VIVEKANANDHA

COLLEGE OF ARTS AND SCIENCES FOR WOMEN

ELAYAMPALAYAM, TIRUCHENGODE (Tk.), NAMAKKAL(Dt.).

[AN ISO 9001:2015 CERTIFIED INSTITUTIONS]

Affiliated to Periyar University ,Approved by AICTE

& Re-Accredited with 'A+' Grade by NAAC,

Recognized under section 2(f) & 12(B) of UGC Act,1956)

ELAYAMPALAYAM,TIRUCHENGODE(Tk.),NAMAKKAL(Dt.)

AUTONOMOUS

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE&APPLICATIONS

B.Sc. DATA SCIENCE

SYLLABUS & REGULATIONS

FOR CANDIDATES ADMITTED FROM 2024 – 2025 ONWARDS
UNDER AUTONOMOUS & CBCS & OBE PATTERN

VIVEKANANDHA EDUCATIONAL INSTITUTIONS
Angammal Educational Trust
Elayampalayam, Tiruchengode(Tk.),Namakkal(Dt.)

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)

B.Sc (DATA SCIENCE)

(Candidates admitted from 2024-2025onwards)

I. SCOPE OF THE PROGRAMME

Bachelor of Information Technology can be considered to be one of the most prominent UG level programs in our country. This program mainly deals with the development of computer applications for the purpose of updating computer programming languages. B.Sc.[DS] also aims at creating strong knowledge of theoretical Information Technology subjects who can be employed in software development and testing units of industries. The course has a time period of 3 years with 6 semesters.

II. SALIENT FEATURES

- Regular conduct of guest lectures and seminars
- Campus recruitment
- Provides facilities such as Internet Access and In-House Library
- Provides Career Guidance for Post Graduate Courses like M.Sc, MCA and the Certifications in programming languages
- Conduct of Personality Development Program
- Visiting Faculties from Industries

III. OBJECTIVES OF THE PROGRAMME

The Course Objective of the B.Sc. Data Science program is to provide advanced and in-depth knowledge of Information Technology and its applications to enable students pursue a professional career in Information and Communication Technology in related industry, business and research. The course designed to impact professional knowledge and practical skills to the students.

IV. ELIGIBILITY FOR ADMISSION

A Candidates seeking admission to the first year Degree course(B.Sc. Data Science)shall be required to have passed Higher Secondary Examination with Mathematics or Business Mathematics or Computer Science or Computer Applications or Computer Technology or Statistics (Academic Stream or Vocational Stream) as one of the subject under Higher Secondary Board of Examination, conducted by the Government of Tamilnadu or an examination accepted as equivalent thereto by the syndicate, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the B.Sc. Data Science Degree Examination of Periyar University

V. DURATION OF THE PROGRAMME

- The course shall extend over a period of three academic years consisting of six semesters. Each academic year will be divided into two semesters. The First semester will consist of the period from July to November and the Second semester from December to April.
- The subjects of the study shall be in accordance with the syllabus prescribed from time to time by the Board of Studies of Vivekanandha College of Arts and Sciences for Women with the approval of Periyar University.

VI. CONTINUOUS INTERNAL ASSESSMENT(CIA)

The performance of the students will be assessed continuously and the Internal

ASSESSMENT MARKS **FOR THEORY PAPERS** WILL BE AS UNDER:

Average of Two Tests		-	05
Model Exam		-	10
Assignment		-	05
Attendance		-	05
	TOTAL	-	25

ASSESSMENT MARKS **FOR PRACTICAL PAPERS** WILL BE AS UNDER:

Model Exam		-	20
Observation Note		-	10
Attendance		-	10
	TOTAL	-	40

PASSING MINIMUM – EXTERNAL

THEORY	In the End Semester Examinations, the passing minimum shall be 40% out of 75 Marks.(30Marks)
PRACTICAL/MINI PROJECT	In the End Semester Examinations, the passing minimum shall be 40% out of 60 Marks.(24Marks)

VII. ELIGIBILITY FOR EXAMINATION

A candidate will be permitted to appear for the University Examination only on learning 75% of attendance and only when her conduct has been satisfactory. It shall be open to grant Exemption to a candidate for valid reasons subject to conditions prescribed.

DISTRIBUTION OF MARKS FOR ATTENDANCE:

ATTENDANCE PERCENTAGE	MARKS	
	THEORY	PRACTICAL
75-80	1	2
81-85	2	4
86-90	3	6
91-95	4	8
96-100	5	10

VIII. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Successful candidates passing the Examination of Core Courses (Main & Allied Subjects) &Securing Marks.

a) 75 % and above shall be declared to have passed the examination in First Class with Distinction provided they pass all the examinations prescribed for the course at first appearance itself.
b) 60% and above but below 75 % shall be declared to have passed the Examinations in First Class.
c) 50% & above but below 60% shall be declared to have passed the examinations in Second Class.
d) All the remaining successful candidates shall be declared to have passed the examinations in Third Class.
e) Candidates who pass all the examinations prescribed for the course at the First appearance itself and within a period of three Consecutive Academic years from the year of admission only will be eligible for University Rank.

IX. ELIGIBILITY FOR AWARD OF THE DEGREE

A candidate shall be eligible for the award of the Degree only if she has undergone the above Degree for a period of not less than Three Academic years comprising of six semesters and passed the Examinations prescribed and fulfilled such conditions has have been prescribed therefore.

X. PROCEDURE IN THE EVENT OF FAILURE

If a candidate fails in a particular subject, she may reappear for the university examination in the concerned subject in subsequent semesters and shall pass the examination.

XI. COMMENCEMENT OF THESE REGULATIONS

These regulations shall take effect from the academic year2023-2024 (i.e.,) for the students who are to be admitted to the First year of the course during the Academic year 2023-24 and thereafter.

XII. TRANSITORY PROVISIONS

Candidates who were admitted to the UG course of study before 2021-2022 shall be permitted to appear for the examinations under those regulations for the period of Three years ie., upto and inclusive of the Examinations of 2023-2024. Thereafter, they will be permitted to appear for the examinations only under the regulations then in force.

EVALUATION OF EXTERNAL EXAMINATIONS(EE)

QUESTION PAPER PATTERN–Theory	
duration:3Hours	**Max.Marks:75**
PART-A: **(10 x 1=10)**	Answer all the Questions Two Questions from each Unit
PART-B: **(5x 7 =35)**	Answer all the questions One Question from each Unit(Either or Type)
PART-C: **(3 x 10 =30)**	Answer any **THREE** of the questions One Question from each Unit(3Outof 5)
THE END SEMESTER EXAMINATIONS,THE PASSING MINIMUM SHALL BE %OUT OF 75MARKS.(30MARKS)	

QUESTION PAPER PATTERN–Practical	
Time duration: 3 Hours	**Max.Marks:60**
One compulsory question from the given list of objectives	**30Marks**
One either/or type question from the given list of objectives	**30Marks**
IN THE END SEMESTER EXAMINATIONS, THE PASSING MINIMUM SHALL 40% OUT OF 60 MARKS. (24 MARKS)	

B.Sc., DATA SCIENCE

CURRICULUM ACADEMIC YEAR 2024–2025

COURSE PATTERN AND SCHEME OF EXAMINATIONS UNDER AUTONOMOUS, CBCS & OBE PATTERN

FOR THE CANDIDATES ADMITTED FROM THE YEAR 2024–2025 ONWARDS

SEMESTER: I&II

SEM	PART	COURSE CODE	COURSETITLE	Hrs	CREDIT	MARKS		
						CIA	EE	TOT
I	I	24U1LT01	Tamil-I	6	3	25	75	100
	II	23U1LE01	Communicative English – I	4	3	25	75	100
	III	24U1DSC01	Data Structures and Program Design in C	5	4	25	75	100
	III	24U1DSCP01	Data Structures and Program Design in C Lab	5	3	40	60	100
	III	23U1MAGE01	Allied01:NumericalMethods	4	3	25	75	100
	III	23U1ENAC01	Soft Skill for Effective Communication – I	2	2	25	75	100
	IV	23U1CSAC01	Ability Enhancement Compulsory Course (AECC 1): Introduction to HTML	2	2	25	75	100
	IV	23U1VE01	Value Education	2	2	25	75	100
	Total			**30**	**22**	**215**	**585**	**800**
II	I	24U2LT02	Tamil-II	5	3	25	75	100
	II	23U2LE02	Communicative English – II	5	3	25	75	100
	III	24U2DSC02	Python Programming	5	4	25	75	100
	III	24U2DSCP02	Python Programming Lab	5	3	40	60	100
	III	23U2MAGE07	Allied02:BasicStatisticalMethods	4	3	25	75	100
	III	23U2ENAC02	Ability Enhancement Compulsory Course(AECC2)SoftSkill-2Office Automation	2	2	25	75	100
	IV	24U2DSS01	SBEC -I	**2**	**2**	**25**	**75**	**100**
	IV	23U2EVS01	Environmental Studies	2	2	25	75	100
	Total			**30**	**22**	**215**	**585**	**800**

SEMESTER:III&IV

Sem	Part	Course Code	COURSETITLE	Hrs	CREDIT	MARKS		
						CIA	EE	TOT
III	I	24U3LT03	Language–III	5	3	25	75	100
	II	23U3GEN03	English–III	5	3	25	75	100
	III	23U3DSC03	RDBMS	5	4	25	75	100
	III	23U3DSCP03	RDBMS LAB	5	3	40	60	100
	III	23U3MAGE13	Allied03:Operations Research	4	3	25	75	100
	III	23U3DSDE-	Discipline Elective–I	4	3	25	75	100
	IV	NMEC	Non-MajorElective–01	2	2	25	75	100
	Total			**30**	**21**	**190**	**510**	**700**
IV	I	24U4LT04	Language–IV	5	3	25	75	100
	II	23U4GEN04	English–IV	5	3	25	75	100
	III	23U4DSC04	Mongo DB	5	4	25	75	100
	III	23U4DSCP04	Mongo DB Lab	5	3	40	60	100
	III	23U4MAGE15	Allied04:Discrete Mathematics	4	3	25	75	100
	III	23U4DSDE-	Discipline Elective–II	4	3	25	75	100
	IV	NMEC	Non Major Elective –02	2	2	25	75	100
	Total			**30**	**21**	**190**	**510**	**700**

SEMESTER:V&VI

Sem	Part	Course Code	COURSETITLE	Hrs	CREDIT	MARKS		
						CIA	EE	TOT
V	III	23U5DSC05	Data Mining	5	5	25	75	100
	III	23U5DSCP05	Data Mining Lab	4	3	40	60	100
	III	23U5DSC06	Data Visualization Techniques	5	4	25	75	100
	III	23U5DSCP06	Data Visualization Lab	4	3	40	60	100
	III	23U5DSC07	Computer Networks	5	5	25	75	100
	III	23U5DSDE-	Discipline Elective–III	5	4	25	75	100
	IV	23U5DSS02	SBEC –II	2	2	25	75	100
	Total			**30**	**26**	**205**	**495**	**700**
VI	III	23U6DSC08	Modern Database Systems	5	5	25	75	100
	III	23U6DSCP07	Modern Database Systems Lab	4	4	40	60	100
	III	23U6DSC09	Deep Learning	5	4	25	75	100
	III	23U6DSCP08	Deep Learning Lab	4	4	40	60	100
	III	23U6DSCPR01	Project	4	4	40	60	100
	III	23U6DSDE-	Discipline Elective–IV	4	4	25	75	100
	IV	23U6DSS03	SBEC –III	2	2	25	75	100
	V		Extension Activities	-	1	-	-	-
			Library &Sports	2	-	-	-	-
	Total			**30**	**28**	**220**	**480**	**700**
	Grand Total			**180**	**140**	**1235**	**3165**	**4400**

DISCIPLINE SPECIFIC ELECTIVES

Course Code	Course Name	Semester
23U3DSDE01	Data Science	Semester: III
23U3DSDE02	Cloud Computing	Semester: III
23U4DSDE03	Operating System	Semester: IV
23U4DSDE04	Predictive Analysis	Semester: IV
23U5DSDE05	Internet of Things	Semester: V
23U5DSDE06	Cyber Security	Semester: V
23U6DSDE07	Web Mining	Semester: VI
23U6DSDE08	Software Engineering	Semester: VI

SKILL BASED ELECTIVE COURSES(SBEC) (OFFER TO SAME STUDENTS)

Course Code	Course Name	Semester
23U5DSS01	Human Computer Interaction	Semester :II
23U5DSS02	Cyber Security and Ethical Hacking	Semester :II
23U5DSS03	Advanced Excel	Semester: V
23U5DSS04	Professional Ethics	Semester: V
23U5DSS05	Academic Writing and Academic Portfolio(CDC)	Semester: VI
23U6DSS06	Sentiment Analysis	Semester: VI
23U6DSS07	Analytical Skills	Semester: VI

SEMESTER–I

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**							
Programme	**B.Sc**	**Programme Code**	**UDS**			**Regulations**		**2024-2025**
Department	**DATA SCIENCE**		**Semester**					**I**
Course Code	**Course Name**		**Periods Per Week**			**Credit**	**Maximum Marks**	
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
24U1DSC01	**Data Structures and Programming Design in C**		**5**	**0**	**0**	**4**	**25**	**75**	**100**
COURSE OBJECTIVES	To emphasize the importance of appropriate data structure in developing and implementing efficient algorithms. Apply important algorithmic design paradigms and methods of analysis							
POs	PROGRAMEOUTCOME							
PO1	Understand and apply fundamental principles, concepts and methods in critical areas of science and multidisciplinary fields.							
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for scientific requirements.							
PO3	Develop critical thinking with scientific and apply the technologies in various fields of Data Science							
PO4	Communicate the subject effectively							
PO5	Understand professional, ethical, and social responsibilities							
PO6	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.							
PO7	Imbibe Quality Software Development practices							

COs	COURSE OUTCOME
CO1	Formulate new solutions for programming problems or improve existing code using learned algorithms and data structures.
CO2	Select basic data structures and algorithms for autonomous realization of simple programs or program parts.
CO3	Determine and demonstrate bugs in program, recognize needed basic operations with data structures.
CO4	Definebasicstaticanddynamicdatastructuresandrelevantstandardalgorithmsfor them.
CO5	Evaluate algorithms and data structures in terms of time and memory complexity of basic Operations.
Pre-requisites	To emphasize the importance of appropriate data structure in developing and implementing efficient algorithms. Understand basic data structures such as arrays, stacks, queues, hash tables and linked list

Knowledge Levels
1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing
CO/ PO /KL Mapping (3/2/1indicatesthestrengthofcorrelation, 3-strong, 2- medium, 1- weak)

COs	KLs	POs	KLs
CO1	2	PO1	1
		PO2	3
		PO3	2
CO2	1	PO4	3
		PO5	4
		PO6	5
CO3	3	PO7	6
CO4	4		
CO5	6		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	3	2	1	1	1
CO2	3	1	2	1	1	1	1
CO3	1	3	2	3	2	1	1
CO4	1	2	1	2	3	2	1
CO5	1	1	1	1	1	2	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit- I	INTRODUCTION TO C	Periods	12
	Introduction to C-Constants-Variables-keywords-Data Types–Operators in C First C Program–Arrays-Decision control Structure: If, If-else-Nested If-else. Loop control structure: While, do-While - For Loop-Break - Continue.		
Unit- II	STRINGS,FUNCTIONANDPOINTERS	Periods	12
	Definition of String - More about String - String Functions – Introduction to Function Why Use function-Passing Value between functions-Introduction to Pointers-Pointer Operators-Pointer Expressions-char, int and Float Pointers –Structures and Union		
Unit- III	INTRODUCTIONTODATASTRUCTURE	Periods	12
	Definition– Algorithms–Complexities-Programming Design-Abstract Data Type- Stack ADT - Applications Of Stack - Queue ADT - Queue Operations -Linked List - Singly Linked List-Doubly Linked List		
Unit- IV	SORTINGAND SEARCHING	Periods	12
	Introduction to Sorting – Bubble Sort –Insertion Sort –Selection Sort – Merge Sort-Quick Sort - Searching Introduction to searching - Linear Search- Binary Search.		
Unit- V	TREESANDGRAPH	Periods	12
	Definition of Tree-Representation of Tree-Binary Tree- Binary Tree Traversals-Expression Tree – Definition of Graph- Types of Graph Representation of Graph - Traversal of Graph - The Minimum Spanning Tree.		
Total Periods			60

Text Books	
1	“Data Structures Using C ”Rajesh K. Shukla, Publisher: Wiely Precise Text Book2011, Wiley India.
2	”Let Us C” Yashavant Kanetkar, Seventh Edition, Bpb Puiblications.
3	”Understanding Pointers In C”, Yashavant Kanetkar,Third Edition Bpb Publications.
References	
1	”Data Structures With C” ,Seymour Lipschutz, Mcgraw Hill Education(India)Private Limited.
E-References	
1	https://www.studytonight.com/data-structures/introduction-to-data-structures
2	https://www.javatpoint.com/data-structure-introduction
3	https://www.tutorialspoint.com/data_structures_algorithms/index.htm

	VIVEKANANDHA COLLEGE OF ARTSANDSCIENCESFORWOMEN (AUTONOMOUS) Elayampalayam,Tiruchengode-637 205.					
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**	**2024-2025**
Department	**Data Science**		**Semester**			**I**

Course Code	**Course Name**	**Periods perWeek**		**Credit**	**Maximum Marks**		
		T	**P**	**C**	**CA**	**ESE**	Total
24U1DSCP01	**DATA STRUCTURES AND PROGRAMMING DESIGN IN C LAB**	**0**	**5**	**3**	**40**	**60**	100

List of Experiments

1	Write a program to implement Fibonacci series of numbers upto given range.
2	Write c program to implement Armstrong number
3	Write c program to implement singly linked list
4	Write c program to implement stack operations
5	Write c program to implement queue operations
6	Write c program to implement tree traversals
7	Write c program to implement Merge Sort
8	Write c program to implement Quick Sort
9	Write c program to implement binary search
10	Write c program to implement graph traversals

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U1CSAC01	INTRODUCTION TO HTML	Skill Enha. Course (SEC)	2	-	-		2	25	75	100

Learning Objectives

LO1	Insert a graphic within a web page.
LO2	Create a link within a web page.
LO3	Create a table within a web page.
LO4	Insert heading levels within a web page.
LO5	Insert ordered and unordered lists within a web page. Create a web page.

UNIT	Contents	No. Of. Hours
I	Introduction :Web Basics: What is Internet–Web browsers–What is Webpage –HTML Basics: Understanding tags.	**6**
II	Tags for Document structure (HTML, Head, Body Tag). Block level text elements: Headings paragraph (<p> tag)–Font style elements:(bold, italic, font, small, strong, strike, big tags)	**6**
III	Lists: Types of lists: Ordered, Unordered– Nesting Lists–Other tags: Marquee, HR, BR-Using Images –Creating Hyperlinks.	**6**
IV	Tables: Creating basic Table, Table elements, Caption–Table and cell alignment–Rowspan, Colspan–Cell padding.	**6**
V	Frames: Frameset–Targeted Links–No frame–Forms: Input, Text area, Select, Option.	**6**
	TOTAL HOURS	**30**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Knows the basic concept in HTML Concept of resources in HTML	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Knows Design concept. Concept of Meta Data Understand the concept of save the files.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Understand the page formatting. Concept of list	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Creating Links. Know the concept of creating link to email address	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Concept of adding images Understand the table creation.	PO1, PO2, PO3, PO4, PO5, PO6

Textbooks	
1	"Mastering HTML5 and CSS3 Made Easy", Teach U Comp Inc., 2014.
2	Thomas Michaud, "Foundations of Web Design: Introduction to HTML & CSS"
Web Resources	
1.	https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf
2.	https://www.w3schools.com/html/default.asp

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	2	3	3	3
CO 3	2	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	2	3	3
Weightage of course contributed to each PSO	14	15	14	14	15	15

S-Strong-3 M-Medium-2 L-Low-1

SEMESTER-II

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**				
Programme	**B.Sc**	**Programme Code**	**UDS**	**Regulations**	**2024-2025**
Department	**DATA SCIENCE**		**Semester**		**II**

Course Code	**Course Name**	**Periods per Week**			**Credit**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
24U2DSC02	**PYTHON PROGRAMMING**	**5**	**0**	**0**	**4**	**25**	**75**	**100**

COURSE OBJECTIVES	Learn the syntax and semantics of the Python programming language. Illustrate the process of structuring the data using lists, tuples.
POs	PROGRAME OUTCOME
PO1	Understand and apply fundamental principles, concepts and methods in critical areas Of science and multidisciplinary fields.
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for scientific requirements.
PO3	Develop critical thinking with scientific temper and apply the technologies in various fields of Data Science
PO4	Communicate the subject effectively
PO5	Understand professional, ethical, and social responsibilities
PO6	Ability to understand and analyse a given real-time problems and propose feasible computing solutions.
PO7	Imbibe Quality Software Development practices

COs	COURSE OUTCOME
CO1	Demonstrate proficiency in handling loops and creation of functions
CO2	Identify the methods to create and manipulate lists ,tuples and dictionaries
CO3	Develop programs for string processing and file organization
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.
CO5	Read and write data from/to files in Python Programs
Pre-requisites	Demonstrate the use of built-in functions to navigate the file system. Implement the Object Oriented Programming concepts in Python.

Knowledge Levels
1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing
CO/ PO /KL Mapping (3/2/1indicatesthestrengthofcorrelation, 3-strong, 2- medium, 1- weak)

COs	KLs	POs	KLs
CO1	2	PO1	1
		PO2	3
		PO3	2
CO2	1	PO4	3
		PO5	4
		PO6	5
CO3	3	PO7	6
CO4	4		
CO5	6		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	3	2	1	1	1
CO2	3	1	2	1	1	1	1
CO3	1	3	2	3	2	1	1
CO4	1	2	1	2	3	2	1
CO5	1	1	1	1	1	2	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit- I	Introduction to Programming in Python	Periods	12
	Introduction to Programming in Python: What Is Python? Features of Python, Python environment set up: Installing Python, Running Python, Python Documentation, Structure of aPythonProgramBasicsofProgramminginPython:Inputstatement,outputstatement, variables, operators, numbers, Literals, strings, lists and tuples, dictionaries, Code Blocks Use Indentation		
Unit- II	Conditionals, Loops and Function	Periods	12
	Conditionals and Loops: if statement, else Statement, elif Statement, while Statement, for Statement break Statement, continue Statement, pass Statement. Functions: Built-in Functions, User defined functions: Defining a Function, Calling a Function, Various Function Arguments.		
Unit- III	Python Basics	Periods	12
	Statements and Syntax, Variable Assignment, Identifiers, Basic Style Guidelines, First Python Programs, Python Objects, Standard Types, Other Built-in Types, Introduction to Numbers, Built-in and Factory Functions, Sequences		
Unit- IV	Files, Modules and Introduction to Advanced Python. Files	Periods	12
	File Objects, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages		
Unit- V	Python GUI &CGI Programming and Python database Connectivity.	Periods	12
	Python GUI Programming(Tkinter): Tkinter Programming example, Tkinterwidges, Python database connectivity: Establishing connection, insert, retrieve, delete, and rollback and commit ,Operations		
Total Periods			60

Text Books	
1	Core Python Programming Wesley J. Chun Publisher: Prentice Hall PTR First Edition.
2	T. Budd, Exploring Python, TMH,1stEd,2011.
3	Python Tutorial/Documentationwww.python.or2010
References	
1	Paul Deitel and Harvey Deitel, “PythonforProgrammers”,PearsonEducation,1st Edition, 2021..
E-References	
1	https://infytq.infosys.com/
2	https://www.learnbyexample.org/python/
3	https://pythontutor.com/visualize.html#mode=edit

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**
Department	**Data Science**		**Semester**				**II**
Course Code	**Course Name**	**Periods per Week**		**Credit**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
24U2DSCP02	**PYTHON PROGRAMMING LAB**	**0**	**0**	**5**	**3**	**40**	**60**	**100**

List of Experiments

1	Write a simple Python Program to display the message on the screen
2	Write a simple Python Program using operators
3	Write a simple Python Program to demonstrate the use of conditional Statement
4	Write a python program to perform following operations on list a)create b)Access c)update d)delete
5	Write a python program to perform following operations on dictionary a)create b) Access c) update d)delete
6	Write a python program to demonstrate string built in functions
7	Create a small script to use raw_input() built-in function to take a string input from the user, then Display to the user what/just typed in.
8	Write a python program to Read and Display the file
9	Write a python program to Checking the Type
10	Write simple functions max2()and min2()that take two items and return the larger and smaller item, respectively

SEMESTER–III

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**
Department	**Data Science**		**Semester**				**III**
Course Code	**Course Name**		**Periods per Week**		**Credit**	**Maximum Marks**	
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U3DSC03	**RELATIONAL DATA BASE MANAGEMENT SYSTEMS**		**5**	**0**	**0**	**4**	**25**	**75**	**100**

COURSE OBJECTIVES	The main objective of this course is to enable students to the fundamental concepts of database analysis and Design
POs	PROGRAMME OUTCOME
PO1	Understand and apply fundamental principles ,concepts and methods in critical areas of science and multidisciplinary fields
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for Scientific Requirements
PO3	Develop critical thinking with scientific temper and apply the technologies in various Fields of Data Science
PO4	Communicate the subject effectively.
PO5	Understand professional, ethical, and social responsibilities.
PO6	Ability to understand and analyse a given real-time problems and propose feasible computing Solutions
PO7	Imbibe Quality Software Development practices.

Cos	COURSE OUTCOME
CO1	Understand the basic principles of database management systems
CO2	Draw Entity-Relationship diagrams to represent simple database application scenarios
CO3	Write SQL queries for a given context in relational database
CO4	Discuss normalization techniques with simple examples.
CO5	Describe transaction processing and concurrency control concepts
Pre-requisites	Discrete Structures

Knowledge Levels
1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing
CO/ PO /KL Mapping (3/2/1indicatesthestrengthofcorrelation, 3-strong, 2- medium, 1- weak)

Cos	KLs	POs	KLs
CO1	2	PO1	2
		PO2	1
		PO3	4
CO2	2	PO4	2
		PO5	2
		PO6	3
CO3	1	PO7	4
CO4	4		
CO5	3		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	3	3	2	1
CO2	3	2	1	3	3	2	1
CO3	2	3	1	2	2	1	1
CO4	1	1	3	1	1	2	1
CO5	2	1	2	2	2	3	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit- I	Introduction	Periods	12
	Introduction: Database System Applications-DBMS Vs. File System - View of Data- Data Model Database Languages - Database users and Administrators - Transaction Management - Database System Structure - Application Architecture. Data Models: Basic Concepts - Constraint- Keys- ER Diagram - Weak Entity - Extended ERFeatures-UML;RelationalModel:StructureofRelationalDatabases-Relational Algebra-Views.		
Unit- II	SQL	Periods	12
	Background-BasicStructure-SetOperation-AggregateFunction-NullValues-NestedSub Queries - Views -Modification of the Database - Data Definition Language - Embedded SQL-Dynamic SQL		
Unit- III	Advance SQL	Periods	12
	Integrity and Security: Domain-Constraint- Referential Integrity- assertions-Triggers -Security and Authorization-Authorization in SQL-Encryption and Authentication		
Unit- IV	Relational Database Design	Periods	12
	First Normal Form-Pitfalls in Relational Database Design-Functional Dependencies (Second Normal Form) - Boyce-Codd Normal Form - Third Normal Form - Fourth Normal Form - Overall Database Design Process		
Unit- V	Transaction Management	Periods	12
	Transaction concepts-States-Serializability. Lock based concurrency control: Locks - Granting - Two-Phase Locking protocol. Timestamp based protocol: Timestamps - Timestamp ordering protocol -Dead lock handling.		
Total Periods			60

Text Books	
1	A Silberschatz H Korth S Sudarshan Database System and Concepts5thEditionMcGraw Hill2005
References	
1	Alexix Leon Mathews Leon Essential of DBMS 2nd reprint Vijay Nicole Publications 2009
2	Alexix Leon Mathews Leon Fundamentals of DBMS 2nd Edition Vijay Nicole Publications2014
E-References	
1	https://www.techtarget.com/search datamanagementdefinition /database-management-system

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**	**2024-2025**	
Department	**Data Science**		**Semester**			**III**	
Course Code	**Course Name**		**Periods per Week**	**Credit**	**Maximum Marks**		
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U3DSCP03	**Relational Data Base Management System Lab**		**0**	**0**	**5**	**3**	**40**	**60**	**100**

List of Experiments

1	Data Definition of Base Tables.
2	DDL with Primary key constraints
3	DDL with constraints and verification by insert command
4	Data Manipulation of Base Tables and Views
5	Demonstrate the Query commands
6	Write a PL/SQL code block that will accept an account number from the user and debit an amount of Rs. 2000 from the account if the account has a minimum balance of 500after the amount is debited. The Process is to fired on the Accounts table.
7	Write a PL/SQL code block to calculate the area of the circle for a value of radius varying from 3to 7. Store the radius and the corresponding values of calculated area in a table Areas. Areas– radius, area.

SEMESTER–IV

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**
Department	**Data Science**		**Semester**				**IV**
Course Code	**Course Name**		**Periods per Week**	**Credit**	**Maximum Marks**		
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U4DSC04	**MONGODB**		**5**	**0**	**0**	**4**	**25**	**75**	**100**
COURSE OBJECTIVES	Understand MongoDB's fundamentals, including its architecture and basicCRUD operations. Master advanced querying techniques such as aggregation pipelines & geospatial queries.								
POs	PROGRAMME OUTCOME								
PO1	Understand and apply fundamental principles, concepts and methods in critical areas of science and multidisciplinary fields.								
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for scientific requirements.								
PO3	Develop critical thinking with scientific temper and apply the technologies in various fields of Data Science								
PO4	Communicate the subject effectively.								
PO5	Understand professional, ethical, and social responsibilities.								
PO6	Ability to understand and analyze a given real-time problems and propose feasible Computing solutions.								
PO7	Imbibe Quality Software Development practices.								

COs	COURSE OUTCOME
CO1	Remember the basic concepts of software Engineering.
CO2	Understanding requirement analysis.
CO3	Apply software design.
CO4	Evaluate with UML.
CO5	Implement coding and testing.
Pre-requisites	Basic knowledge about Computing techniques

Knowledge Levels

1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing

CO/ PO /KL Mapping
(3/2/1indicates the strength of correlation, 3-strong, 2-medium, 1- weak)

Cos	KLs	POs	KLs
CO1	1	PO1	1
		PO2	2
		PO3	3
CO2	2	PO4	4
		PO5	4
		PO6	2
CO3	3	PO7	2
CO4	3		
CO5	4		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	1	1	2	2
CO2	2	3	2	1	1	3	1
CO3	1	2	3	2	2	2	2
CO4	1	2	3	2	2	2	2
CO5	1	1	2	3	3	1	1

Course AssessmentMethods
Direct
1. ContinuousAssessmentTestI,II &Model 2. Assignment 3. EndSemesterExaminations
Indirect
1. CourseEnd Delivery

MongoDB			
Unit- I	**Introduction to MongoDB**	Periods	12
	Introduction: Ease of Use-Easy Scaling-Tons of Features. **Getting Started**: Documents-Collections-Databases-Getting and Starting MongoDB-Introduction to the MongoDB Shell-Running the Shell-A MongoDB Client-Basic Operations with the Shell-**Data Types**:Basic Data Types-Dates-Arrays-Embedded Documents.		
Unit- II	**Creating, Updating, and Deleting Documents**	Periods	12
	Inserting and Saving Documents: Batch Insert-Insert Validation. **Removing Documents:** Remove Speed. **Updating Documents:** Document Replacement-Using Modifiers-Upserts-Updating Multiple Documents-Returning Updated Documents-Setting a Write Concern.		
Unit- III	**Querying**	Periods	12
	Introduction to find: Specifying Which Keys to Return-Limitations. **Query Criteria:** Query Conditionals-OR Queries-$not-Conditional Semantics. **Type-Specific Queries:** null-Regular Expressions-Querying Arrays-Querying on Embedded Documents. **$where Queries:** Server-Side Scripting. **Cursors:** Limits, Skips, and Sorts-Avoiding Large Skips-Advanced Query Options-Getting Consistent Results-Immortal Cursors-Database Commands.		
Unit- IV	**Indexing & Aggregation**	Periods	12
	Introduction to Indexing-Introduction to Compound Indexes-Using Compound Indexes-How $-Operators Use Indexes-Indexing Objects and Arrays-Index Cardinality-Using explain() and hint()-The Query Optimizer-When Not to Index. Types of Indexes: Unique Indexes-Sparse Indexes. Index Administration: Identifying Indexes-Changing Indexes. The Aggregation Framework-Pipeline Operations: $match, $project, $group, $unwind, $sort, $limit, $skip-Using Pipelines. MapReduce: MongoDB and MapReduce. Aggregation Commands.		
Unit- V	**Application Design**	Periods	12
	Normalization versus Denormalization-Examples of Data Representations-Cardinality-Friends, Followers, and Other Inconveniences-Optimizations for Data Manipulation-Optimizing for Document Growth-Removing Old Data-Planning Out Databases and Collections-Managing Consistency-Migrating Schemas-When Not to Use MongoDB.		
	Total Periods		60

Text Books	
1	Kyle Banker “MongoDB in Action” Manning PublicationsCo,2012.
2	Rick Copeland “MongoDB Applied Design Patterns”,1st Ed, O-Reilly Media Inc,2013.
References	
1	Gautam Rege(2012).Ruby and MongoDB Web Development Beginners Guide. Packt Publishing Ltd.
2	David Hows (2009)The definitive guide to MongoDB, 2nd edition , Apress Publication

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**				
Programme	**B.Sc**	**Programme Code**	**UDS**	**Regulations**	**2024-2025**
Department	**Data Science**		**Semester**		**IV**

Course Code	**Course Name**	**Periods per Week**			**Credit**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U4DSCP04	**MONGODB LAB**	**0**	**0**	**5**	**3**	**40**	**60**	**100**

List of Experiments

1	Write a MongoDB query to create a Database.
2	Write a MongoDB query to create a collection “customers” in my database.
3	Write a MongoDB query to insert record in collection “customers”.
4	Write a MongoDB query to find the customers from Erode in “customers”.
5	Write a MongoDB query to insert multiple Documents in collection “customers”.
6	Write a MongoDB query to update multiple documents with the update()method in collection “customers”.
7	Delete Document from a Collection a) Delete Document using remove()method b) Remove only one document matching your criteria c) Remove all documents
8	Find the cities inTamilnaduwithpopulationlessthan10Lakh, sort by cities’ name by ascending and limit to 5.
9	Write a Mongo DB query to create a sort the list of Record in ascending & descending order.
10	Write a MongoDB query to limit there cord retrieving from collection“customers”.

SEMESTER–V

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**
Department	**Data Science**		**Semester**				**V**
Course Code	**Course Name**		**Periods per Week**	**Credit**	**Maximum Marks**		
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U5DSC05	**DATA MINING**		**5**	**0**	**0**	**5**	**25**	**75**	**100**
COURSE OBJECTIVES	Data mining has opened a world of possibilities for business. This field of computational statistics compares millions of isolated pieces of data and isused by companies to detect and predict consumer behaviour.								
POs	PROGRAMME OUTCOME								
PO1	Understand and apply fundamental principles, concepts and methods in critical areas of science and multidisciplinary fields.								
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for scientific requirements.								
PO3	Develop critical thinking with scientific temper and apply the technologies in various fields of Data Science								
PO4	Communicate the subject effectively								
PO5	Understand professional, ethical, and social responsibilities								
PO6	Ability to understand and analyse a given real-time problems and propose feasible computing solutions.								
PO7	Imbibe Quality Software Development practices								

COs	COURSE OUTCOME
CO1	In data mining tasks like data characterization and classification, statistical models of target classes can be built.
CO2	Statistical models can be the outcome of a data mining task.
CO3	Data mining tasks can be built on top of statistical models.
CO4	Data mining has opened a world of possibilities for business
CO5	This field of computational statistics compares millions of isolated pieces of data and is used by companies to detect and predict consumer behaviour.
Pre-requisites	Relational Linear Algebra ,statistical analysis Database and data retrieval Algorithms and data structures Artificial intelligence Problem-solving ability

Knowledge Levels

1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing

CO/ PO /KL Mapping
(3/2/1indicates the strength of correlation, 3-strong,
2- medium, 1- weak)

COs	KLs	POs	KLs
CO1	2	PO1	1
		PO2	3
		PO3	2
CO2	1	PO4	3
		PO5	4
		PO6	5
CO3	3	PO7	6
CO4	4		
CO5	6		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	3	2	1	1	1
CO2	3	1	2	1	1	1	1
CO3	1	3	2	3	2	1	1
CO4	1	2	1	2	3	2	1
CO5	1	1	1	1	1	2	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit- I	Introduction to Data Mining	Periods	12
	Need of Data Mining-What Can Data Mining Do and Not Do?-Data Mining Applications-DataMiningProcess-DataMiningTechniques-DifferencebetweenData Mining and Machine Learning-		
Unit- II	Beginning with Weka and R Language	Periods	12
	About Weka-Installing Weka-Understanding Fisher's Iris Flower Dataset-Preparing the Dataset-Preparing the Dataset-Understanding ARFF (Attribute Relation File Format)-Working with a Dataset in Weka- Introduction to R-Features of R-Installing R-Variable Assignment and Output Printing in R-Data Types-Basic Operators in R-Installing Packages-Loading of Data		
Unit- III	Data Preprocessing &Classification	Periods	12
	Need for Data Preprocessing- Data Preprocessing Methods- Introduction to Classification- Types of Classification- Input and Output Attributes- Working of Classification-Guidelines for Size and Quality of the Training Dataset-NaïveBayes Method		
Unit- IV	Implementing Classification in Weka and R	Periods	12
	Building a Decision Tree Classifier in Weka-Applying Naïve Bayes-Creating the Testing Dataset- Decision Tree Operation with R- Naïve Bayes Operation using R		
Unit- V	WebMining and Search Engines	Periods	12
	Introduction-Web Content Mining-Web Usage Mining-Web Structure Mining-Introduction to Modern Search Engines-Working of a Search Engine-Page Rank Algorithm-Precision and Recall		
Total Periods			60

Text Books	
1	Data Mining and Data Warehousing Principles and Practical Techniques, Parteek Bhatia, ©Cambridge University Press 2019
References	
1	Arun K Pujari Data Mining Techniques –10th impressionUniversityPress2008
E-References	
1	https://nptel.ac.in/courses/106105174/
2	http://cecs.louisville.edu/datamining/PDF/0471228524.pdf

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**	**2024-2025**	
Department	**Data Science**		**Semester**			**V**	
Course Code	**Course Name**	**Periods Per Week**			**Credit**	**Maximum Marks**	
		L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U5DSCP05	**DATA MINING LAB**	**0**	**0**	**4**	**3**	**40**	**60**	**100**

List of Experiments

1	Installation of WEKA Tool
2	Creating new Arff File
3	Data Processing Techniques on Dataset
4	Implementation of Apriori algorithm
5	Implementation of K-means algorithm
6	Calculating Information gains measures
7	Implementation of Decision Tree Induction
8	Calculating Information gains measures

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**
Department	**Data Science**		**Semester**				**V**
Course Code	**Course Name**		**Periods per Week**	**Credit**	**Maximum Marks**		
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U5DSC06	**DATA VISUALIZATION TECHNIQUES**		**5**	**0**	**0**	**4**	**25**	**75**	**100**
COURSE OBJECTIVES	The main goal of data visualization is to make it easier to identify patterns, trends and outliers in large datasets. The term is often used interchangeably with others, including information graphics, information visualization and statistical graph								
Pos	PROGRAMME OUTCOME								
PO1	Understand and apply fundamental principles, concepts and methods in critical areas of science and multidisciplinary fields.								
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for scientific requirements.								
PO3	Develop critical thinking with scientific temper and apply the technologies in various fields of Data Science								
PO4	Communicate the subject effectively								
PO5	Understand professional, ethical, and social responsibilities.								
PO6	Ability to understand and analyse a given real-time problems and propose feasible computing solutions.								
PO7	Imbibe Quality Software Development practices.								

COs	COURSE OUTCOME
CO1	Design and create data visualizations.
CO2	Conduct exploratory data analysis using visualization.
CO3	Craft visual presentations of data for effective communication.
CO4	Use knowledge of perception and cognition to evaluate visualization design alternatives.
CO5	Data visualization allows business users to gain insight into their vast amounts of data.
Pre-requisite	Well-versed in SQL, Excel and basic programming languages like Python/R etc. Moderate/Expert level knowledge in creating presentations. Data analysis and handlingskills.

Knowledge Levels
1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing
CO/ PO /KL Mapping (3/2/1indicatesthestrengthofcorrelation, 3-strong, 2- medium, 1- weak)

COs	KLs	POs	KLs
CO1	1	PO1	2
		PO2	1
		PO3	3
CO2	3	PO4	4
		PO5	5
		PO6	6
CO3	2	PO7	5
CO4	5		
CO5	4		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	1	1	1	1	1
CO2	2	1	3	2	1	1	1
CO3	3	2	2	1	1	1	1
CO4	1	1	1	2	3	2	1
CO5	1	1	2	3	2	1	2

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
Unit- I	.Introduction	Periods	12
	Visualizing Data: Mapping Data onto Aesthetics.-Coordinate Systems and Axes-Color Scales-Directory of Visualizations-Visualizing Amounts		
Unit- II	Visualizing Distributions	Periods	12
	Histograms and Density Plots-Empirical Cumulative Distribution Functions and Q-Q Plots-Visualizing Many Distributions at Once-Visualizing Proportions-Visualizing Nested Proportions		
	Visualizing Associations Among Two or More Quantitative Variables	Periods	12
Unit- III	Visualizing Trends-Visualizing Geo spatial Data-Visualizing Uncertainty-The Principle of Proportional Ink- Handling Overlapping Point- Common Pitfalls of Color Use		
	Redundant Coding	Periods	12
Unit- IV	Multipanel Figures-Titles, Captions, and Tables-Balance the Data and the Context-Use Larger Axis Labels- Avoid Line Drawings- Don’t Go 3D.		
	Understanding the Most Commonly Used Image File Formats.	Periods	12
Unit- V	Choosing the Right Visualization Software.-Telling a Story and Making a Point- Build Up Toward Complex Figures		
Total Periods			60

Text Books	
1	Fundamentals of Data Visualization by Claus O.Wilke Copyright ©2019 Claus O. Wilke.
References	
1	1The Truthful Art Data Charts and Maps for Communication –Pearson Education2016
2	2Few Stephen Show Methe Numbers Designing Tables and Graphs to Enlighten– Second Edition Burlingam CA Analytics Press, 2012
E-References	
1	https://www.analyticsvidhya.com/blog/2021/06/must.known-data-visualisation. techniques-for-data-science/

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**
Department	**Data Science**		**Semester**				**V**
Course Code	**Course Name**	**Periods per Week**	**Credit**	**Maximum Marks**			
		L	**T**	**P**	**C**	**CA**	**ESE**	Total
23U5DSCP06	**DATAVISUALIZATION LAB**	**0**	**0**	**4**	**3**	**40**	**60**	100

List of Experiments

1	Demonstration of Data visualization software: PowerBI or Tableau Public or Google Data Studio(Choose any one tool to conduct this lab)
2	Data Sourcing and migration of data on the chosen platform(Dataset: Superstore Sales Dataset/Big mart dataset)
3	Data Processing: check for missing values and imputation on The chosen platform(Dataset: super store dataset/Bigmart dataset)
4	Data Processing :Data transformation of data on the chosen platform (Data set :super store data set/Big mart dataset)
5	Data Processing: creating derived columns of data on the chosen platform and renaming the columns (Dataset: superstore dataset/Big mart dataset)
6	Demonstration: How to build a chart and chart elements such as Title, Legend, Color, Font size, Gridlines, Chart format and Labels.
7	Building Basic chart (Bar, line, stack and clustered charts) on the chosen platform (Dataset: superstore dataset/Big mart dataset) Building Basic chart (pie, scatter plot, bubble chart) on the chosen platform (Dataset: super store dataset/Big mart dataset)
8	Create a Decision Tree, train a Decision Tree using the complete data set as the training data. Report the model obtained after training.

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**
Department	**Data Science**		**Semester**				**V**
Course Code	**Course Name**	**Periods per Week**			**Credit**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U5DSC07	**Computer Networks**	**5**	**0**	**0**	**5**	**25**	**75**	**100**
COURSE OBJECTIVES	Resource sharing....Resource availability & reliability. Performance management Increased storage capacity Streamlined collaboration & communication Reduction of errors Secured remote access							
Pos	PROGRAMME OUTCOME							
PO1	Understand and apply fundamental principles, concepts and methods in critical areas of science and multidisciplinary fields.							
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for Scientific requirements.							
PO3	Develop critical thinking with scientific temper and apply the technologies in various fields of Data Science							
PO4	Communicate the subject effectively.							
PO5	Understand professional, ethical, and social responsibilities.							
PO6	Ability to understand and analyse a given real-time problems and propose feasible computing solutions.							
PO7	Imbibe Quality Software Development practices.							

COs	COURSE OUTCOME
CO1	Recognize the technological trends of Computer Networking
CO2	Discuss the key technological components of the Network
CO3	Evaluate the challenges in building networks and solutions to those.
CO4	A student in Computer Networking will gain valuable skills in computer networks (switching, routing), system and network administration, computer and network security, operating systems, web programming and databases.
CO5	A student can easily explain OSI working principles.
Pre-requisites	An understanding of the TCP/IP protocol and the its layer model is recommended. Basic knowledge of python(such as through Intro to Computer Science)is required. You should Be comfortable with the implementation of basic search algorithms and a work

Knowledge Levels

1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating,6.Synthesizing

CO/ PO /KL Mapping
(3/2/1indicates the strength of correlation, 3-strong,
2- medium, 1- weak)

COs	KLs	POs	KLs
CO1	1	PO1	1
		PO2	2
		PO3	3
CO2	2	PO4	5
		PO5	6
		PO6	4
CO3	4	PO7	5
CO4	6		
CO5	3		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	1	1	1	1
CO2	2	3	2	1	1	1	1
CO3	1	1	2	2	1	3	2
CO4	1	1	1	2	3	1	2
CO5	1	2	3	1	1	2	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit- I	Introduction	Periods	12
	Network Hardware - Software - Reference Models - OSI and TCP/IP Models - Example Networks: Internet, ATM, Ethernet and Wireless LANs –Physical Layer-Theoretical Basis for Data Communication – Guided Transmission Media		
Unit- II	Wireless Transmission	Periods	12
	Communication Satellites - Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues-Error Detection and Correction.		
Unit- III	Elementary Data Link Protocols	Periods	12
	Sliding Window Protocols-Data Link Layer in the Internet –Medium Access Layer-Channel Allocation Problem - Multiple Access Protocols - Bluetooth.		
Unit- IV	Network Layer	Periods	12
	Design Issues- Routing Algorithms- Congestion Control Algorithms – IP Protocol- IP Addresses – Internet Control Protocols.		
Unit- V	Transport Layer	Periods	12
	Services-Connection Management-Addressing, Establishing and Releasing a Connection –Simple Transport Protocol-Internet Transport Protocols(ITP)-Network Security: Cryptography.		
	Total Periods		60

Text Books	
1	A.S Tanenbaum Computer Networks 4th Edition Prentice Hall of India2008
References	
1	BA Forouzan Data Communications and Networking Tata Mc Graw Hill 4th Edition 2007
2	F Halsall Data Communications Computer Networks and Open Systems Pearson Education2008
3	D Bertsekas and R Gallagher Data Networks 2nd Edition PHI 2008
4	Lamarca Communication Networks Tata Mc Graw Hill 2002
E-References	
1	www.w3schools.com
2	www.askgenius.com

SEMESTER–VI

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**
Department	**Data Science**		**Semester**				**VI**
Course Code	**Course Name**		**Periods per Week**		**Credit**	**Maximum Marks**	
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U6DSC08	**Modern Database Systems**		**5**	**0**	**0**	**5**	**25**	**75**	**100**
COURSE OBJECTIVES	To understand the basic Distributed Database Design ,To learn the basics of Parallel Database Systems ,To learn efficient NoSQL and Aggregate Data Models, To understand the concepts of Hadoop , Bigdata and To know how to use Mongo DB, Hbase, Cassandra						
POs	PROGRAMME OUTCOME						
PO1	Understand and apply fundamental principles ,concepts and methods in critical areas science and multidisciplinary fields.						
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for scientific Requirements						
PO3	Develop critical thinking with scientific temper and apply the technologies in various fields of Data Science						
PO4	Communicate the subject effectively.						
PO5	Understand professional, ethical, and social responsibilities.						
PO6	Ability to understand and analyse a given real-time problems and propose feasible computing solutions.						
PO7	Imbibe Quality Software Development practices						

COs	COURSE OUTCOME
CO1	Apply the knowledge of Distributed Database system concept while developing
CO2	Analyze the complexity of Parallel Database Systems.
CO3	Choose the appropriate graph database.
CO4	Investigate database revolution.
CO5	Analyze about in-memory databases.

Knowledge Levels

1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing

CO/ PO /KL Mapping
(3/2/1indicatesthestrengthofcorrelation, 3-strong, 2- medium, 1- weak)

COs	KLs	POs	KLs
CO1	1	PO1	2
		PO2	2
		PO3	1
CO2	2	PO4	1
		PO5	3
		PO6	2
CO3	2	PO7	2
CO4	3		
CO5	3		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	3	3	1	2	2
CO2	3	3	2	2	2	3	1
CO3	3	3	2	2	2	3	1
CO4	2	2	1	1	3	2	2
CO5	2	2	1	1	3	2	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit- I	DistributedDatabaseSystems	Periods	12
	Distributed Database system- Promises- Complications – Design Issues - Distributed DBMS Architecture .Distributed Database Design: Distributed Database Design Issues - Fragmentation - Allocation.		
	Parallel Database Systems:	Periods	12
Unit- II	Architecture- Parallel Data Placement-Query Processing-Load Balancing-Database Clusters.		
	NOSQL	Periods	12
Unit- III	The value of Relational databases-Application and Integration Database-The Emergence of NoSQL. Aggregate Data Models - Map-Reduce - Graph Databases.		
	Next Generation Databases	Periods	12
Unit- IV	Database Revolutions-Google, Bigdata and Hadoop.		
	Distributed Database Patterns	Periods	12
Unit- V	Document Databases-Column Databases-In-memory Databases. Distributed Database Patterns: Mongo DB - Hbase - Cassandra.		
Total Periods			60

Text Books	
1	M. Tamer Ozsu, Patrick Valduriez, Principles of Distributed Database Systems,2011 -unit 1, 2
2	Pramod J.Sadalage and Martin Fowler, NoSQL Distilled “Brief Guide to the Emerging World of Polyglot Persistance, Pearson Education,2013-unit3
3	Guy Harrison, Next Generation Databases: NoSQL and Big Data,Apress,2015-unit4,5
References	
1	Ramez Elmasri and Shamkrant Nava the, Fundamentals of Database Systems, Addison Wesley,2013.
2	KristinaChodorow,MongoDB:TheDefinitiveGuide,OReillyMedia,2012.

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam , Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**
Department	**Data Science**		**Semester**				**VI**
Course Code	**Course Name**		**Periods per Week**		**Credit**	**Maximum Marks**	
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U6DSCP07	**MODERN DATABASE SYSTEMS LAB**		**0**	**0**	**4**	**4**	**40**	**60**	**100**

List of Experiments

1	Create a distributed Database for Bookstore.
2	Create a Parallel Database for University Counseling.
3	Create No-SQL database using MongoDB Library Management System.
4	Distribution using Map-Reduce on BigData (Hadoop)
5	Create a database and implement the following functionsusingNeo4J a. count(*) b. groupby c. order by d. limit e. join
6	Implement column oriented database.
7	Implement Partitioning on the tables.
8	Create a collection using MongoDB.

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**							
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**	**2024-2025**		
Department	**Data Science**		**Semester**			**VI**		
Course Code	**Course Name**		**Periods per Week**		**Credit**	**Maximum Marks**		
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U6DSC09	**Deep Learning**		**5**	**0**	**0**	**4**	**25**	**75**	**100**
COURSE OBJECTIVES	To understand the basic Distributed Database Design ,To learn the basics of Parallel Database Systems ,To learn efficient NoSQL and Aggregate Data Models, To understand the concepts of Hadoop , Bigdata and To know how to use Mongo DB, Hbase, Cassandra							
POs	PROGRAMME OUTCOME							
PO1	Understand and apply fundamental principles, concepts and methods in critical areas science and multidisciplinary fields.							
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for Scientific Requirements							
PO3	Develop critical thinking with scientific temper and apply the technologies in various fields of Data Science							
PO4	Communicate the subject effectively.							
PO5	Understand professional , ethical ,and social responsibilities.							
PO6	Ability to understand and analyse a given real-time problems and propose feasible Computing solutions.							
PO7	Imbibe Quality Software Development practices							

COs	COURSE OUTCOME
CO1	Apply the knowledge of Distributed Database system concepts while developing
CO2	Analyze the complexity of Parallel Database Systems.
CO3	Choose the appropriate graph database.
CO4	Investigate database revolution.
CO5	Analyze about in-memory databases.

Knowledge Levels

1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing

CO/ PO /KL Mapping
(3/2/1indicatesthestrengthofcorrelation, 3-strong, 2- medium, 1- weak)

COs	KLs	POs	KLs
CO1	1	PO1	2
		PO2	2
		PO3	1
CO2	2	PO4	1
		PO5	3
		PO6	2
CO3	2	PO7	2
CO4	3		
CO5	3		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	3	3	1	2	2
CO2	3	3	2	2	2	3	1
CO3	3	3	2	2	2	3	1
CO4	2	2	1	1	3	2	2
CO5	2	2	1	1	3	2	2

Course Assessment Methods
Direct

1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit- I	Basics of Neural Networks	Periods	12
	Basic Concept of Neurons - Perceptron Algorithm - Feed Forward and Back propagation Networks. Perceptron Training Rule, Gradient Descent Rule, Restricted Boltzmann Machines, Deep Belief Networks.		
Unit- II	Activation Functions:	Periods	12
	Sigmoid,ReLU,HyperbolicFns,Softmax,OptimizationandRegularization:Adam optimization, Over fitting and Capacity, Cross Validation, Feature Selection, Regularization, Hyper parameter tuning.		
Unit- III	Convolutional Neural Networks	Periods	12
	CNNArchitectures-Convolution-PoolingLayers-TransferLearning-Image ClassificationusingTransferLearning-RecurrentandRecursiveNets-RecurrentNeural Networks-DeepRecurrentNetworks-RecursiveNeuralNetworks-Applications.		
Unit- IV	Deep auto encoders	Periods	12
	Introduction-Use of auto encoders– Denoise autoencoder - deep network for stacked generative learning.		
Unit- V	Applications of deep learning	Periods	12
	Image processing, Natural Language Processing-speech recognition, video analytics.		
	Total Periods		60

Text Books	
1	Good fellow ,I., Bengio,Y., and Courville,A., Deep Learning, MIT Press,2016.
2	LiDeng and Dong Yu., Deep Learning Methods and Applications ,Foundations and Trends in Signal Processing, 2014.
References	
1	Yegnanarayana, B. ,Artificial Neural Networks–,PHI Learning Pvt.Ltd,2009.
2	Bishop, C.M., Pattern Recognition and Machine Learning, Springer, 2006.
E-References	
1	https://neuralnetworksanddeeplearning.com

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FORWOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**							
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**	
Department	**Data Science**		**Semester**				**VI**	
Course Code	**Course Name**		**Periods per Week**		**Credit**	**Maximum Marks**		
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U6DSCP08	**DEEP LEARNING LAB**		**0**	**0**	**4**	**3**	**40**	**60**	**100**

List of Experiments

1	Introduction to DLand Framework
2	Feed Forward Network on sample dataset
3	Multi-layer perceptron(MLP)on real-time dataset
4	Convolution neural network on binary classification task: Cat and Dog dataset
5	Convolution neural network on multi-classification task: Dog breed classifications
6	Transfer learning using pretrained architectures
7	Hyper parameter optimization on CNN models
8	Recurrent neural network on stock price prediction.

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam,Tiruchengode-637 205.						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**	**2024-2025**	
Department	**DATA SCIENCE**		**Semester**			**VI**	
Course Code	**Course Name**		**Periods per Week**		**Credit**	**Maximum Marks**	
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U6DSCPR01	**Project**		**0**	**0**	**4**	**4**	**40**	**60**	**100**

Project Work Pattern

FIRST REVIEW: **(20Marks)**

1. Project Title
2. Project Platform(Language/Package Selected)
3. Confirmation Letter(from Company/Industry)
4. Details of Internal Guide with Designation &Qualification (in the company/Industry)
5. Presentation

SECONDREVIEW: **(20Marks)**

1. Work Observation
2. Modules in Project(Design Screens Sample)
3. DFD/ ERD/ System Flow Diagram(Which ever Applicable)
4. Estimated Time of Completion
5. Completed Work in the form of Percentage Analysis
6. Power Point Presentation.

FINALREVIEW: **(60Marks)**

1. Documentation
2. Screens Shots
3. DFD/ ERD/ System Flow Diagram(Whichever Applicable)
4. Final Project Report(with executable form at including complete source code)

The Passing minimum shall be 40% out of 60 marks (24 Marks)

DISCIPLINE SPECIFIC ELECTIVES

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**
Department	**Data Science**		**Semester**				**III**
Course Code	**Course Name**		**Periods per Week**	**Credit**	**Maximum Marks**		
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U3DSDE01	**Data Science**		**4**	**0**	**0**	**3**	**25**	**75**	**100**
COURSE OBJECTIVES	Data Science enables companies to efficiently understand gigantic data from multiple sources and derive valuable insights to make smarter data-driven decisions. Data Science is widely used in various industry domains, including marketing, healthcare								
Pos	PROGRAMME OUTCOME								
PO1	Understand and apply fundamental principles, concepts and methods in critical areas science and multidisciplinary fields.								
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for Scientific requirements.								
PO3	Develop critical thinking with scientific temper and apply the technologies in various fields of Data Science								
PO4	Communicate the subject effectively.								
PO5	Understand professional, ethical, and social responsibilities.								
PO6	Ability to understand and analyse a given real-time problems and propose feasible Computing solutions.								
PO7	Imbibe Quality Software Development practices.								

COs	COURSE OUTCOME
CO1	Understand the fundamental concepts of data science.
CO2	Evaluate the data analysis techniques for applications handling large data and demonstrate the data science process.
CO3	Understand concept of machine learning used in the data science process.
CO4	Visualize and present the inference using various tools.
CO5	Learn to think through the ethics surrounding privacy, data sharing.
Pre-requisites	Modeling. Mathematical models enable you to make quick calculations and predictions Based on what you already know about the data. Statistics. Statistics area the core of data science

Knowledge Levels
1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing
CO/ PO /KL Mapping (3/2/1indicatesthestrengthofcorrelation, 3-strong, 2- medium, 1- weak)

COs	KLs	POs	KLs
CO1	1	PO1	1
		PO2	1
		PO3	1
CO2	1	PO4	1
		PO5	1
		PO6	1
CO3	1	PO7	1
CO4	1		
CO5	1		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	3	3	1
CO2	3	3	3	3	3	3	1
CO3	3	3	3	3	3	3	1
CO4	3	3	3	3	3	3	1
CO5	3	3	3	3	3	3	1

Course Assessment Methods
Direct
1.Continuous Assessment Test I,II &Model 2.Assignment 3.End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit- I	Data Evolution	Periods	12
	Data to Data Science-Understanding data: Introduction-Type of Data, Data Evolution- Data Sources. Preparing and gathering data and knowledge - Philosophies of data science.		
Unit- II	Data all around us	Periods	12
	The virtual wilderness – Data wrangling: From capture to domestication- Data science in a big data world -Benefits and uses of data science and big data - facets of data.		
	Digital Data-An Imprint	Periods	12
Unit- III	Introduction to Big Data: - Evolution of Big Data - What is Big Data - Sources of Big Data. Characteristics of Big Data 6Vs- Big Data- Challenges of Conventional Systems –Data Processing Models-Limitation of Conventional Data Processing Approaches- Big Data.		
	Machine learning	Periods	12
Unit- IV	Modelling Process - Training model - Validating model - Predicting new observations – Supervised learning, Unsupervised learning, Semi supervised learning. Exploratory data analysis. First steps in big data:-Distributing data storage and processing with Frameworks		
	Ethics and Data Science	Periods	12
Unit- V	Doing Good Data Science ,The Five Cs, Implementing the Five Cs, Ethics and Security Training, Building Ethics into a Data-Driven Culture, Regulation, Building Our Future.		
	Total Periods		60

Text Books	
1	Davy Cielen, Arno D. B. Meysman and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016. Brian Godsey, "Think Like a Data Scientist", Manning Publications, 2017. Mike Loukides, Hilary Mason & D J Patil, "Ethics and Data Science", Oâ€™Reilly, 1st Ed, 2018.Davy Cielen, Arno D.B.Meysman, Mohamed Ali, "Introducing Data Science", 2016. Reema Thareja, "Data Science and Machine Learning with R", 2021. Luca Massaron John Paul Mueller, "Python for Data Science", 2nd Ed, 2019.
References	
1	Brian Godsey, "Think Like a Data Scientist", Manning Publications, 2017.
2	Mike Loukides ,Hilary Mason &DJPatil, "Ethics and Data Science", O Reilly,1st Ed, 2018.
3	Davy Cielen ,Arno D.B. Meysman, Mohamed Ali, "Introducing Data Science", 2016.

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**	**2024-2025**	
Department	**Data Science**		**Semester**			**III**	
Course Code	**Course Name**		**Periods per Week**	**Credit**	**Maximum Marks**		
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U3DSDE02	**CLOUD COMPUTING**		**4**	**0**	**0**	**3**	**25**	**75**	**100**
COURSE OBJECTIVES	An insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now.								
POs	PROGRAMME OUTCOME								
PO1	Understand and apply fundamental principles , concepts and methods in critical areas of science and multidisciplinary fields.								
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for Scientific requirements.								
PO3	Develop critical thinking with scientific temper and apply the technologies in various Fields of Data Science								
PO4	Communicate the subject effectively.								
PO5	Understand professional ,ethical, and social responsibilities.								
PO6	Ability to understand and analyze a given real-time problems and propose feasible Computing solutions.								
PO7	Imbibe Quality Software Development practices.								

COs	COURSE OUTCOME
CO1	Remember the basic concepts of software Engineering.
CO2	Understanding requirement analysis.
CO3	Apply software design.
CO4	Evaluate with UML.
CO5	Implement coding and testing.
Pre-requisites	Basic knowledge about Computing techniques

Knowledge Levels			
1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing			
CO/ PO /KL Mapping (3/2/1indicatesthestrengthofcorrelation, 3-strong, 2- medium, 1- weak)			
COs	KLs	POs	KLs
CO1	1	PO1	1
		PO2	2
		PO3	3
CO2	2	PO4	4
		PO5	4
		PO6	2
CO3	3	PO7	2
CO4	3		
CO5	4		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	1	1	2	2
CO2	2	3	2	1	1	3	1
CO3	1	2	3	2	2	2	2
CO4	1	2	3	2	2	2	2
CO5	1	1	2	3	3	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit- I	Cloud Computing Overview	Periods	12
	Origins of Cloud computing - Cloud components –Essential characteristics - On-demand self- service- Broad network access- Location independent resource pooling-Rapid elasticity-Measuredservice-ComparingcloudproviderswithtraditionalITservice providers-Roots of cloud computing.		
Unit- II	Cloud Insights	Periods	12
	Architectural influences - High-performance computing- Utility and Enterprise grid computing-Cloud scenarios - Benefits: scalability-simplicity-vendors - security - Limitations -Sensitive information - Application development-security level of third party -security benefits- Regularity issues :Government policies.		
Unit- III	Cloud Architecture –Layers and Models	Periods	12
	Layers in cloud architecture - Software as a Service - features of SaaS and benefits – Platform as a Service-features of PaaS and benefits-Infrastructure as a Service- features of IaaS and benefits-Service providers-challenges and risks in cloud adoption. Cloud deploymentmodel:Publicclouds-Privateclouds-Communityclouds-Hybridclouds-Advantages of Cloud computing.		
Unit- IV	Cloud Simulators –Cloud Sim and Green Cloud	Periods	12
	Introduction to Simulator-understanding Cloud Sim simulator-Cloud Sim Architecture-Understanding Working platform for CloudSim- Introduction to Green Cloud		
Unit- V	Introduction to VMWare Simulator	Periods	12
	Basics of VMWare- advantages of VMware virtualization- using Vmware workstation-creating virtual machines-understanding virtual machines-create a new virtual machine on local host- cloning virtual machines- virtualize a physical machine- starting and stopping a Virtual machine.		
	Total Periods		60

Text Books	
1	Cloud computing a practical approach-Anthony T.Velte To by J.Velte Robert Elsenpeter TATAMcGraw-HillNewDelhi2010
2	Cloud Computing: Web-Based Applications That Change the Way You Work and CollaborateOnline-MichaelMiller-Que2008
References	
1	Cloud computing for dummies –Judith Hurwitz Robin Bloor Marcia Kaufman Fern Halper-WileyPublishing Inc – 2010
2	Cloud Computing Principles and Paradigms-Edited by Rajkumar Buyya James Broberg Andrzej Goscinski-John Wiley and Sons Inc.2011

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**
Department	**Data Science**		**Semester**				**IV**
Course Code	**Course Name**		**Periods per Week**		**Credit**	**Maximum Marks**	
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U4DSDE03	**Operating System**		**4**	**0**	**0**	**3**	**25**	**75**	**100**
COURSE OBJECTIVES	To introduce basic concepts and functions of operating systems and understand the concept of process, thread and resource management. To understand various Memory, I/O and File management techniques.								
POs	PROGRAMME OUTCOME								
PO1	Understand and apply fundamental principles, concepts and methods in critical areas is science and multidisciplinary fields.								
PO2	Demonstrate problem-solving, analytical and logical skills to provide Solutions for scientific requirements.								
PO3	Develop critical thinking with scientific temper and apply the technologies in various Fields of Data Science								
PO4	Communicate the subject effectively.								
PO5	Understand professional, ethical, and social responsibilities.								
PO6	Ability to understand and analyse a given real-time problems and propose feasible Computing solutions.								
PO7	Imbibe Quality Software Development practices.								

COs	COURSE OUTCOME
CO1	Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions
CO2	To provide users a convenient interface to use the computer system.
CO3	To act as an intermediary between the hardware and its users, making it easier for the Users to access and use other resources.
CO4	The core of the course contains concurrent programming (threads and synchronization), interprocess communication ,and an introduction to distributed operating systems.
CO5	I understand the high-level structure of the Linux kernel both in concept and source code
Pre-requisites	Good programming skills and ability to reason well. Good knowledge of C, Computer Organization and Architecture, x86 Assembly level programming

Knowledge Levels
1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing
CO/ PO /KL Mapping (3/2/1indicatesthestrengthofcorrelation,3-strong,2- medium, 1- weak)

COs	KLs	POs	KLs
CO1	1	PO1	1
		PO2	2
		PO3	2
CO2	2	PO4	4
		PO5	4
		PO6	2
CO3	3	PO7	2
CO4	5		
CO5	6		

Cos	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	1	1	2	2
CO2	2	3	3	1	1	3	1
CO3	1	2	2	2	2	2	2
CO4	1	1	1	2	2	1	1
CO5	1	1	1	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit- I	Introduction	Periods	12
	Introduction- History of operating system- Different kinds of operating system- Operating system concepts - System calls-Operating system structure.		
Unit- II	Processes and Threads	Periods	12
	Processes and Threads: Processes -threads-thread model and usage-inter process communication.		
Unit- III	Scheduling	Periods	12
	Scheduling-MemoryManagement:MemoryAbstraction-VirtualMemory-Page Replacement algorithms.		
Unit- IV	Deadlocks	Periods	12
	Deadlocks: Resources- introduction to deadlocks - deadlock detection and recovery – deadlocks avoidance-deadlock prevention. Multiple processor system: multiprocessors - Multi computers.		
Unit- V	Input/Output	Periods	12
	Input /Output: principles of I/O hardware –principles of I/O software. Files systems: Files - directories -files systems implementation - File System Management and Optimization.		
	Total Periods		60

Text Books	
1	Andrew S. Tanenbaum, "Modern OperatingSystems",2nd Edition, PHI private Limited, New Delhi, 2008.
References	
1	William Stallings, "Operating Systems-Internals & Design Principles",5th Edition, Prentice - Hall of India private Ltd, New Delhi, 2004.
2	Sridhar Vaidyanathan,"Operating System",1st Edition ,Vijay Nicole Publications,2014.
E-References	
1	https://www.google.com/search?q=geeksforgeeks+operating+system&ei=xt4RY-irHs3F4-EPlbSr2Ao&oq=geeksforgeeks+in+operating+&gs
2	https://www.geeksforgeeks.org/last-minute-notes-operating-systems/

	VIVEKANANDHACOLLEGEOFARTSANDSCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**	**2024-2025**	
Department	**Data Science**		**Semester**			**IV**	
Course Code	**Course Name**		**Periods per Week**		**Credit**	**Maximum Marks**	
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U4DSDE04	**Predictive Analysis**		**4**	**0**	**0**	**3**	**25**	**75**	**100**
COURSE OBJECTIVES	Develop theoretical understanding of modeling techniques in data science. Formulate complex decision-making problems with data for predictive analysis in business context.Analyzeandevaluatepredictivemodeloutcomesforinformingdecision-making.						
POs	PROGRAMME OUTCOME						
PO1	Understand and apply fundamental principles ,concepts internet and methods in critical areas science and multidisciplinary fields.						
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for Scientific requirements.						
PO3	Develop critical thinking with scientific temper and apply the technologies in various fields of Data Science						
PO4	Communicate the subject effectively						
PO5	Understand professional, ethical, and social responsibilities.						
PO6	Ability to understand and analyse a given real-time problems and propose feasible Computing solutions.						
PO7	Imbibe Quality Software Development practices .						

COs	COURSE OUTCOME
CO1	Analyze the difference between predictive modeling with other models.
CO2	Represent data in various statistical formats.
CO3	Identify the methods for data cleaning.
CO4	Analyze different Association rules and Item sets.
CO5	Assess the predictive modeling and Linear Regression.
Pre-requisites	The practice of aggregating and analyzing historical data to anticipate future outcomes. Aggregating multiple datasets connects the dots between different departments, business processes, and types of data (structured vs. unstructured).

Knowledge Levels

1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating,6.Synthesizing

CO/ PO /KL Mapping
(3/2/1indicatesthestrengthofcorrelation, 3-strong, 2- medium, 1- weak)

COs	KLs	POs	KLs
CO1	1	PO1	1
		PO2	1
		PO3	3
CO2	2	PO4	4
		PO5	5
		PO6	6
CO3	3	PO7	6
CO4	4		
CO5	5		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	1	1	1	1	1
CO2	2	2	2	1	1	1	1
CO3	1	1	3	2	1	1	1
CO4	1	1	2	3	2	1	1
CO5	1	1	1	2	3	2	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit- I	Introduction to Predictive Analysis	Periods	12
	Introduction to Predictive Analysis: Analytics - Predictive Analytics- Business Intelligence - Predictive Analytics vs. Business Intelligence - Predictive Analytics vs. Statistics - Predictive Analytics vs. Data Mining- Challenges in using predictive analytics. Predictive Analytics Processing steps - Business understanding - Defining data for predictive modelling – Defining the target variable - Defining measures of Success for predictive models.		
Unit- II	Understanding Data	Periods	12
	Understanding Data: Single Variable Summaries- Data Visualisation in one dimension - Histograms -Multiple Variable summaries - Data Visualisation, two or higher dimensions - Value of statistical significance		
Unit- III	Data Preparation-Variable cleaning	Periods	12
	Data Preparation- Variable cleaning: Incorrect values - consistency in Data Formats - Outliers - Multidimensional Outliers - Missing values - Fixing Missed Data Feature creation: Simple Variable Transformations - Fixing Skew - Binning Continuous Variables-Numeric Variable Scaling - Nominal variable transformation - Ordinal variable transformation - Data and time variablefeatures-ZIPCodefeatures-MultidimensionalFeatures-VariableselectionPriorto modeling–Sampling		
Unit- IV	Itemsets	Periods	12
	Itemsets: Terminology-Parameter Settings-Frequent Itemset. Predictive Modeling: Logistic Regression- K-Nearest Neighbor		
Unit- V	Predictive Modeling	Periods	12
	PredictiveModeling:NaiveBayes-Regressionmodels-LinearRegression.AssessingPredictive Models: Batch approach to model assessment - Assessing Regression models		
	Total Periods		60

Text Books	
1	Dean Abbott, Applied Predictive Analytics-Principles and Techniques for the Professional Data Analyst, Wiley India Pvt Ltd., 2015.
References	
1	1.DanielT.Larose,ChantalD.Larose,DataMiningandPredictiveAnalysis, WileyIndiaPvt Ltd, 2nd Edition, 2017.
2	2.MaxKuhn,KjellJohnson,AppliedPredictiveModeling,Springer,2016.
E-References	
1	https://medium.com/analytics-vidhya/predictive-web-analytics-a-case-study-f30feda45002
2	https://cloud.google.com/learn/what-is-predictive-analytics

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**
Department	**Data Science**		**Semester**				**V**
Course Code	**Course Name**		**Periods per Week**		**Credit**	**Maximum Marks**	
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U5DSDE05	**INTERNETOF THINGS**		**5**	**0**	**0**	**4**	**25**	**75**	**100**
COURSE OBJECTIVES	Use of Devices ,Gateways and Data Management in IoT. Design IoT applications in different domain and be able to analyze their performance and Implement basic IoT applications on embedded platform.								
POs	PROGRAMME OUTCOME								
PO1	Understand and apply fundamental principles, concepts and methods in critical areas science and multidisciplinary fields.								
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for scientific requirements.								
PO3	Develop critical thinking with scientific temper and apply the technologies in various fields of Data Science								
PO4	Communicate the subject effectively.								
PO5	Understand professional, ethical ,and social responsibilities.								
PO6	Ability to understand and analyse a given real-time problems and propose feasible computing solutions.								
PO7	Imbibe Quality Software Development practices.								

COs	COURSE OUTCOME
CO1	Remember IoT and Web technology.
CO2	UnderstandingM2MtoIoT.
CO3	Apply IoT Architecture.
CO4	Evaluate IoT Applications.
CO5	Implement IoT Privacy, Security and Governance.
Pre-requisites	Basic Knowledge about IOT

Knowledge Levels

1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing

CO/ PO /KL Mapping
(3/2/1indicatesthestrengthofcorrelation, 3-strong, 2- medium, 1- weak)

COs	KLs	POs	KLs
CO1	1	PO1	1
		PO2	2
		PO3	2
CO2	2	PO4	3
		PO5	3
		PO6	3
CO3	2	PO7	2
CO4	3		
CO5	2		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	1	1	1	2
CO2	2	3	3	2	2	2	1
CO3	2	3	3	2	2	2	1
CO4	1	2	2	3	3	3	2
CO5	2	3	3	2	2	2	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

ContentoftheSyllabus			
Unit- I	FUNDAMENTALS OF IOT	Periods	12
	Introduction - Definition and Characteristics of IoT - Physical design - IoT Protocols – Logical design - IoT communication models, IoT Communication APIs - Enabling technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates - Domain specific IoTs - IoT Architectural view.		
Unit- II	ELEMENTS OF IOT	Periods	12
	IoT and M2M- difference between IoT and M2M - Software Defined Networks – Network Function Virtualization - IoT systems management – Needs - NETCONF, YANG - IoT design methodology..		
Unit- III	IOT PROTOCOLS	Periods	12
	Sensors and actuators - Communication modules – Zigbee - LoRa - RFID - Wi-Fi - Power sources.		
Unit- IV	BUILDING IoT WITH CLOUD AND DATA ANALYTICS	Periods	12
	IoT platforms – Arduino – Raspberry Pi - Cloud Computing in IoT - Cloud Connectivity – Big Data Analytics - Data Visualization		
Unit- V	CHALLENGES IN IOT AND CASE STUDIES	Periods	12
	Security Concerns and Challenges - Real time applications of IoT – Home automation – Automatic lighting – Home intrusion detection – Cities – Smart parking – Environment – Weather monitoring system – Agriculture – Smart irrigation.		
	Total Periods		60

Text Books	
1	Vijay Madisetti and Arshdeep Bahga, Internet of Things: A Hands-on Approach–, Universities Press -INDIA Private Limited 2014, 1st Edition.
References	
1	Michael Miller, The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World–,PearsonEducation2015
2	Francis da Costa, Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, ApressPublications2013,1stEdition
3	Waltenegus Dargie,Christian Poellabauer, Fundamentals of Wireless Sensor Networks: Theory and Practice,Wiley2014.
4	CunoP fister, Getting Started with the Internet of Things, O Reilly Media 2011.
E-References	
1	https://github.com/connectIOT/iottool
2	kit2.https://www.arduino.cc/

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**	**2024-2025**	
Department	**Data Science**		**Semester**			**V**	
Course Code	**Course Name**	**Periods per Week**			**Credit**	**Maximum Marks**	
		L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U5DSDE06	**CYBER SECURITY**	**5**	**0**	**0**	**4**	**25**	**75**	**100**
COURSE OBJECTIVES	The technical knowledge and skills needed to protect and defend computer systems and networks. To develop graduates that can plan, implement, and monitor cyber security mechanisms to help ensure the protection of information technology assets.						
Pos	PROGRAMME OUTCOME						
PO1	Understand and apply fundamental principles, concepts and methods in critical areas Is science and multidisciplinary fields.						
PO2	Demonstrate problem-solving, analytical and logical skills to provide Solutions for scientific requirements.						
PO3	Develop critical thinking with scientific temper and apply the technologies in various fields of Data Science						
PO4	Communicate the subject effectively.						
PO5	Understand professional, ethical, and social responsibilities.						
PO6	Ability to understand and analyse a given real-time problems and propose Feasible computing solutions.						
PO7	Imbibe Quality Software Development practices.						

COs	COURSE OUTCOME
CO1	Understand the fundamentals of Cyber security, Cyber Crime, threats and vulnerabilities.
CO2	Apply the different operational tips for Social networks and browsers.
CO3	Apply the different Investigation roles to identify the cybercrime.
CO4	Understand various digital forensic and analyzing data for preventing cyber crime.
CO5	Analyze and Create the Cyber Crime Models
Pre-requisites	Familiarity with Unix, Linux, and Windows operating system. Knowledge about SaaS models and cloud computing.

Knowledge Levels
1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing
CO/ PO /KL Mapping (3/2/1indicatesthestrengthofcorrelation, 3-strong, 2- medium, 1- weak)

COs	KLs	POs	KLs
CO1	1	PO1	1
		PO2	2
		PO3	3
CO2	2	PO4	4
		PO5	4
		PO6	5
CO3	3	PO7	6
CO4	4		
CO5	5		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	1	1	1	1
CO2	2	3	2	1	1	1	1
CO3	1	2	3	2	2	1	1
CO4	1	1	2	3	3	2	1
CO5	1	1	1	2	2	3	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit- I	Introduction to cybercrime	Periods	12
	Introduction to cyber crime: Classification of cyber crimes - reasons for commission of cyber crime – malware and its type - kinds of cyber crime - authentication - encryption - digital signatures - antivirus - firewall - steganography - computer forensics - why should we report cyber crime-introductioncountercybersecurityinitiativesinindia-generating secure password -usingpasswordmanager-enablingtwo-stepverification-securitycomputerusingfree antivirus.		
Unit- II	Tips for buying online	Periods	12
	Tips for buying online: Clearing cache for browsers – wireless LAN-major issues with WLAN-safe browsing guidelines for social networking sites - email security tips - introduction- smart phone security guideling- purses, wallets, smart phones- platforms, setup and installation-Communicating securely with a smart phone.		
Unit- III	Cyber investigation roles	Periods	12
	Cyber investigation roles: Introduction - role as a cyber crime investigator - the role of law enforcement officers - the role of the prosecuting attorney - incident response: introduction-postmortmem versus live forensics - computer analysis for the hacker defender program-network analysis - legal issues of intercepting wifi transmission .		
Unit- IV	Seizure of digital information	Periods	12
	Seizure of digital information: introduction - defining digital evidence – digital evidence seizure methodology - factors limiting the wholesale seizure of hardware - other options for seizing digital evidence- common threads within digital evidence seizure - determining the most appropriate seizure method		
Unit- V	Digital forensics and analyzing data	Periods	12
	Digital forensics and analyzing data: introduction - the evolution of computer forensics- phasesof digital forensics-collection - examination-analysis - reporting - Cyber crime prevention: introduction - crime targeted at a government agency.		
Total Periods			60

Text Books	
1	Dr.JeetendraPande,introductiontocybersecuritypublishedbyUttarakhandOpen University,2017.Chapter:1.2-6.4,9.3-12.2
2	Anthonyreyes,Kevinoâ€™shea,jimsteele,jonR.hansen,captainBenjaminR.jeanThomas Ralph,Cybercrimeinvestigationsbridgingthegapsbetweensecurityprofessionals, law enforcement, andprosecutors2007.Chapter: 4, 5, 6, 7, 8, 9, 10
References	
1	https://www.sanfoundry.com/best-reference-books-information-network-security/
E-References	
1	https://www.consilium.europa.eu/media/40984/intro-cyber-security-002.pdf

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**	**2024-2025**	
Department	**DATA SCIENCE**		**Semester**			**VI**	
Course Code	**Course Name**	**Periods per Week**	**Credit**	**Maximum Marks**			
		L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U6DSDE07	**WEBMINING**	**4**	**0**	**0**	**4**	**25**	**75**	**100**

COURSE OBJECTIVES	Design and implementation of various web analytical tool to understand complex unstructured data on the Internet for aiding individuals and Businesses to grow their business
POs	PROGRAME OUTCOME
PO1	Understand and apply fundamental principles, concepts and methods in critical areas of science and multidisciplinary fields.
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions for scientific requirements.
PO3	Develop criticalthinkingwithscientifictemperandapplythetechnologiesinvarious fields of Data Science
PO4	Communicate the subject effectively
PO5	Understand professional, ethical ,and social responsibilities
PO6	Ability to understand and analyse a given real-time problems and propose feasible computing solutions.
PO7	Imbibe Quality Software Development practices

COs	COURSE OUTCOME
CO1	To Understand the difference between Web Mining and Data mining
CO2	To Understand the Basics and Needs of Web Mining.
CO3	To Understand Web-based Data.
CO4	To Understand Opinion Mining and Sentiment classification.
CO5	Develop deep understanding of mining techniques exclusively for the Internet
Pre-requisites	Introduction to problems, principles, mechanisms, and techniques connected to mining large datasets. Skills: Similarity search, mining streaming data, social network analysis, synopses for massive data, web usage mining, and recommendation systems. Competence: Mining massive datasets.

Knowledge Levels
1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing

CO/ PO /KL Mapping
(3/2/1indicatesthestrengthofcorrelation, 3-strong, 2- medium, 1- weak)

COs	KLs	POs	KLs
CO1	2	PO1	1
		PO2	3
		PO3	2
CO2	1	PO4	3
		PO5	4
		PO6	5
CO3	3	PO7	6
CO4	4		
CO5	6		

COs	ProgrammeOutcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	3	2	1	1	1
CO2	3	1	2	1	1	1	1
CO3	1	3	2	3	2	1	1
CO4	1	2	1	2	3	2	1
CO5	1	1	1	1	1	2	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit- I	Introduction to Web Mining	Periods	12
	Web Mining, Data Mining, Basic Concepts ,Difference, Mining Sequential Patterns on Prefix Span, Generating Rules from Sequential Patterns.		
Unit- II	Basic Concepts	Periods	12
	Basic Concepts of Information Retrieval, Information Retrieval Models, Relevance feedback, Evaluation measures Text and Web Page Preprocessing ,Inverted Index and Its Compression, latent semantic indexing, Web Search, Web Spamming		
Unit- III	Opinion Mining and Web Usage Mining	Periods	12
	Web Information Retrieval, Sentiment Classification, Feature based Opinion Mining and Summarization, Comparative Sentence and Relation Mining, Opinion Search and Opinion Spam. Web Usage Mining.		
Unit- IV	Social Network &Link Analysis	Periods	12
	Link Analysis, Scrapy using python(without pipelining),Social Network Analysis, Co-Citation and Bibliographic Coupling, PageRank, HITS, Community Discovery		
Unit- V	Webpage crawlers and usage mining	Periods	12
	Basic Crawler Algorithm, Implementation Issues, Universal Crawlers, Focused Crawlers, Topical Crawlers, Crawler Ethics and Conflicts, Data modelling and webpage usage mining, Discovery and analysis of webusage patterns ,Recommender systems and Collaborative filtering, querylog mining		
Total Periods			60

Text Books	
1	Web Data Mining: Exploring Hyperlinks, Contents ,and Usage Data by Bing Liu(Springer Publications)2017publication
References	
1	WebMining:ApplicationsandTechniquesbyAnthonyScime,2010
2	Mining the Web: Discovering Knowledge from Hypertext Data by Soumen Chakrabarti 2010
E-References	
1	https://www.udemy.com/course/

	VIVEKANANDHACOLLEGEOFARTSANDSCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam,Tiruchengode-637 205.**						
Programme	**B.Sc**	**Programme Code**	**UDS**		**Regulations**		**2024-2025**
Department	**Data Science**		**Semester**				**VI**
Course Code	**Course Name**		**Periods per Week**		**Credit**	**Maximum Marks**	
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
23U6DSDE08	**SOFTWARE ENGINEERING**		**4**	**0**	**0**	**4**	**25**	**75**	**100**
COURSE OBJECTIVES	To understand the software engineering concepts. Understand the coding, testing and user interface design , develop the software projects and Software reliability and quality management								
POs	PROGRAMME OUTCOME								
PO1	Understand and apply fundamental principles, concepts and methods in critical areas science and multidisciplinary fields								
PO2	Demonstrate problem-solving, analytical and logical skills to provide solutions For scientific requirements.								
PO3	Developcriticalthinkingwithscientifictemperandapplythetechnologiesinvarious fields of Data Science								
PO4	Communicate the subject effectively.								
PO5	Understand professional ,ethical, and social responsibilities.								
PO6	Ability to understand and analyse given real-time problems and propose feasible Computing solutions.								
PO7	Imbibe Quality Software Development practices								

COs	COURSE OUTCOME
CO1	Basic knowledge and understanding of the analysis and design of complex systems
CO2	Ability to apply software engineering principles and techniques
CO3	Work as an individual and as part of a multidisciplinary team to develop and deliver quality software
CO4	Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle
CO5	Demonstrate an ability to use the techniques and tools necessary for engineering practice
Pre-requisites	LearnaProgrammingLanguage.LearnDataStructuresandAlgorithms.Builda Portfolio on Github. Ace the Coding Interview. Expand Your Knowledge

Knowledge Levels

1.Remembering,2.Understanding,3.Applying,4.Analyzing,5.Evaluating, 6.Synthesizing

CO/ PO /KL Mapping
(3/2/1indicatesthestrengthofcorrelation, 3-strong, 2- medium,
1- weak)

COs	KLs	POs	KLs
CO1	1	PO1	1
		PO2	2
		PO3	3
CO2	2	PO4	4
		PO5	5
		PO6	6
CO3	3	PO7	6
CO4	4		
CO5	5		

COs	Programme Outcome(POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	1	1	1	1
CO2	2	3	2	1	1	1	1
CO3	1	2	3	2	1	1	1
CO4	1	1	2	3	2	1	1
CO5	1	1	1	2	3	2	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I,II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

ContentoftheSyllabus			
Unit- I	Introduction	Periods	12
	Introduction - Software Engineering Discipline - Evolution and Impact - Programs Vs Software Products. Software Life Cycle Models: Use of a Life Cycle Models - Classical WaterfallModel-IterativeWaterfallModel-PrototypingModel-EvolutionaryModel-Spiral Model..		
Unit- II	Requirements Analysis and Specification	Periods	12
	Requirements Analysis and Specification : Requirements Gathering and Analysis - Software Requirements Specification (SRS) - Formal System Development Techniques. Software Design:CharacteristicsofaGoodSoftwareDesign-CohesionandCoupling-Neat Arrangement-Software Design Approaches.		
Unit- III	Function-Oriented Software Design	Periods	12
	Function-OrientedSoftwareDesign:OverviewofSA/SDMethodology-StructuredAnalysis- Data Flow Diagrams (DFDs).Object Modeling Using UML: Overview of Object-Oriented Concepts - UML Diagrams - Use Case Model - Class Diagrams - Interaction Diagrams - Activity Diagrams –State Chart Diagram.		
Unit- IV	User Interface Design	Periods	12
	User Interface Design: Characteristics of a Good User Interface –Basic Concepts-Types of User Interfaces- Component-Based GUI Development; Coding and Testing: Coding -		
Unit- V	Software Reliability and Quality Management	Periods	12
	SoftwareReliabilityandQualityManagement:SoftwareReliability-StatisticalTesting- Software Quality -Software Quality Management System .		
Total Periods			60

Text Books	
1	Rajib Mall, "FundamentalsofSoftwareEngineering",3rdEdition, Prentice Hall of India Private Limited,2008.
References	
1	Rajib Mall, "Fundamentals of Software Engineering", 4thEdition, Prentice Hall of India Private Limited,2014.
2	Richard Fairley, "Software Engineering Concepts ",TMGH Publications, 2004.
E-References	
1	https://www.geeksforgeeks.org/software-engineering/
2	https://www.javatpoint.com/software-engineering-tutorial

Subject Title	HUMAN COMPUTER INTERACTION	Semester	II
Subject Code	24U2DSS01	Specialization	NA
Type	CORE: THEORY	L:T:P:C	2:0:0:2

COURSE OBJECTIVE:

1. Understand Fundamental HCI Concepts
2. Develop Skills in Designing User Interfaces
3. Apply User-Centered Design (UCD) Methodology

CO No.	CO Statement	Knowledge Level
CO1	Students will understand human cognitive processes, memory, emotions, and individual differences to enhance interaction design and usability.	K1
CO2	Students will understand computer hardware, including input devices, displays, memory, and paper, to improve system design and user interfaces.	K2, K4
CO3	Students will learn interaction models, ergonomic design, and interface styles to create effective user interfaces, including 2D/3D navigation and WIMP elements.	K3
CO4	Students will apply design principles, user focus, and iterative prototyping to create effective screen layouts and incorporate HCI in the software life cycle to improve usability and design rationale.	K1, K2
CO5	Students will analyze and apply design rules, principles, standards, and heuristics to enhance usability and interface effectiveness	K4

Unit	Contents	No. of Hrs
I	**The human:** Introduction - Input–Output channels - Human memory - Thinking: Reasoning and Problem Solving - Emotion - Individual differences. (1.1 to 1.5)	6
II	**The Computer:** Introduction - Text entry devices - Positioning, pointing and drawing - Display devices - Paper: printing and scanning – Memory. (2.1 to 2.8)	6
III	**The interaction:** Introduction - Models of interaction - Frameworks and HCI – Ergonomics: Design Focus: Industrial interfaces - Interaction styles: Design Focus: Navigation in 3D and 2D - Elements of the WIMP interface - Design Focus: Learning toolbars - Interactivity (3.1 to 3.7)	6
IV	**Interaction design basics:** What is design - The process of design - User focus – Screen design and layout - Iteration and prototyping. **HCI in the software process:** The software life cycle - Usability engineering - Iterative design and prototyping - Design rationale. (5.2 to 5.4, 5.7 to 5.8, 6.2 to 6.5)	6
V	**Design rules:** Introduction - Principles to support usability – Standards – Guidelines - Golden rules and heuristics - HCI patterns. (7.1 to 7.7)	6

Learning Resources	
Text book	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human -Computer Interaction", 3rd Edition, Pearson Education, 2004.
Reference book	Serengul Smith-Atakan, "Human-Computer Interaction: Basics and Practice", Bentham books.
Websit e / Link	https://www.tutorialspoint.com/human_computer_interface/index.htm