectures**

Reference Books:

1) Financial Markets and Institutions by Frederic S. Mishkin and Stanley Eakins, 2018
2) Financial Markets and Services, E. Gordon and K. Natarajan, 2016
3) Indian Financial Market: A Complete Guide" by M. R. Vasudevan,
4) Indian Financial System by M. Y. Khan, 2015
5) Financial Markets and Institutions in India by Praveen Kumar Bhalla,2017

Course Code	**UDS1.4**					
Name of the Course	**Online Design Tools**					
Name of Board of Studies	**Information Technology and Data Science**					
Semester	**I**					
Number of Credits	**02**					
Number of Lectures	**60**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	To gain proficiency in using Canva to create visually appealing designs for various purposes, including graphics, presentations, posters, and social media posts.
LOC2	To understand and effectively utilize the comprehensive suite of post-production tools offered by DaVinci Resolve.
LOC3	To handle and use Animation Desk and learn the fundamental principles of animation.

Learning Outcomes of the Course

Sr.No.	Outcomes
CO1	Learners will demonstrate proficiency in using Canva to create a wide range of designs, including graphics, presentations, posters, and social media posts.
CO2	Learners will be able to understand and effectively use DaVinci Resolve's comprehensive set of post-production tools to manage their own video editing projects from start to finish.
CO3	Learners will be able to create engaging animations with smooth motion, proper timing, and synchronized audio.

Module. No	Details	No. of Lectures
	Module 1: Canva **1. Introduction to Canva and Account Setup** ● Explore the features and capabilities of Canva by navigating through the interface. **2. Graphics for Social Media** ● Create graphics for three different social media platforms (e.g., Facebook, Instagram, Twitter) using Canva. Experiment with different layouts, typography, and color schemes suitable for each platform. **3. Poster Design** ● Design a poster using Canva's templates and design	**20**

	elements. Check the layout, typography, color theory, and imagery to create an eye-catching poster. **4. Presentation Slides** ● Utilize Canva's presentation templates and design elements effectively to create visually appealing slides. **5. Typography Basics** ● Create a typography-focused design using Canva, emphasizing different font styles, sizes, and formatting options. **6. Image Editing and Arrangement** ● Uploading images to Canva and practicing editing it using built-in editing tools. Experiment with cropping, resizing, and adding filters. **7. Crafting Marketing Materials** ● Design marketing materials such as a flyer, brochure, and business card using Canva. Explore various templates and design elements suitable for each marketing collateral type. **8. Story Design for Social Media** ● Create a series of Instagram or Facebook stories using Canva. Utilize Canva's story templates and design elements to craft engaging and visually appealing story sequences. **9. Customizing Designs from Scratch** ● Design a custom graphic or visual from scratch using Canva. Experiment with different design elements, layouts, and color schemes to create a unique and personalized design. **10. Effective Use of Templates** • Choose a design template from Canva's library and customize it to suit your needs. Modify existing templates to match your design preferences and requirements.	
	Module 2: Animation Desk	**20**

	1. **Interface Navigation**: ● Familiarize yourself with the Animation Desk interface to learn where essential tools and functions are located. 2. **Workspace Setup**: ● Customize your workspace according to your preferences. Understand how to optimize the environment for efficient animation creation. 3. **Basic Animation Principles**: ● Create a simple animation demonstrating principles like squash and stretch, anticipation, and follow-through. 4. **Media Management**: ● Import various media assets (images, audio files) into your project. Learn how to organize and manage different types of media within the Animation Desk. 5. **Drawing Techniques**: ● Experiment with different drawing tools and techniques. Understand the capabilities and limitations of the drawing tools available. 6. **Frame-by-Frame Animation**: ● Create a short animation using frame-by-frame drawing and editing. Master the process of creating smooth animations frame by frame. 7. **Onion Skinning**: ● Utilize onion skinning to reference previous and upcoming frames. Learn how to use onion skinning effectively for accurate animation. 8. **Keyframe Animation**: ● Use keyframes to animate objects along a motion path. Understand the concept of keyframing and its application in creating complex animations. 9. **Audio Integration**: ● Add sound effects and background music to your animation. Learn how to synchronize audio with animation for a more immersive experience.	

	10. **Exporting and Sharing**: ● Export your animation in various formats (e.g., GIF, video). Understand the different export options available and how to share your animations with others.	
	Module 3: DaVinci Resolve	**20**
	1. Navigating the User Interface in DaVinci Resolve ● Familiarize with the layout, panels, and tools available in DaVinci Resolve. **2. Project Setup and Configuration** ● Create a new project in DaVinci Resolve and configure project settings according to your intended output format and resolution. **3. Basic Editing Tools and Techniques** ● Import media into a project and practice basic editing techniques such as cutting, trimming, and rearranging clips on the timeline. **4. Timeline Editing: Trimming, Cutting, and Rearranging Clips** ● Perform detailed timeline editing, including ripple, roll, slip, and slide edits. Practice using the blade tool and other trimming techniques. **5. Adding Transitions and Effects** ● Add transitions between clips and apply various effects to enhance the visual appeal. **6. Working with Audio: Mixing, Levels, and Effects** ● Import audio tracks and adjust levels, pan, and apply basic audio effects. **7. Creating Motion Graphics and Visual Effects** ● Learn to use keyframes, masks, and nodes to create simple animations and visual effects.	

	8. Compositing and Green Screen (Chroma Key) Techniques ● Perform chroma keying to replace green screen backgrounds with different visuals. Practice compositing multiple layers to create complex scenes. **9. Advanced Audio Editing and Mixing** ● Explore advanced audio editing techniques, including using equalizers, compressors, and audio plugins. **10. Export Settings and Formats: Rendering and Exporting Projects** ● Learn to export your project using different settings and formats. Practice rendering a project for different delivery platforms (e.g., YouTube, broadcast, film).	
	TOTAL	**60 Lectures**

Reference Books:

1. Canva Made Simple: A step-by-step guide from getting started to designing like a pro, Angela Feser, 1st Edition, 2022.
2. Canva like a pro by Ash Thompson, 1st Edition, 2020.
3. Gesture Drawing for Animation, Walt Stanchfield. 1st Edition, 2000.
4. The Beginner's Guide to DaVinci Resolve, Paul Saccone and Dion Scoppettuolo, Blackmagicdesign, 16th Edition, 2020.
5. The Definitive Guide to DaVinci Resolve, Paul Saccone and Dion Scoppettuolo, Blackmagicdesign, 15th Edition, 2018.

Course Code	**UDS1.5**					
Name of the Course	**Advanced Spreadsheets**					
Name of Board of Studies	**Information Technology and Data Science**					
Semester	**I**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	Edit worksheets using advanced enhancements and worksheet features.
LOC 2	Summarizing and Managing data in worksheets and workbooks
LOC 3	Enhance lists using pivot tables and pivot table charts

Learning Outcomes of the Course

Sr. No.	Outcomes
CO1	Learners will be able to understand the use of Microsoft Excel to create personal and/or business spreadsheets.
CO2	Learners will be able to organize, use and modify data tables.
CO3	Learners will be able to create and edit a pivot chart and plot the data in various formats.

Module No	Details	No. of Lecture
1	**Module 1: Introduction to Excel and Formatting Cells**	**10**
	Introduction to Excel: Excel Workbook, Quick Access Toolbar, Worksheet, Cell, Formula Bar, Status Bar, Keyboard Shortcuts. **Formatting Cells:** Basic Formatting Options (Font, Alignment, and Number Formatting), Conditional Formatting (Highlighting Rules, Data Bars, Color Scales, Icon Sets, etc.) **Working with Sheets and Data:** Adding, Removing, Renaming, Duplicate, Hiding and Unhiding, Sorting and Filtering Data, Find and Replace in Sheets. Advanced Filtering in Excel (Practicals Based on Module 1)	
2	**Module 2: Formulas, Functions and Advanced Functions**	**10**
	Formulas and Functions: Understanding Basic Formulas,	

	Arithmetic Operations, General Functions (Sum, Average, Min, Max, Count, etc.) **Advanced Functions:** Lookup, HLookup, VLookup, If, Countif, Sumif, Averageif, Nested if, Trim, Len, Left, Mid and Right. (Practicals Based on Module 2)	
3	**Module 3: Working with Pivot Tables, Charts and its types and Data Analysis**	**10**
	Working with Pivot Tables: What is Pivot Table, Creating and Modifying Pivot Table, Sorting and Filtering contents of Pivot Table **Charts and its types:** Bar Charts, Line Charts, Column Charts, Pie Charts, Gantt Charts, Histogram. **Data Analysis:** using scenarios, creating and managing scenario, using goal seek, using solver, understanding macros, advanced excel skills using AI (Practicals Based on Module 3)	
	TOTAL	**30 Lectures**

Reference Books:

1. Excel 2019 Bible by Michael Alexander and Richard Kusleika, Wiley Publications, 2019.
2. Advanced Excel Essentials by Jordan Goldmeier and John Michaloudis, Apress, 2014.
3. Excel 2019 All-in-One For Dummies, Greg Harvey, 1st Edition, 2019.
4. Microsoft Excel 2019 Formulas and Functions, Paul McFedries, Pearson Education, 2019
5. Power Excel with Mrexcel: Master Pivot Tables, Subtotals, Charts, VLOOKUP, IF, Data Analysis in Excel 2010-13, Bill Jelen, Holy Macro! Books, 2016.

Course Code	**UDS1.6**					
Name of the Course	**Effective Communication in English**					
Name of Board of Studies	**Multi Media and Communication Skills**					
Semester	**I**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	To develop in the learners the ability to communicate effectively and to be able to use language for real life functions.
LOC2	To locate and understand specific information contained in notices, instructions, signs and product description
LOC3	To develop basic-level reading comprehension and focus on the sub-skills of reading such as predicting, identifying factual details.

Learning Outcomes of the Course

Sr.No.	Outcomes
CO1	Learners will be able to read and understand basic English communication
CO2	Learners will be able to apply and write correct and coherent information in English
CO3	Learners will be able to execute by listening, understanding and conversing in English for everyday functioning.

Module. No	Details	No. of Lectures
1	**Module 1: READING**	**10**
	Infer meaning from context, Locate and understand specific information from a product description (brochure/advertisement/poster), Locate and understand specific information from a product description from short texts, Learn topic related new words/phrases, Read information /interesting events (national & international)from newspapers & magazines, Read and understand short illustrated narratives, Draw simple inferences based on a story, Locate and understand information & provide accurate details about the events, Read short informative text about new age jobs (newspapers/internet)	

2	**Module 2: WRITING**	**10**
	Paragraph writing: Basic concepts of writing a paragraph (topic sentence/organization/coherence/transition phrases), Types of paragraph, Expository Paragraph, Comparison Paragraph, Contrast Paragraph, Writing a paragraph **Describing an event:** Describing past events by using words, phrases and expressions. **Describing an object:**Describing size, shape, colour, texture, material. **Describing a place/location:** Describing through use of senses(smell, sight,touch etc) dimensions, geographical orientation	
3	**Module 3:LISTENING & SPEAKING**	**10**
	Listening: Listing for the main idea in a spoken piece, Pronunciation, Differences between sounds, Listening for pauses, Addressing people, Emphasis & tonal variations **Speaking:**Introducing oneself and others, Asking for and giving information, Making requests and responding to requests, Giving Instructions, Giving permission	
	TOTAL	**30 Lectures**

Reference Books:

1. English through reading by W.W.S. Bhaskar and N.S. Prabhu, 2017
2. Study Reading- A course in reading skills for Academic purposes by Eric H. Glendinning and Beverly Holmstrom, 2004
3. Speaking English Effectively by Krishna Mohan, N.P. Singh, 2013

Course Code	**UDS1.7**					
Name of the Course	**Green Computing**					
Name of Board of Studies	**Information Technology and Data Science**					
Semester	**I**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	To decrease the use of toxins and maximize energy efficiency in the product development and its use.
LOC2	To understand the new technologies which will help in efficient cooling and datacenter working.
LOC3	To decrease the use of paper and understand the recycling process.
LOC4	To understand the role of Chief Green Officer and the benchmarking process.

Learning Outcomes of the Course

Sr. No.	Outcomes
CO1	Learners will be able to understand about the current problems related to Computing and the working of the latest technologies which may help in energy efficiency of the datacenter.
CO2	Learners will be able to analyze the strategies to make the hardware use and recycling efficient.
CO3	Learners will be able to evaluate fundamental roles emerging as part of Green Computing working in industries.

Module. No	Details	No. of Lectures
1	**Module 1:Green Computing Overview and Standards**	**10**
	Overview and Issues: Problems: Toxins, Power Consumption, Equipment Disposal, And Company's Carbon Footprint: Measuring, Details, Plan for the Future, Cost Savings: Hardware, Power. **Initiatives and Standards**: Global Initiatives: United Nations, Basel Action Network, Basel Convention, Europe, WEEE Directive, Restriction of Hazardous Substances, National Adoption, Asia: Japan, China, Korea.	

2	**Module 2: Power Usage and Cooling**	**10**
	Minimizing Power Usage: Power Problems, Monitoring Power Usage, Servers, Low-Cost Options, Reducing Power Use, Data Deduplication, Virtualization, Management, Bigger Drives, Involving the Utility Company, Low Power Computers, Monitors, Software. **Cooling:** Cooling Costs, Power Cost, Causes of Cost, Calculating Cooling Needs, Reducing Cooling Costs, Economizers, On-Demand Cooling, HP's Solution, System Design, Datacenter Design, Centralized Control.	
3	**Module 3: Recycling and Staying Green**	**10**
	Recycling and Hardware : Recycling, Refurbishing, Green Design, Hard Drive Recycling, EPEAT, RoHS, Energy Star, Computers, Servers, Consolidation, Products, Hardware Considerations, Remote Desktop, Using Remote Desktop. **Staying Green:** Organizational Check-ups, Chief Green Officer, Evolution, Sell the CEO, SMART Goals, Equipment Check-ups, Gather Data, Tracking the data, Baseline Data, Benchmarking, Analyze Data, Conduct Audits, Certifications.	
	TOTAL	**30 Lectures**

Reference Books:

1. Green IT , Author: Toby Velte, Anthony Velte, Robert Elsenpeter ,McGrawHill,September 2008
2. Green Computing and Green IT Best Practice , Jason Harris , Emereo,2008
3. Green Data Center: Steps for the Journey , Alvin Galea, Michael Schaefer,Mike Ebbers, Shroff Publishers and Distributors,2011
4. Green Computing Tools and Techniques for Saving Energy, Money and Resources , Bud E. Smith, CRC Press,2017
5. The Green Computing Book Tackling Energy Efficiency at Large Scale , Edited By Wu-chun Feng , CRC Press,2014

Course Code	**UIT1.8**					
Name of the Course	**Indian Knowledge System - Computing Science in Ancient India**					
Name of Board of Studies	**Information Technology and Data Science**					
Semester	**I**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	To understand ancient Indian scientific concepts and methodologies.
LOC2	To analyze various ancient Indian mathematical and cosmological concepts
LOC3	To enhance calculation speed and mental ability by providing alternative methods to perform mathematical operations quickly.

Learning Outcomes of the Course

Sr.No.	Outcomes
CO1	Understand the foundational principles and interdisciplinary connections within ancient Indian science.
CO2	Apply the concepts of Vedic mathematics for answering numerical aptitude questions from Competitive Examinations
CO3	Analyze the planetary references in Vedic literature, and the interplay between them.

Module. No	Details	No. of Lectures
1	**Module 1 - Computing Science in Ancient India**	**10**
	Introduction, Overview of Ancient Indian Science, Binary Numbers in Indian Antiquity - The Sanskrit Metrical Tradition, Formal Structures in Indian Logic.	
2	**Module 2 - Formula and Notation**	**10**
	The Katapayadi Formula, The Modern Hashing, BNF Notation, Planets in Vedic Literature, Speed of Light and Puranic Cosmology	

3	**Module 3 - Vedic Mathematics**	**10**
	Introduction and History of Vedic Mathematics, Sutras of Vedic Mathematics, Various techniques to carry out basic operations covering Addition, Subtraction, Multiplication, Division, Quadratic Equations, Simultaneous Equations, Use of various Vedic Techniques for answering numerical aptitude questions from Competitive Examinations.	
	TOTAL	**30 Lectures**

Reference Books:

1. Computing Science in Ancient India edited by T.R.N. Rao, 2016
2. Science and Technology in ancient India by Angad Godbole and Pranav Chandavarkar, 2023
3. Vedic Mathematics made easy by Dhaval Bhatia, 2021
4. The essentials of Vedic Mathematics by Rajesh Thakur, 2013
5. Vedic Mathematics New Horizons by Dr. S.K. Kapoor, 2012
6. Vedic Mathematics for Learners by Manu Tripathi, 2022

SEMESTER II

Course Code	**UDS2.1**					
Name of the Course	**R Programming**					
Name of Board of Studies	**Information Technology and Data Science**					
Semester	**II**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	Master the use of the R interactive environment and expanding by installing R packages.
LOC2	Read Structured Data into R from various sources.
LOC3	Understand base R graphics and Manipulate strings, dates in R.

Learning Outcomes of the Course

Sr. No.	Outcomes
CO1	Learners will be able to understand R Studio and explore the features for R programming.
CO2	Learners will be able to apply R functions and graphics.
CO3	Learners will be able to design data constructs in R.

Module. No	Details	No. of Lectures
1	**Module 1: Introduction to R and File Handling**	**10**
	Introduction : Getting Started, Numeric, Arithmetic, Assignment and Vectors, Matrices and Vectors, Non-numeric values, Special Values, Classes, List and Data frames **Reading and Writing Data To and From R**: Importing and reading textfiles data into RStudio, Importing data using R command read.table(), Exercise, Importing textfiles Using scan(),Parsing eachline– Readlines, Writing Data table from R, Importing Data From other Software, Reading data from Excel into R, Sampling and Creating simulated data	
2	**Module 2: Functions and Graphics in R**	**10**
	Functions in R:Conditional statements (if, if else, switch), Repetitive execution: For and While loops, The Apply Functions, Functions for parsing text, Programming in R:ViewingCode of functions from R packages, Exercise-Parsing Real Data - World	

	Population Data from Wikipedia. **Graphics in R**:The R function plot(),Customize plot with low-level plotting commands, Interacting with graphics, Saving plots, Useful Graphics Resources	
3	**Module 3: Data Frames and Modules**	**10**
	Manipulating Data Frames–dplyr: Selecting Columns, Filter, Sorting, Modifying Data Frames, Grouping and Summarizing, Joining Tables, Income in Fictional Countries **Working with Strings**-stringr: Counting String Patterns, Splitting Strings, Capitalizing Strings, Wrapping, Padding, and Trimming, Detecting Substrings, Extracting Substrings, Transforming Strings **Working with Dates** – lubridate: Time Points, Time Zones, Time Intervals	
	TOTAL	**30 Lectures**

Reference Books:

1. THE BOOK OF R , Tilman M.Davies No Starch Press,July 2016
2. R for Data Science, Hadley Wickham, Garrett Grolemund, O'Reilly,2nd Edition,June 2023
3. R Data Science Quick Reference,Thomas Mailund , Apress,August 2019
4. Practical Data Science with R , Nina Zumel John Mount,Manning,November 2019
5. The Art of R Programming, A Tour of Statistical Software Design Norman Matloff , No Starch Press San Francisco,2011

Course Code	**UDS2.2**					
Name of the Course	**Web Data Presentation**					
Name of Board of Studies	**Information Technology and Data Science**					
Semester	**II**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	To understand and use different HTML elements to create a web page structure.
LOC2	To learn how to add interactivity to web pages by applying CSS transitions and animations.
LOC3	To learn how to use JavaScript and jQuery to manipulate the DOM and make web pages interactive.

Learning Outcomes of the Course

Sr. No.	Outcomes
CO1	Learners will be able to construct their own web pages using HTML. This includes personal websites, portfolios, and basic mock-ups of ideas.
CO2	Learners will be able to enhance the user experience on web pages by providing visual feedback and creating interesting visual effects.
CO3	Learners will be able to develop web applications with dynamic and interactive user experiences.

Module. No	Details	No. of Lectures
1	**Module 1: Using HTML to Structure Web Pages**	**10**
	Introduction to HTML: Basic HTML Document Structure, Favicon, Metadata, Adding Hyperlinks, Lists. **HTML Tables:** Creating simple tables, Table Dimension, Merging Table Cells. **HTML Forms:** Collecting user input with HTML Forms, Advanced Input Types in HTML5. **HTML Media:** Embedding Images, Audio and Video on web page.	
2	**Module 2: Responsive Web Designing with CSS**	**10**
	Introduction to CSS: CSS formats, CSS box model for spacing border and background, working with fonts form and tables. **CSS Page Layouts:** Using Layout Elements, Semantic Elements, Creating, Positioning and Formatting Divisions using CSS.	

	CSS3 Transitions, Transforms, Animations and Filters: accordion using transitions, 2D transforms with text and images, Simple animations, adding filters to images.	
3	**Module 3: Javascript and jQuery**	**10**
	Introduction to JavaScript: including javascript in webpage, methods and properties of DOM scripting, Event Handling in Javascript. **Introduction to jQuery:** including jQuery in webpage, jQuery Selectors, methods, and event methods.	
	TOTAL	**30 Lectures**

Reference Books:

1. Step by Step HTML5, Faithe Wempen, Microsoft Press, 2011.
2. Web Design: The Complete Reference, Thomas Powell, TMH, 2009.
3. JavaScript 2.0: The Complete Reference, Thomas Powell, Fritz Schneider, 2nd Edition, 2004.
4. Learning Web Design, Jennifer Niederst Robbins, O`Reilly, 5th Edition.
5. Murach's HTML5 and CSS, Anne Boehm, Zak Ruvalcaba, Murach, 3rd Edition.

Course Code	**UIT2.3**					
Name of the Course	**R-Programming and Web Data Presentation Practical**					
Name of Board of Studies	**Information Technology and Data Science**					
Semester	**II**					
Number of Credits	**04**					
Number of Lectures	**60**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Sr. No.	Objectives
LOC1	To understand use of the R interactive environment and expanding by installing R packages
LOC2	To build Structured Data into R from various sources
LOC3	To apply base R graphics and its modules.
LOC4	To understand and use different HTML elements to create a web page structure.
LOC5	To learn how to add interactivity to web pages by applying CSS transitions and animations.
LOC6	To learn how to use JavaScript and jQuery to manipulate the DOM and make web pages interactive.

Sr. No.	Outcomes
CO1	Learners will be able to understand R Studio and explore the features for R programming.
CO2	Learners will be able to apply R functions and graphics.
CO3	Learners will be able to design data constructs in R.
CO4	Learners will be able to construct their own web pages using HTML. This includes personal websites, portfolios, and basic mock-ups of ideas.
CO5	Learners will be able to enhance the user experience on web pages by providing visual feedback and creating interesting visual effects.
CO6	Learners will be able to develop web applications with dynamic and interactive user experiences.

Module No	Details	No. of Lectures
	Module 1	**30**
1	Introduction to R Programming Write R Program to implement expressions Write R Program to implement use of assignment operators	
2	Write R Program to implement	

	a. Use of Scalars b.Use of vectors	
3	Write R Program to implement the following Creating Matrices Performing different operations on Matrices	
4	Write R Program to implement a. List Creation b. Data frames Creation	
5	Write R Program to perform the file operations a. Read the file b.Access the file	
6	Write R Program to perform a. Sampling of data b.Simulate the data	
7	Write an R Program to simulate conditional statements. IF statement switch statement	
8	Write R Program to implement loops For Loop While Loop	
9	Write R Program to implement Packages Functions	
10	Write R Program to demonstrate the following: Plotting in R Graphics Resources in R	
11	Working with data frames and its operations	
12	Working on data to perform Grouping Summarizing	
13	Write an R program to demonstrate data interface with CSV files [creating data for CSV, analyzing, writing CSV files]	
14	Write an R program to demonstrate use of various string manipulation functions.[paste(), print(),noquote(),format(), cat(),toString(), sprint()]	
15	Write an R program to perform time-series analysis for the given data.	
	Module 2	**30**
1	a. Create a web page using different text formatting tags. b. Create a web page with links to different pages and allow navigation between web pages.	

2	a. Create a web page with links within the pages using bookmarks. b. Create a web page to demonstrate concepts of types of Lists.	
3	a. Create a web page showing a simple table with borders. b. Create a web page showing a table using concepts of merging table cells. [rowspan] c. Create a web page showing a table using concepts of merging table cells. [colspan] d. Create a web page showing a table using concepts of merging table cells. [Rowspan and colspan]	
4	a. Embed images into a web page using the <img> tag. b. Embed audio and video files into a web page using the <audio>, <video> tag.	
5	Design a web page demonstrating different semantics elements and position them in proper manner. [Take any page for reference and try to recreate it or design a page on your own]	
6	a. Create and use different style rules with available types of lists. b. Create and use different style rules with hyperlinks. c. Create and use different style rules with tables.	
7	a. Create and use different style rules with font elements. b. Create and use different style rules with Paragraph elements. c. Demonstrate the use of inline, internal and external CSS in one webpage.	
8	a. Demonstrate the use of Document object methods. b. Using javascript, demonstrate validating Text Input Fields, Drop-down Lists and Checkboxes. c. Using javascript, demonstrate validating Radio buttons and Validating Multi-Select Boxes.	
9	a. Applying multiple transitions on a web page. b. Applying CSS transforms on web elements.	
10	a. Applying simple animations to web page. b. Applying various filters to an image.	
11	a. Using javascript, demonstrate the use of onAbort, onBlur, onChange, onClick, onDblClick events. b. Using javascript, demonstrate the use of onDragDrop, onError, onFocus events.	
12	a. Using javascript, demonstrate the use of onKeyDown, onKeyPress, onKeyUp, onLoad, onReset, onResize, onSelect, onSubmit, onUnloadevents. d.Using javascript, demonstrate the use of onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove events.	
13	Demonstrate complete validation of User Registration form using appropriate fields of html and events of javascript.	
14	Develop an email list application using jQuery.	

Course Code	**UDS2.4**						
Name of the course	**Pre-Calculus**						
Name of Board of Studies	**Mathematics and Statistics**						
Semester	**II**						
Number of credits	**2**						
Number of lectures	**30**						
Lecture duration	**60 minutes**						
Total marks	**CE**	**20**	**SEE**	**30**	**Total Marks**		**50**

15	a. Develop an image rollover application using jQuery. b. Develop an image swap application using jQuery.	

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	To master the number fundamentals, equations and different types of mathematical functions
LOC2	To review and explain trigonometry and gain expertise in trigonometric identities.
LOC3	To understand Vectors, Matrices, system of linear equations and its solutions.

Learning Outcomes of the Course

Sr.No.	Outcomes After Completing this course Learners will be able to:
CO1	Apply the knowledge of numbers, graphs and functions in real life.
CO2	Apply Trigonometry In modeling real life problems.
CO3	Apply matrices and knowledge of solving system of linear equations in real life problems

Module No.	Details	No. of Lectures
1	**Module 1: Fundamentals and Functions**	
	Fundamentals: Real Numbers, Exponents and Radicals, Algebraic Expressions, Rational Expressions, Equations, Modeling with Equations, Inequalities, Coordinate Geometry, Graphing Calculators; Solving Equations and Inequalities Graphically, Lines, Making Models Using Variation. **Functions**: What is function? Graphs of Functions, Getting Information from the Graph of a Function, Average Rate of Change of a Function, Transformations of Functions, Combining Functions, One-to One Functions and Their Inverses.	**10**
2	**Module 2 :Trigonometric Functions and Trigonometric Functions of Angles**	

	Trigonometric Functions: The Unit Circle, Trigonometric Functions of Real Numbers, Trigonometric Graphs, Inverse Trigonometric Functions and Their Graphs, Modelling Harmonic Motion **Trigonometric Functions of Angles:** Angle Measure, Trigonometry of Right Triangles, Trigonometric Functions of Angles, Inverse Trigonometric Functions and Right Triangles, The Law of Sines, The Law of Cosines.	**10**
3	**Module 3: Vectors and Systems of Equations and Inequalities**	**10**
	Vectors in Two and Three Dimensions: Vectors in Two Dimensions, The Dot Product, Three-Dimensional Coordinate Geometry, Vectors in Three Dimensions, The Cross Product, Equations of Lines and Planes **Systems of Equations and Inequalities:** Systems of Linear Equations in Two Variables, Systems of Linear Equations in Several Variables, Matrices and Systems of Linear Equations, The Algebra of Matrices, Inverses of Matrices and Matrix Equations, Determinants and Cramer's Rule, Partial Fractions, Systems of Nonlinear Equations, Systems of Inequalities	
	TOTAL	**30 Lectures**

Books and references:

1. Precalculus– Mathematics for Calculus, 5th Edition by James Stewart, Lothar Redlin, Saleem Watson, Cengage Learning, 2013
2. Precalculus, David H. Collingwood, K. David Prince, Matthew M. Conroy, Free Software Foundation, 2011
3. Pre-calculus Demystified, Second Edition by Rhonda Huettenmueller, Tata McGraw Hill, 2005
4. Contemporary Precalculus: A Graphing Approach, 5th Edition by Thomas W. Hungerford, Douglas J. Shaw, Thomson Higher Education, 2009

Course Code	**UOE2.10**					
Name of the Course	**Basics of Accounting**					
Name of Board of Studies	**Accountancy and Finance**					
Semester	**II**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	To acquire conceptual knowledge of financial accounting and Indian Accounting Standards.
LOC2	To understand accounting in a computerized environment.
LOC3	To provide knowledge on the technique for preparing accounts and financial statements.

Learning Outcomes of the Course

Sr. No.	Outcomes
CO1	Learners will be able to understand the basic accounting principles and accounting standards.
CO2	Learners will be able to apply and analyze financial transactions of the business for managerial decisions.
CO3	Learners will be able to create financial statements.

Module. No	Details	No. of Lectures
1	**Introduction to Accounting**	**10**
	● **Meaning and Scope of Accounting**: Need and importance, Concept of Book Keeping, Branches of accounting, Objectives of accounting, Basic Terminologies. ● **Introduction to Accounting Standards**: Meaning and Scope. ● **Accounting in Computerized Environment**: Introduction, Features and application in various areas of Accounting.	
2	**Interpretation of Financial Statements**	**10**
	● **Terminologies in company accounts** – Balance Sheet (Equity and liabilities, shareholder's funds, share application money pending allotment, non-current liabilities, current liabilities, Assets, non-current assets, current assets) ● **Terminologies in company accounts** – Revenue Statement (Revenue from operations, Other income, Expenses, Exceptional items, Extraordinary items, Tax expense,	

	Profit/(Loss) for the period, Earnings per equity share) ● Comprehending financial statements in annual reports of limited companies in India.	
3	**Trial Balance and Final Accounts**	**10**
	● Ratio analysis and Interpretation (based on vertical form of financial statements)including conventional and functional classification ● **Balance sheet ratios**: Current ratio, Liquid Ratio ● **Revenue statement ratios**: Gross profit ratio, Net profit ratio. ● **Combined ratios**: Return on capital employed, Return on proprietors fund.	
	TOTAL	**30 Lectures**

Reference Books:

1. Financial Accounting for Management by N. Ramchandran and Ram Kumar Kakani, The McGraw Hill Companies, 2011
2. Accounting for Management - by T. Vijaykumar, The McGraw Hill Companies, 2009
3. Financial Accounting for Business Managers by Asish K. Bhattacharyya. - PHI Learning, 2012
4. Financial Accounting by A Mukherjee and M. Hanif. – The McGraw Hill Companies, 2021
5. Financial Accounting by V. Rajasekaran and R. Lalitha, Pearson Publication, 2010
6. Financial Accounting by P.C. Tulsian, Pearson Publication, 2002
7. Financial Accounting by CA Raj K Agrawal and CA Rupesh Agrawal, Taxmann's, 2015

Course Code	**UOE2.7**					
Name of the Course	**Organizational Behavior**					
Name of Board of Studies	**Management**					
Semester	**II**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	To understand the changing role of practicing managers and learn about the theories of motivation in a work environment.
LOC2	To study the components of Individual behavior and group dynamics, leadership and power politics.
LOC3	To understand in the work culture and change management

Learning Outcomes of the Course

Sr. No.	Outcomes
CO1	Learner will be able to understand the theories of motivation in an organization
CO2	Learner will analyze the factors influencing individual and group behavior, aspects of leadership and Power & politics in an organization
CO3	Learners will be able to adapt to the work culture and learn the nuances of managing change.

Module. No	Details	No. of Lectures
1	**Module 1: Introduction of organizational Behavior**	**10**
	Introduction of organizational Behavior: Meaning, Nature and scope of OB, Models of OB. Theories of Motivation : Maslow, Herzberg, Mc. Gregor Theory X and Theory Y, William Ouchi's Theory Z, Victor Vroom . ERG theory.	
2	**Module 2: Group Dynamics, Leadership, Power & Politics**	**10**
	Group Dynamics: Individual Behavior (IQ, EQ, SQ). Group Formation, Team Building, Team Development.. Goal Setting. **Leadership-** Introduction and characteristics of Leadership, Formal and Informal leadership. **Power & Politics**-Difference between Influence, Power & Authority, Sources of power, Organizational Politics, Ethics of Power, and Politics in Organizations.	

3	**Module 3: Organizational Culture and Change Management**	**10**
	Organizational Culture and Change Management: Work Culture, types of culture, creating and maintaining organizational culture, Organizational Change, effects of Resistance to Change, ways to overcome resistance to change. Time and Stress Management.	
	TOTAL	**30 Lectures**

Reference Books:

1. Organizational Behavior, Stephen P. Robbins, Prentice Hall of India Private Ltd., 2018
2. OrganizationalBehaviour, Mirza S. Saiyadain, Tata c. Graw Hill, 2003
3. Understanding Organizational Behavior, Udai Pareek, Oxford University Press. 2010.
4. Work and Organizational Behavior, John Bratton, Militza Callinan, Carolyn Forshaw and Peter, Sawchuk Palagrave Macmilla, New York, 2010
5. Organizational Behavior, Fred Luthans.. McGraw Hill. 2008
6. Organizational Behavior, by Margie Parikh and Rajen Gupta, Tata Mc. Graw Hill Education Private Limited , New Delhi, 2010.

Course Code	**UDS2.5**					
Name of the Course	**Robotics Process Automation**					
Name of Board of Studies	**Information Technology and Data Science**					
Semester	**II**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	To make the Learners aware about automation today in the industry.
LOC2	To make the Learners aware about the tools used for automation.
LOC3	To help the Learners automate a complete process.

Learning Outcomes of the Course

Sr. No.	Outcomes
CO1	Learners will be able to Understand the mechanism of the business process and can provide the solution in an optimized way.
CO2	Learners will be able to apply and use Sequence, Flowchart, and Control Flow.
CO3	Learners will be able to create Automation for the business processes.

Module. No	Details	No. of Lectures
1	**Module 1: Sequence, Flowchart, and Control Flow**	**10**
	1. Create a simple sequence-based project. 2. Create a flowchart-based project. 3. Automate UiPath Number Calculation (Subtraction, Multiplication, Division of numbers). 4. Create an automation UiPath project using different types of variables (number, datetime, Boolean, generic, array, data table) 5. Consider an array of names. We have to find out how many of them start with the letter "a". 6. Create an automation where the number of names starting with "a" is counted and the result is displayed. 7. Demonstrate switch statement with an example. 8. Create an automation To Print numbers from 1 to 10 with break after the writeline activity inside for each activity	

	9. Create an automation using Do..While Activity to print numbers from 5 to 1 10. Create an automation using Delay Activity between two writeline activities to separate their execution by 5 seconds	
2	**Module 2: Data Manipulation and Using Controls**	**10**
	1. Automate the process to extract data from an excel file into a data table and vice versa 2. Create an automation To Write data to specific cell of an excel sheet. 3. Create an automation To Read data to specific cell of an excel sheet. 4. Create an automation to append data to specific cell of an excel sheet. 5. Create an automation to Read an Excel sheet and write the data another sheet based on some conditionv 6. Create an automation to sort a table of an excel sheet. 7. Create an automation To filter a table of an excel sheet 8. Implement the attach window activity. 9. Perform data scraping on any e-commerce website (eg. Amazon/Flipkart) 10. Automate the process of logging and taking screenshots in UiPath.	
3	**Module 3: Application with Plugins, Extensions, Handling User Events and Assistant Bots**	**10**
	1. Demonstrate the Mouse (click, double click and hover) activities in UiPath: 2. Demonstrate the Type into activities in UiPath: 3. Demonstrate the Type Secure text in UiPath: 4. Demonstrate the Element triggering events in UiPath: 5. Demonstrate the Image triggering events in UiPath: 6. Demonstrate the System triggering events in UiPath: 7. Install and automate any process using UiPath with the Java Plugin 8. Install and automate any process using UiPath with the Mail Plugin 9. Install and automate any process using UiPath with the PDF Plugin 10. Install and automate any process using UiPath with the Excel Plugin 11. Install and automate any process using UiPath with the Word Plugin Automate the process of send mail event (on any email). 12. Demonstrate the Exception handing in UiPath.	
	TOTAL	**30 Lectures**

Reference Books:

1. Learning Robotic Process Automation, by Alok Mani Tripathi, Packt, 2018
2. Robotic Process Automation Tools, Process Automation and their benefits, by Srikanth Merianda, Createspace, 2018
3. The Simple Implementation Guide to Robotic Process, by Kelly Wibbenmeyer, iUniverse, 2018
4. Robotic Process Automation Projects, by Nandan Mullakara, Arun Kumar Asokan, Packt, 2020
5. Robotic Process Automation, by Anand Singh Gadwal, Wiley, 2023

Course Code	**UDS2.6**					
Name of the Course	**Prompt Engineering**					
Name of Board of Studies	**Information Technology and Data Science**					
Semester	**II**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	To understand the fundamentals of prompt engineering.
LOC2	To illustrate the role of prompt engineers in Generative AI-powered systems and Natural Language Processing (NLP).
LOC3	To develop a deep knowledge of Large Language Models (LLMs) and their workings.

Learning Outcomes of the Course

Sr.No.	Outcomes
CO1	Learners will be able to understand the fundamentals of prompt engineering.
CO2	Learners will be able to identify the role of prompt engineers in Generative AI-powered systems and NLP.
CO3	Learners will be able to formulate the art of crafting, optimizing, and customizing prompts for various AI models.

Module. No	Details	No. of Lectures
1	**Module 1: Generative AI and Prompt Engineering**	**10**
	Understanding Generative AI: Evolution of AI: From rule-based to generative models, Key generative AI models: RNNs, LSTMs, GPT, and more, Popular use cases for generative AI **Introduction to Prompt Engineering:** What is prompt engineering and why it matters, Prompt types: explicit, implicit, and creative prompts, The role of prompts in guiding AI models (Practical based on Module1)	
2	**Module 2: Designing Effective Prompts and Advanced Prompt Engineering Techniques**	**10**
	Designing Effective Prompts: Understanding your AI model: capabilities and limitations, Crafting clear and concise prompts, Using tokens, temperature, and other parameters, Iterative prompt design: testing and refining	

	Advanced Prompt Engineering Techniques: Conditional prompts for context-sensitive AI, Multi-step prompts for complex tasks, Leveraging transfer learning for prompt engineering (Practical based on Module 2)	
3	**Module 3: Ethical and Real-world Applications and Case Studies**	**10**
	Ethical Considerations in Generative AI and Prompt Engineering: Addressing AI biases and fairness, Ensuring transparency and explainability, Data privacy and security concerns **Real-world Applications and Case Studies:** Content generation and creative writing, Data analysis and visualization, Chatbots and conversational AI, Anomaly detection and pattern recognition (Practical based on Module3)	
	TOTAL	**30 Lectures**

Reference Books:

1. Mastering Generative AI and Prompt_Engineering by Data Science Horizons,2022
2. Prompt Engineering for Generative AI- James Phoenix, Mike Taylor,2024
3. The Art of Prompt Engineering with ChatGPT: A Hands-on Guide (learn AI Tools the Fun Way!)" by Nathan Hunter,2023
4. "Prompt Engineering: Unlocking Generative AI: Ethical Creative AI for All" by Navveen Balani,2023
5. "An Illustrated Guide to AI Prompt Mastery: for MidJourney, DALL-E, NightCafe, Deep Dream Generator, and More" by Jack Wylder, 2023

Course code	**UDS2.7**					
Name of the Course	**English Technical Writing**					
Name of Board of Studies	**Multi Media and Communication Skills**					
Semester	**II**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	This course aims to provide conceptual understanding of developing a strong foundation in general writing, including research proposals and reports.
LOC2	Learners will be able to apply skills for writing Article, Blog, E-Book, Commercial web Page design, Business Listing Press Release, E-Listing and Product Description.
LOC3	This course aims to evaluate conceptual understanding of ethics and plagiarism

Learning Outcomes of the Course

Sr.No.	Outcomes
CO1	To understand basic concepts of Technical Communication.
CO2	To be able to organise and write reports.
CO3	To be able to use online collaborative tools.

Module. No	Details	No. of Lectures
1	**Module 1: Technical Writing**	**10**
	Introduction to Technical Communication: Meaning, characteristics, essential practices **Steps of Writing Technical Documents**:Planning, Drafting, Revising, Editing, Proofreading **Writing Collaboratively**: Managing Projects, Conducting Meetings, Using Social Media and Other Electronic Tools in Collaboration, **Introduction to Content Writing: Types of Content,** Article, Blog, E-Books, Press Release, Newsletters Etc) **Organizing Information:** Principles for Organizing Technical Information,Understanding Conventional Organizational Patterns. **Emphasizing Important Information**: Writing Clear,Informative Titles, Writing Clear, Informative Headings,Writing Clear Informative Lists, Writing Clear Informative Paragraphs.	

2	**Module 2:Report Writing**	**10**
	Report Components: Title page, Executive summary, Contents page, Introduction, Background information, Methodology, Findings,Analysis, Conclusion, Recommendations, Bibliography, Appendices, Glossary. **Types of Reports:**Feasibility Reports, Investigative Reports, Laboratory Reports, Test Reports, Trip Reports, Trouble Reports **Writing Proposals:** Understanding the Process of Writing Proposals. **Writing Informational Reports**: Understanding the Process of Writing Informational Reports, Writing Directives, Writing Field Reports, Writing Progress and Status Reports, Writing Incident Reports, Writing Meeting Minutes. **Writing Recommendation Reports:** Understanding the Role of Recommendation Reports, Writing Recommendation Reports.	
3	**Module 3:Evaluation and Plagiarism**	**10**
	Reviewing, Evaluating, and Testing Documents :Understanding Reviewing, Evaluating, and Testing, Reviewing Documents ,Using Internet tools to check writing Quality, Duplicate Content Detector, **Plagiarism**: Concept, Ethical and professional issues of plagiarism, ways to avoid plagiarism	
	TOTAL	**30 Lectures**

Reference Books:

1. Technical Communication Mike Markel Bedford/St. Martin's 2014
2. Handbook of Technical Writing Gerald J. Alred , Charles T.Brusaw , Walter E.Oliu Bedford/St.Martin's 2008
3. Technical Writing 101: A Real-World Guide to Planning and Writing Technical Content Alan S. Pringle and Sarah S. O'Keefe scriptorium 2009

Course code	**UDS2.8**					
Name of the Course	**Lifestyle for Holistic Health**					
Name of Board of Studies	**Information Technology and Data Science**					
Semester	**II**					
Number of Credits	**02**					
Number of Lectures	**30**					
Lecture Duration	**60 Minutes**					
Total Marks:	**CE**	**20**	**SEE**	**30**	**Total**	**50**

Learning Objectives of the Course

Sr. No.	Objectives
LOC1	Define what holistic health is.
LOC2	Discuss the concepts of holistic health.
LOC3	Practice ways to attain holistic health.

Learning Outcomes of the Course

Sr. No.	Outcomes
CO1	Learners will be able to understand inner resources to strengthen mind- body connections.
CO2	Learners will be able to apply knowledge of health risks, disease, and wellness in diverse populations.
CO3	Learners will be able to evaluate health challenges to the mind-body- spirit and holistic methods.

Module. No	Details	No. of Lectures
1	**Module 1: Ethics of Eating and Dietary Theory**	**10**
	The Ethics of Eating and Importance of Balanced Diet: What We Eat, When We Eat, How We Eat, Nutrient Requirements, Health Benefits, Weight Management, Mental Health, Cultural and Social Aspects. **Dietary Theory :** Diet Puzzle , Traditional Style Diets, Modern Themes, Finding the Right Diet for you.	
2	**Module 2: Health, Redefining Health and stress response**	**10**
	Why be healthy : Authentic Self-Expression, Unpredictable Futures, Building Your Future, Spiritual Beings, This is your life. **Redefining Health :** Story of Self Healing, How Lifestyle affects your body, Sick versus Well, Psychology of emotions. **How to counteract the stress response :** Introduction. How to	

	elicit the relaxation response, simplified way to elicit the relaxation response, Meditation, Self-healing.	
3	**Module 3: Radical Self care and Healing Yourself**	**10**
	Radical Self care : The Whole Health Cairn , Treatments that foster self-healing **Healing Yourself :** Believe you can heal yourself, Find the Right Support, Listen to your body and intuition, diagnose the root cause of illness, Work-Life balance , Write the Prescription for Yourself, Surrender Attachment to Outcomes	
	TOTAL	**30 Lectures**

Reference Books:

1. Integrative Nutrition: A Whole-Life Approach to Health and Happiness by Joshua Rosenthal, 2018
2. Mind Over Medicine: Scientific Proof That You Can Heal Yourself" by Lissa Rankin, M.D, 2014
3. The Healing Power of Mindfulness: A New Way of Being by Jon Kabat-Zinn, 2018
4. Holistic Health: A Comprehensive Guide to Wellness by Bruce W. Tuckman and Robert E. Kennedy,
5. The Encyclopedia of Natural Medicine by Michael T. Murray and Joseph Pizzorno, 3rd Edition, 2012

Scheme of Evaluation Pattern

Table 1A: Scheme of Continuous Evaluation (CE) Scheme of Evaluation Pattern

Sub-components	Maximum Marks	Conditions for passing
1) Fieldwork-based project work and report or assignment or presentation or report-writing or article/ book review or topic-based activity	10	a) A learner must be present for each of the sub- components. b) The subtotal of both the sub-components must be minimum **08 marks**
2) Assignment/ Presentation/ Quizz	10	
Total	20	

Note: Learner must be Present in all the two exam components

Table 1B: Scheme of Semester End Examination (SEE) Evaluation
Question Paper Pattern for Semester End Examination (SEE)

Maximum Marks: 30 Minimum Marks to Pass: 12 Duration: 1 hour

Note: All questions are compulsory. Each question has an internal choice.

Question Number		Nature of Questions	Maximum Marks
1)		Attempt any TWO of the following: (From Module I)	10
	A.		
	B.		
	C.		
2)		Attempt any TWO of the following: (From Module II)	10
	A.		
	B.		
	C.		
3)		Attempt any TWO of the following: (From Module III)	10
	A.		
	B.		
	C.		

Note:

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	Understand	Apply	Analyze	Evaluate	Create	
% in Question Paper	20	20	30	10	10	10	100%

Table 1C: Scheme of Semester End Practical Examination (SEE)
Evaluation Question Paper Pattern for Practical Semester End Examination (SEE)
Major Practical Subject Minor \ VSC \ SEC Practical Subject

A Practical of 2 credits is evaluated for a total of 50 Marks

Internal Continuous Assessment: 40% [20 Marks]

Continuous Evaluation through: Students are expected to attend each practical and submit the written practical of the previous session.

Performing Practical and write up submission will be continuous internal evaluation. 2.5 marks can be awarded for each practical performance and write up submission totaling to 50 marks and can be converted to 20 marks.

Semester End Examination: 60% [30 Marks]

Question Number		Nature of Questions	Marks
1)		Implement following practical's:	
	A.	Practical Question from Major 1	13
	B.	Practical Question from Major 2	12
	C.	Journal and Viva	05