

PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR SALEM – 636011

B.Sc., DATA SCIENCE *CHOICE BASED CREDIT SYSTEM*

OBE REGULATIONS AND SYLLABUS

(SEMESTER PATTERN) (For Candidates admitted in the Colleges affiliated to Periyar University from 2022-2023 onwards)

Outcome Based Education (OBE) REGULATIONS AND SYLLABUS

(With effect from the academic year 2022-2023 onwards)

1. PREAMBLE

The program prepares under Graduates in Data Science with strong theoretical input and relevant practical knowledge, who can be employed in industries. The program develops requisite professional skills and problem solving abilities to pursue a successful career in software industry and pursuing higher studies in Data Science.

2. GRADUATE ATTRIBUTES

- 1. Computational Knowledge
- 2. Problem Analysis & Solving
- 3. Design & Development of Solutions
- 4. Modern Tool Usage
- 5. Communication skills
- 6. Innovation & Entrepreneurship
- 7. Societal & Environmental concern

3. PROGRAMME SPECIFIC QUALIFICATION ATTRIBUTES

The programme specific qualification attributes meant to be achieved through subjects in the programme in terms of

- 1. Knowledge and understanding level (K1 and K2)
- 2. Application level (K3)
- 3. Analytical level (K4)
- 4. Evaluation capability level (K5)
- 5. Scientific or Synthesis level (K6)

4. ELIGIBILITY FOR ADMISSION

A candidate who has passed in Higher Secondary Examination with Mathematics or Computer Science or Statistics as one of the subject under Board of Higher Secondary Examination, Tamil Nadu as per norms set by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the syndicate, subject to such conditions as may be prescribed, are permitted to appear and qualify for the **Bachelor of Science in Data Science** degree examination of this university after a programme of study of three academic years.

5. PROGRAMME OBJECTIVES AND OUTCOMES

> Programme Educational Objectives (PEOs)

PEO1: Students are prepared to be employed in IT industries by providing expected domain Knowledge.

PEO2: Students are provided with practical training, hands-on and project experience to meet the industrial needs.

PEO3: Students are motivated in career and entrepreneurial skill development to become global leaders.

PEO4: Students are trained to demonstrate creativity, to develop innovative ideas and to work in teams to accomplish a common goal.

PEO5: Students are trained to address social issues and guided to approach problems with solutions.

> Programme Specific Outcomes(PSOs)

After completion of the programme the graduates will be able

PSO1: To develop the ability to understand abstract concepts that lead to various data science theories in Mathematics, Statistics, and Computer Science.

PSO2: To identify, analyze and design solutions for problems using the fundamental principles of Mathematics, Statistics, Computing Sciences, and relevant domain disciplines.

PSO3: To acquire the skill of handling data science programming tools for problemsolving.

PSO4: To understand and commit to professional ethics, cyber regulations, responsibilities, and norms of professional computing practices.

PSO5: To understand the role of statistical approaches and apply the same to solve reallife problems in the fields of data science.

PSO6: To apply research-based knowledge to analyze and solve problems in data science.

> Programme Outcomes(POs)

On successful completion of the BSc Programme, the students will be able to:

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.

6. DURATION OF THE PROGRAMME

The Programme shall extend over a period of three years comprising of six semesters with two semesters in one academic year. There shall not be less than 90 working days for each semester. Examination shall be conducted at the end of every semester for the respective subjects.

7. COURSE OF STUDY

The programme of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time. The syllabus for various subjects shall be clearly demarcated into five units in each subject. Part -I, Part-II, Part – III, Part – IV and Part-V subjects are as prescribed in the scheme of examination. The Extension Activities are a must for each student to take part at least in any one of the activities like NSS, YRC, SPORTS and RRC for the fulfillment of the degree.

8. EXAMINATIONS

The theory examination shall be 3 Hrs duration for each subject at the end of every semester. The candidate failing in any subject(s) will be permitted to appear in the subsequent examination. The practical examinations for core subjects and SBEC should be conducted at the end of the every semester.

Submission of Record Note Books for Practical Examinations

Candidates appearing for practical examinations should submit bonafide Record note books prescribed for practical examinations, otherwise the candidates will not be permitted to appear for the practical examinations. However, in genuine cases where the students who could not submit the record note books, they may be permitted to appear for the practical examinations, provided the concerned Head of the Department certified that the candidate has performed the experiments prescribed for the subject. For such candidates zero (0) marks will be awarded for record note books.

9. REVISION OF REGULATIONS AND CURRICULUM

The University may revise/amend/ change the Regulations and Scheme of Examinations, if found necessary.

10. PASSING MINIMUM MARKS

Theory

The candidate shall be declared to have passed the examination if the candidate secured **not less than 40 marks** put together out of 100 marks (CIA + EA). Minimum 40% should be secured (30 out of 75) in EA of each theory subject.

Practical/Project viva voce

The candidate shall be declared to have passed the examination if the candidate **scored not less than 40 marks** put together out of 100 marks (**CIA** + **EA**). **Minimum 40% should be secured (24 out of 60) in EA** of each Practical subject.

11. MARKS DISTRIBUTION AND QUESTION PAPER PATTERN FOR BCA

11.1 Theory –Marks Distribution

Maximum Marks	:	100 Marks
External [EA]	:	75 Marks
Internal [CIA]	:	25 Marks

(a) Theory - Question Paper Pattern [External]

(Total Marks: 75)

Section	Approaches	Mark Pattern
A	One word (Answer all questions &Three questions from each unit)	15X1 = 15 (Multiple Choice Questions)
В	100 to 200 words (Answer any Two out of five questions &One question from each unit)	2X5 = 10 (Analytical type questions)
С	500 to 1000 words(Answer ALL questions &One question from each unit with Internal Choice)	5X10 = 50 (Essay type questions)

(b) Theory - Internal Marks Distribution (Total Marks: 25)

Attendance	:	5 Marks
Assignment	:	5 Marks
Test	:	15 Marks

11.2. Practical – Marks Distribution

Maximum Marks	: 100 Marks
External [EA]	: 60 Marks
Internal [CIA]	: 40 Marks

(a) Practical-External Marks Distribution (Total Marks :60)

For each practical question the marks should be awarded as follows (External)

i)	Algorithm/flowchart	-20%
ii)	Writing the program in the main answer book	-30%
iii)	Test and debug the program	-30%
iv)	Printing the correct output	-20%

(Marks may be proportionately reduced for the errors committed in each of the above)

Practical Ouestion Paper Pattern

Student should attend two questions (either or pattern)

Note:

- (i) Core and SBEC Practical have same pattern
- (ii) Core and SBEC Practical Examination must be conducted at the end of every Semester

(b) Practical - Internal Marks Distribution (Total Marks: 40)

Record	:	15 Marks
Internal Practical examinations	:	25 Marks

11.3 Project Evaluation:

Continuous Internal Assessment	: 80 Marks
Evaluation (External)	: 80 Marks
Viva-voce (jointly)	: 40 Marks

12. COMMENCEMENT OF THIS REGULATION:

These regulations shall take effect from the academic year 2022-2023, i.e, for students who are to be admitted to the first year of the programme during the academic year 2022-23 and thereafter.

SEMESTER	Ι	II	III	IV	V	VI	Total Credits
PART – I	3	3	3	3	-	-	12
PART – II	3	3	-	-	-	-	6
ALLIED	4	6	4	6	-	-	20
THEORY	5	10	10	9	12	5	51
PRATICAL/MIMI PROJECT	2	2	2	2	4	8	20
ELECTIVE	-	-	-	-	4	8	12
SBEC	-	-	3	-	3	3	9
NMSDC	-	2	-	2	-	2	6
NMEC	-	-	2	2	-	-	4
PROFESSIONAL ENGLISH	4	4	-	-	-	-	8
EVS	-	-	-	-	-	-	-
ADD-ON COURSE	-	-	-	-	-	-	-
VALUE EDUCATION	2	-	-	-	-	-	2
EXTENSION ACTIVITY	-	-	-	-	-	1	1
Cumulative Total Credits	23	30	24	24	23	27	151

Scheme of Examinations from the Academic Year 2022-2023 Credit Distribution as per the University Norms.

COURSE OF STUDY AND SCHEME OF EXAMINATION

		Hours			Μ	arks		
Part	Subject Code	Subject Title	Lect.	Lab	Credit	CIA	EA	Total
		SEMESTER I	1		L	1	1	
I II II III	21UFTA01 20UENC01 22UDS01 22UDSP01	Tamil I English I Communicative English Core I:Python Programming Practical I Python Lab Allied I. Mathematics Paper I	6 6 6 - 7	- - 3	3 3 5 2 4	25 25 25 40 25	75 75 75 60 75	100 100 100 100 100
IV IV	21UVE01 ADD-ON	Value Education Professional English for Physical Science I	2 4	-	2 4	25 25	75 75	100 100
		Total	31	3	23	190	510	700
	SEMESTER II							
Ι	21UFTA02	Tamil II	6	_	3	25	75	100
II II	20UENC02 NMSDC-I	English II Communicative English Language Proficiency for Employability -Effective English	4 2 4	-	3 2 5	25 25 25	75 75 75	100 100 100
	22UDS02 22UDSP02 22UDS03	Core II : Data Structures and Algorithms Practical II :SQL and PL/SQL Lab Core III: Relational Data Base Management Systems	- 3	3	2 5	40 25	60 75	100 100
		Allied II Mathematics Paper II Allied II – Practical	5	- 2	4 2	25 40	75 60	100 100
IV IV	21UES01 ADD-ON	Environmental Studies Professional English for Physical Science II Total	1 4 29	- - 5	- 4 30	25 25 255	75 75 645	100 100 1000

				ırs	S		Mark	s
Part	Subject Code	Subject Title	Lect.	Lab	Credit	CIA	EA	Total
		SEMESTER III						
III III III	21UFTA03 22UDS04 22UDS05	Tamil III Core IV: Data Science Core V: Operating System	6 5 5	- -	3 5 5	25 25 25	75 75 75	100 100 100
III III III III	22UDSP03 22UDSSP01	Practical III: Data Science with Python Lab Allied III Statistical Methods Paper I Allied Practical SBEC I- Data Analytics with Spread Sheet Lab	- 7 -	3 - - 2	2 4 - 3	40 25 - 40	60 75 - 60	100 100 - 100
IV	NMEC –I	Non –Major Elective – I	2	-	2	25	75	100
	Total		25	5	24	205	495	700
	I	SEMESTER IV						
III III III III III IV IV	21UFTA03 22UDS06 22UDSP04 22UDS07 NMSDC-II NMEC – II	Tamil IV Core VI : Computer Networks Practical IV: R- Programming Lab Core VII : Big Data Analysis Allied IV: Statistical Methods Paper II Allied –Practical Digital Skills for Employability - Office Fundamentals Non –Major Elective – II	6 5 5 5 - 2 2		3 5 2 4 4 2 2 2	25 25 40 25 25 40 25 25 25	75 75 60 75 75 60 75 75	100 100 100 100 100 100 100
IV	Add-on Total	Add-on Course Internship Programme	- 25	- 5	- 24	- 230	- 570	800

* Allied Practical Examination will be conducted at the end of even semester.

			Ho	urs	S		M	arks
Part	Subject Code	Subject Title	Lect.	Lab	Credit	CIA	EA	Total
		SEMESTER V		<u> </u>				
III	22UDS08	Core VIII : Data Visualization Techniques	5	-	4	25	75	100
III	22UDS09	Core IX : Machine Learning	5	-	4	25	75	100
III	22UDSP05	Practical V : Data Visualization Lab	-	3	2	40	60	100
III	22UDS10	Core X: Internet of Things	5	-	4	25	75	100
III		Elective – I	5	-	4	25	75	100
III	22UDSP06	Practical VI: NoSQL Lab	-	4	2	40	60	100
IV	22UDSSP03	SBEC – III : Web Design using HTML	-	3	3	40	60	100
	Total		20	10	23	220	480	700
	SEMESTER VI							
			I					
III	22UDS11	Core XI : Digital Marketing	6	-	5	25	75	100
III	22UDSPR01	Mini Project	-	9	8	50	150	200
III	NMSDC-III	Data Analytics with Advanced	2	-	2	25	75	100
		Tools for Employability Elective						
		П						
III		Elective III	5	-	4	25	75	100
III		Elective III	5	-	4	25	75	100
IV	22UDSS01	SBEC - IV : Soft Skills	3	-	3	25	75	100
V	22UEX01	Extension Activity	-	-	1	-	-	-
	Total		21	9	27	175	525	700

ELECTIVE SUBJECTS

Elective – I	I
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Sem	Part	Subject Code	Subject Title
		22UDSE01	Software Engineering
V	III	22UDSE02	Computer Graphics
		22UDSE03	Data Mining

Elective - II

Sem	Part	Subject Code	Subject Title
		22UDSE04	Web Technology
VI	III	22UDSE05	Cloud Computing
		22UDSE06	Deep Learning

Elective-III

Sem	Part	Subject Code	Subject Title
		22UDSE07	Software Project Management
VI	III	22UDSE08	Mobile Computing
		22UDSE09	Network Security

Non Major Elective Course – (NMEC)

Non Major Elective Subjects offered by the Department of Data Science

The department can offer any one of the subjects to the other major subject students in each semester.

PART S	SEM	SUB	SUBJECT TITLE	Lect. Hours		MARKS			
	SEM	CODE	SUBJECT IIILE		Credit	CIA	EA	TOTAL	
			SEMESTER –III & IV						
		22UDSN01	NMEC I: Basics of Computers	2	2	25	75	100	
IV	III	22UDSN02	NMEC I: Computer Applications for Automation	2	2	25	75	100	
	IV	22UDSN03	NMEC II: Basics of Internet	2	2	25	75	100	
		22UDSN04	NMEC II: Image Editing Tool	2	2	25	75	100	

SBEC – Skill Based Elective Courses

ster			Hours		S	Marks			
Part	Seme	Subject Title .		LAB	Credit	CIA	EA	Total	
IV	III	SBEC – I : Data Analytics with Spread Sheet Lab	-	3	3	40	60	100	
IV			-						
IV	V	SBEC - III : Web Design using HTML	-	3	3	40	60	100	
IV	VI	SBEC-IV : Soft Skills	3		3	25	75	100	

B.Sc., Data Science Syllabus under CBCS Pattern with effect from 2022-2023 Onwards Allied Subjects for any Degree offered by the Department of Data Science

SYLLABUS - CBCS PATTERN

EFFECTIVE FROM THE ACADEMIC YEAR 2022-2023

All subjects should be handled and valued by Department of Data Science/ Computer Science only. For University practical examinations both Internal and External examiners should be appointed from Department of Data Science/ Computer Science.

FIRST OPTION (Allied Computer/Data Science) First Year / Second Year (Select any one of the Subject with Practical)

PART	SEMESTER	TITLE OF THE SUBJECT	Hrs.		CRE	MARKS		
PARI			Lect.	Lab	DIT	CIA	EA	TOTAL
III	I /III	Allied Paper – I						
	22UDSA01	Fundamentals of Computers	6	-	4	25	75	100
	II/IV Allied Paper – II							
	22UDSA02	Computer Applications in Office	4	-	4	25	75	100
	22UDSAP01	Allied Practical						
		Office Automation	-	2	2	40	60	100

SECOND OPTION (Allied Computer/Data Science) First Year / Second Year (Select any one of the Subject with Practical)

DADT	SEMESTER	TITLE OF THE SUBJECT	Hrs.		CRE	MARKS		
PARI			Lect.	Lab	DIT	CIA	EA	TOTA L
III	I /III	Allied Paper – I						
	22UDSA03	Database Systems	6	-	4	25	75	100
	II/IV	Allied Paper – II						
	22UDSA04	E-Commerce Techniques	4	-	4	25	75	100
	22UDSAP02	Allied Practical						
		HTML Programming	-	2	2	40	60	100

Allied Courses for Data Science

SYLLABUS - CBCS PATTERN EFFECTIVE FROM THE ACADEMIC YEAR 2022-2023

PART	SEMESTER	TITLE OF THE SUBJECT	Hrs.		CRE	MARKS		
		IIILE OF THE SUBJECT	Lect.	Lab	DIT	CIA	EA	TOTAL
III	Ι	Allied Mathematics Paper – I						
			7	-	4	25	75	100
	III	Allied Mathematics Paper – II						
			5	-	4	25	75	100
		Allied Mathematics Practical						
			-	2	2	40	60	100

First Year

Second Year

PART	SEMESTER	TITLE OF THE SUBJECT	Hrs.		CRE	MARKS		
			Lect.	Lab	DIT	CIA	EA	TOTAL
III	III	Allied Paper – I Statistical Methods and their Applications I	7	-	4	25	75	100
	IV	Allied Paper – II Statistical Methods and their Applications II	5	-	4	25	75	100
		Allied Practical Statistical Methods -Practical	-	2	2	40	60	100

Subject Title	PYTHON PROGRAMMING	Semester	Ι
Subject Code	22UDS01	Specialization	NA
Туре	Core: Theory	L:T:P:C	86:6:0:5

COURSE OBJECTIVE:

CO Number	CO Statement	Knowledge Level
CO1	Understand the Basic Programming Logic.	K1
CO2	Understand the basic Statements.	K2
CO3	Implement Files and SQL.	K2, K3
CO4	Evaluate Graphics in python.	K3,K4
CO5	Analyze Version control system.	K5

*L-Lecture, T-Theory, P-Practical, C-Credit.

Subject Title	PYTHON PROGRAMMING	Semester	Ι		
Subject Code	22UDS01	Specialization	NA		
Туре	Core: Theory	L:T:P:C	86:6:0:5		
Unit	Contents		Levels Session		
Ι	 Hardware - Computer Software - Programming Languages - Algorithmic problem solving - Building blocks of Program - Background of learning to write programs-sample algorithms. Introduction to python - Features of python - Applications of Python - Installation of python - Sample Program - Python virtual machine - Frozen binaries - Memory management in python - Comparison between C and Python - Comparison between Java and Python - Python Vs Similar tools - Python keywords – Python Identifiers – Python statements – Python indentation – Comments in python – Coding styles in python. 			15	
Π	Syntax and Styles: Data types – Literal – Boolean literal – String literal – Variable Expressions – Expressions and Order of evalua Functions applicable to all types of numbers – Control flow: If Statement – While statement – Break statement – Continue statement – Pass controlled loop – Counter Controlled Loop – Co Loop – Nested loops – Sample programs. Sequences – Using lists – List assignment and e bounds – List slicing – List cloning – Ne comprehensions – Lists and functions – Prime list – Adding list elements – Mutability – List un Queue – Functional Programming – Sample program	К2	11		

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	Tuples : Need of tuple – Sequence unpacking – Methods – Sample		
	programs. Dictionary: Making a Dictionary – Basic operations –		
	Dictionary operations - Sets - iterators and Generators - Sample		
	programs. Functions: Introduction – Defining functions – Calling		
III	functions - Passing arguments - Keyword Arguments - Default	K2,K3	20
	Arguments - Required Arguments - Variable-length arguments -		
	Return Statement - Nesting of Passing Arguments - Anonymous		
	Functions – Recursive Function – Scope of Local and Global		
	Variable – Documentation Strings – Sample Programs.		
	Modules: Introduction – Importing modules – Creating modules –		
	Use ofname Name Spacing – Reloading module – Sample		
	Programs. Object oriented programming principles. Packages:		
IV	Introduction to PIP – Installing packages via PIP – Using Python	K3,K4	20
	Packages – Absolute and Relative Imports – Namespace package –		
	Sample Programs. Strings and regular expressions.		
	Files and directory access: Files and Streams – Opening a file –		
	Reading/Writing Operations on a File – Other File Operations –		
	Iterating through files – Splitting words – Serialization and De-		
	serialization – Hash Files – directory Access – Sample Programs.		
	Errors and Exceptions: Motivation – Examples of Exception –		
V	Handling Exceptions – Try Keyword – Finally Keyword –	К5	20
	Handling Exception in Invoked Functions – With and Except		
	Statements – Raising Exceptions – Re-raising Exception –		
	Instantiating Exception – Custom Exception – Assert Statement –		
	Pre-defined Clean-up Actions – Sample Programs.		
	Multithreading.		
	Learning Resources		
	1. Satyanarayana, Radhika Mani, Jagadesh , IPython Programm	ning -, U	niversities
—	press (India) Pvt. Ltd 2018		
Text Books	2. Bill Lubanovic, -Introducing Python O"Reilly First Edition-Second Release		
DUUKS	2014.		

	1. Mark Lutz, -Learning Python I, O"Reilly, Fifth Edition, 2013.
	David M. Beazley,-Python Essential Reference, Developer"s Library, Fourth Edition,
	2009
Reference	2. Gowrishankar S, Veena A, -Introduction to Python Programming ^{II} , 1st Edition, CRC
Books	Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
	3. Jake Vander Plas, —Python Data Science Handbook: Essential Tools for Working with
	Datal, 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
Website/ Link	 https://www.tutorialspoint.com/python/ www.spoken-tutorial.org

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	М	М	S
CO3	S	L	L	М
CO4	М	S	М	S
CO5	S	L	S	S

S- Strong , M- Medium , $L-Low % \mathcal{M}^{(n)}(\mathcal{M})$

Subject Title	PRACTICAL – PYTHON LAB	Semester	Ι
Subject Code	22UDSP01	Specialization	NA
Туре	Core: Practical	L:T:P:C	45:0:3:2

COURSE OBJECTIVE:

- 1. To impart Practical Training in basic python statements.
- 2. Familiarize with control flow tools.
- 3. Build programs using data structure concepts.
- 4. Provide knowledge on working with exception and string handling.

LIST OF PROGRAMS:

Implement the following in Python:

- 1. Program using elementary data items, lists and tuples
- 2. Program using Dictionaries and sets
- 3. Program using conditional branches, loops.
- 4. Program using functions
- 5. Program using exception handling
- 6. Program using classes and objects
- 7. Program using inheritance
- 8. Program using polymorphism
- 9. Program to implement file operations.
- 10. Program using modules

COURSE OUTCOME:

- 1. Study all the Basic commands.
- 2. Practice the usage of control flow statements.
- 3. Apply various commands in files and directories.
- 4. Analysis the use of MYSQL to connect database.

Subject Title	DATA STRUCTURES AND ALGORITHMS	Semester	П
Subject Code	22UDS02	Specialization	NA
Туре	Core: Theory	L:T:P:C	56:4:0:5

COURSE OBJECTIVE:

- 1. Understand the basic concept of algorithms.
- 2. To introduce the various data structures and their implementations.
- 3. Evaluate the performance of various sorting algorithms.

CO Number	CO Statement	Knowledge Level
CO1	Remember the concept of algorithms.	K1
CO2	Understanding the stack and queues.	K2
CO3	Apply linked list for other data structures.	K2, K3
CO4	Evaluate the trees and sorting methods.	K3,K4
CO5	Analyze the sorting and file organizations.	K5

Subject Title	DATA STRUCTURES AND ALGORITHMS	Semester	Π	
Subject Code	22UDS02	Specialization	NA	
Туре	Core: Theory	L:T:P:C	56:4:0:5	
Unit	Contents		Levels	Sessions
I	Introduction of algorithms, analyzing algor Representation of Arrays, Implementation of St Application of Stack: Evaluation of Expression Conversion - Multiple stacks and Queues, Sparse	ithms, Arrays : tacks and queues, - Infix to postfix Matrices.	K1	12
п	Linked list : Singly Linked list - Linked stad polynomial addition - More on linked Lists - D and Dynamic Storage Management - Garbage c compaction.	cks and queues - Ooubly linked List collection and	K2	12
ш	Trees: Basic Terminology - Binary Trees representations - Binary trees - Traversal - More Threaded Binary trees - counting Binary Terminology and Representations - Trave components and spanning Trees, Single Source problem.	- Binary Tree on Binary Trees - trees. Graphs: ersals, connected Shortest path	K2,K3	12
IV	Symbol Tables : Static Tree Tables - Dynamic T Tables Hashing Functions - overflow Handling. Storage Devices -sorting with Disks : K-way with tapes.	Tree Tables - Hash External sorting : merging - sorting	K3,K4	10
v	Internal sorting : Insertion sort - Quick sort - 2 way Merge sort - Heap sort - shell sort - sorting on keys. Files: Files, Queries and sequential organizations - Index Techniques - File organization		К5	10
Text Books	Learning Resources 1. Ellis Horowitz, Sartaj Shani, -Fundamentals of Data Structures I, Galgotia publication.		blication.	
Reference Books	 -Data structures Using Cl Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J.Augenstein, Kindersley (India) Pvt. Ltd., -Data structure and Algorithmsl, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, Pearson Education Pvt. Ltd., 			

B.Sc., Data Science Syllabus under CBCS Pattern with effect from 2022-2023 Onwards

	1. www.freetechbooks.com/a-practical-introduction-to-data-structures-and-
Website/	algorithm-analysis-thirdedition-c-version-t804.html
Link	2. http://www.nptel.ac.in/courses/106101060/
	3. http://www.nptel.ac.in/courses/106104019/

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	М	М	S
CO3	S	L	L	М
CO4	М	S	М	S
CO5	S	L	S	S

S- Strong , M- Medium , $L-Low % \mathcal{M}^{(n)}(\mathcal{M})$

Subject Title	RELATIONAL DATABASE MANAGEMENT SYSTEMS	Semester	II
Subject Code	22UDS03	Specialization	NA
Туре	Core: Theory	L:T:P:C	41:3:0:5

COURSE OBJECTIVE:

- 1. Understand the basic concept of Data Base and database management system.
- 2. Understand and apply the SQL fundamentals.
- 3. Evaluate the Relational database design.

CO Number	CO Statement	Knowledge Level
CO1	Remember the concept of database.	K1
CO2	Understanding the data models and ER Diagram.	K2
CO3	Apply SQL commands.	K2, K3
CO4	Evaluate the DBMS in SQL.	K3,K4
CO5	Analyze the Transaction management.	K5

Subject Title	RELATIONAL DATABASE MANAGEMENT SYSTEMS	Semester	Π	
Subject Code	22UDS03	Specialization	NA	
Туре	Core: Theory	L:T:P:C	41:3:0:5	
Unit	Contents	I	Levels	Sessions
Ι	Introduction: Database System Applica Database Systems-View of Data-Data Transaction Management-Database Architec and Administrators. Relational Model: Structure of Relational Da Design – FR Model-Overview of the Des	ations-Purpose of abase Languages- ture-Database users atabases – Database ign Process – The	K1	10
	Entity – relationship Model – Constraints – Diagrams.	Entity Relationship		
Ш	Relational Algebra Operations –Relationa Tuple Relational Calculus –The Domain Re SQL: Background – Data Definition – Basi Queries – Set Operations – Aggregate Function Nested Sub-Queries – Views – Modification of	l Languages: The elational Calculus – c Structure of SQL ons – Null Values – of the Database.	K2	7
III	Data Normalization: Pitfalls in Relational Decomposition – Functional Dependencies First Normal Form – Second Normal Forr Form – Boyce-Codd Normal Form – Four Fifth Normal Form – Denormalization – Data Security Requirements – Protecting the Data – Granting and Revoking Privileges – Data E	Database Design – – Normalization – n – Third Normal th Normal Form – abase Security: Data within the Database ncryption.	K2,K3	8
IV	PL/SQL: A programming Language: History Block Structure – Comments – Data Types – Declaration – Assignment operation – Substitution Variables – Printing – Arit Control Structures and Embedded SQL: Control Structures and Embedded SQL: Control Blocks – SQ L IN PL/SQL – I	y - Fundamentals – Other Data Types – Bind variables – hmetic Operators. ontrol Structures – Data Manipulation-	K3,K4	8

B.Sc.,	Data Science	Syllabus unde	r CBCS Pattern	with effect from	2022-2023 On	iwards
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	Transaction Control statements. PL/SQL Cursors and				
	Exceptions: Cursors – Implicit & Explicit Cursors and Attributes				
	- Cursor FOR loops - SELECT FOR UPDATE - WHERE				
	CURRENT OF clause - Cursor with Parameters - Cursor				
	Variables – Exceptions – Types of Exceptions.				
	PL/SQL Composite Data Types: Records – Tables – V arrays.				
V	Named Blocks: Procedures – Functions – Packages - Triggers –	К5	8		
	Data Dictionary Views.				
	Learning Resources				
Text Books	 -Database System Concepts, Abraham Silberschatz, Henry F.Korth, S.Sudarshan, TMH 5th Edition (Units – I,II) -Fundamentals of Database Management Systems, Alexis Leon, Mathews Leon, Vijay Nicole Imprints Private Limited. (Unit-III) -Database Systems Using Oracle Nilesh Shah,2nd edition,PHI.UNIT-IV: Chapters 10 & 11 UNIT-V:Chapters 12,13 & 14. 				
Reference Books	1. Alexix Leon & Mathews Leon, "Essential of DBMS", 2nd re Publications, 2009.	eprint, Vija	ay Nicole		
Website / Link	 https://www.w3schools.com/sql https://www.tutorialspoint.com/sql <u>https://livesql.oracle.com</u> 				

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	М	М	S
CO3	S	L	L	М
CO4	М	S	М	S
CO5	S	L	S	S

S- Strong , M- Medium , L-Low

Subject Title	PRACTICAL II – SQL and PL/SQL LAB	Semester	II
Subject Code	22UDSP02	Specialization	NA
Туре	Core: Practical	L:T:P:C	45:0:3:2

COURSE OBJECTIVE:

- 1. To impart Practical Training in DDL Commands.
- 2. Familiarize the different DML Commands.
- 3. Build queries with SQL Commands.
- 4. Provide knowledge on working with big tables.

LIST OF PROGRAMS:

NOTE : Demonstrate the following SQL commands and can take any back end RDBMS system for

implementation purpose.

- 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 500 after the amount is debited. The Process is to fired on the Accounts table.
- Write a PL/SQL code block to calculate the area of the circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in a table Areas. Areas – radius, area.
- 8. Write a PL/SQL block of code for reversing a number. (Example : 1234 as 4321).
- **9.** Create a transparent audit system for a table Client_master (client_no, name, address, Bal_due). The system must keep track of the records that are being deleted or updated. The functionality being when a record is deleted or modified the original record details and the date of operation are stored in the audit client(client_no, name, bal_due, operation, user-id, opdate) table, then the delete or update is allowed to go through.

COURSE OUTCOME:

- 1. Study all the Basic DDL and DML Commands.
- 2. Practice the usage of SQL Statements.
- 3. Apply PL/SQL code usage.
- 4. Analysis the use of PL/SQL for complex problems.

Subject Title	DATA SCIENCE	Semester	III
Subject Code	22UDS04	Specialization	NA
Туре	Core: Theory	L:T:P:C	71:5:0:5

COURSE OBJECTIVE:

- 1. The aim of this course is to understand the fundamental concepts of Data Science and acquire the overview of data engineering and business intelligence.
- 2. It inculcates the importance of data visualization techniques, machine learning and statistical modeling which are used in data science domain

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of Data Science.	K1
CO2	Understanding the Machine Learning.	K2
CO3	Data Visualizations concept.	K2, K3
CO4	Web Services in Python	K3,K4
CO5	Library for Statistics.	K5

Subject Title	DATA SCIENCE	Semester	III		
Subject Code	22UDS04	Specialization	NA		
Туре	Core: Theory L:T:P:C				
Unit	Contents		Levels	Sessions	
Ι	Introduction: Data Science- A Brief History of History of Data Analysis -The Emergence and I Science. Where Is Data Science Used?:What An Is a Data Set?: Perspectives on Data. A Data Sc Moving the Algorithms to the Data - The Tradit the Modern Traditional Database.	Data Science - A Evolution of Data re Data, and What cience Ecosystem: cional Database or	K1	15	
п	Learning from Data with Your Machine: D Learning and Its Processes -Learning Styles - Se based on function. Math, Probability, and Statistic Modeling: Exploring Probability and Infere Quantifying Correlation -Reducing Data Dim Linear Algebra - Introducing Time Series Analysi	K2	15		
III	Data Visualizations: The Big Three - Picking the Design Style – Selecting the Appropriate Data Web-Based Applications for Visualization Design Visualizations for Collaboration - Visualizing S Online Geographic Tools.	K2,K3	15		
IV	Web Services in Python: Parsing XML, JSON, Application Programming Interfaces NumPy Libraries for Arrays, Pandas Library for Data Processing			15	
V	Matplotlib for Visualization, Seaborn Library for Visualization, SciPy Library for Statistics			11	
	Learning Resources				
Text Books	 1. John D. Kelleher and Brendan Tierney, -Data Sciencell, First Edition, The MIT Press, London, 2018. Unit I (Text Book 1): Chapter 1.1, 1.2, 1.3, 2.1, 3.1, 3.2. 2. Lillian Pierson, -Data Science for Dummiesll, 2nd Edition, John Wiley & Sons publications, 2017. Unit II (Text Book 2): Chapter 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7. Unit III (Text Book 2): Chapter 9.1, 9.3, 9.5, 11.1, 11.2. 3. Wesley J Chun, Core Python Applications Programming, 3rd Edition. Pearson 4. Michael Bowles, Machine Leaning in Python, Essential techniques for predictive analysis, Wiley 5. Al Sweigart,—Automate the Boring Stuff with Pythonl,1st Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at https://automatetheboringstuff.com/) 			IT Press, ns on	

B.Sc., Data Science Syllabus under CBCS Pattern with effect from 2022-2023 Onwards

	1. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, -Introducing Data Sciencell,						
	Manning Publications Co, 2016.						
	2. Ramesh Sharda, DursunDelen, Efraim Turban, -Business Intelligence, Analytics, and						
Reference	Data Science: A Managerial Perspectivel, Pearson Education, Fourth edition, 2019.						
Books	3. Mark Pilgrim, Dive into Python: Python Novice to pro (source:						
	http://diveintopython.org/.)						
	4. Alex Martelli, Python Cookbook, O'REILLY						
	5. Shai Vaingast, Beginning Python Visualization, Crafting Visual Transformation						
	1. https://www.edureka.co/blog/what-is-data-science						
Website/	2. https://www.en.m.wikipedia.org/wiki/data_science						
Link							

CO Number **PO1 PO3 PO4 PO2** S S S CO1 -S Μ Μ S **CO2** S L L Μ CO3

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CO5

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Mapping with Programme Outcomes

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Subject Title	OPERATING SYSTEM	Semester	III
Subject Code	22UDS05	Specialization	NA
Туре	Core: Theory	L:T:P:C	71:5:0:4

COURSE OBJECTIVE:

- 1. To understand the fundamental concepts and role of Operating System.
- 2. To learn the Process Management and Scheduling Algorithms
- 3. To understand the Memory Management policies
- 4. To gain insight on I/O and File management techniques

CO Number	CO Statement	Knowledge Level
CO1	Understand the structure and functions of Operating System	K1
CO2	Compare the performance of Scheduling Algorithms	K2
CO3	Understand and organize the memory	K1,K3
CO4	Evaluate the deadlock measures	K3,K4
CO5	Analyze the I/O hardware and software	K5

Subject Title	OPERATING SYSTEM	Semester	ш		
Subject Code	22UDS05	Specialization	NA		
Туре	Core: Theory	L:T:P:C	71:5:0:4		
Unit	Contents		Levels	Sessions	
т	Introduction – History of operating system- Di operating system – Operation system concepts	ifferent kinds of - System calls-	K1	11	
1	Operating system structure.		KI	11	
II	Processes and Threads: Processes – threads – th	hread model and	K2	15	
	usage – inter process communication.				
	Scheduling - Memory Management: Memory	Abstraction –			
111	III Virtual Memory - page replacement algorithms.			15	
	Deadlocks: Resources- introduction to deadlo				
	detection and recovery - deadlocks avoidate				
IV	prevention. Multiple processor system: multiprocessors - multi			15	
	computers.				
	Input/Output: principles of I/O hardware - pr	rinciples of I/O			
V	software. Files systems: Files – directories - files systems			15	
	implementation – File System Management and Optimization.				
	Learning Resources				
Text Books	Andrew S. Tanenbaum, -Modern Operating Sys	tems ^I , 2ndEdition	n, PHI priv	ate	
	Limited, New Delhi, 2008.				
	1. William Stallings, —Operating Systems – Internals & Design Principles ^I , 5th				
Reference	Edition, Prentice – Hall of India private Ltd, Ne	ew Delhi, 2004.			
BOOKS	2. Sridhar Vaidyanathan, -Operating System ^{II} , 1st Edition, Vijay Nicole Publications 2014.			lications,	
Website / Link	 www.wikipedia.org/wiki/Operating_system http://www.freetechbooks.com/introduction 	n n-to-operating-sys	tems-t340.	html	

B.Sc., Data Science Syllabus under CBCS Pattern with effect from 2022-2023 Onwards Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	М	М	S
CO3	S	L	L	М
CO4	М	S	М	S
CO5	S	L	S	S

S- Strong , M- Medium , L-Low

Subject Title	PRACTICAL III – DATA SCIENCE WITH PYTHON LAB	Semester	III
Subject Code	22UDSP03	Specialization	NA
Туре	Core: Practical	L:T:P:C	45:0:3:2

COURSE OBJECTIVE:

- 1. To impart Practical Training in basis Python statements.
- 2. Familiarize with control flow tools.
- 3. Build programs using data structure concepts.
- 4. Provide knowledge on working with exception and string handling.

LIST OF PROGRAMS:

- 1. Write a program using generator function.
- 2. How to call same function with decorator and without decorator.
- 3. Construct an XML formatted data and Write Python Program to Parse that XML data.
- 4. Construct an JSON formatted data and Write Python Program to Parse that XML data.
- 5. Impliement a program using Pandas.
- 6. Accessing Array index using NumPy
- 7. Aggregation function using NumPy.
- 8 Implement
 - a) Matplotlib
 - b) Seaborn
- 9. Implement a program using SciPy

COURSE OUTCOME:

- 1. Study all the Basic commands.
- 2. Practice the usage of control flow statements.
- 3. Apply various XML commands.
- 4. Analysis the use of statistical libraries.

Subject Title	SBEC I – DATA ANALYTICS WITH SPREAD SHEET LAB	Semester	III
Subject Code	22UDSSP01	Specialization	NA
Туре	SBEC: Practical	L:T:P:C	30:0:2:2

COURSE OBJECTIVE:

- 1. To acquire knowledge about spread sheet.
- 2. To improve creative thinking in making Data Analytics.

Lab Components

- 1. Create a Worksheet and do the following
 - Usage of moving, copying data
 - inserting/deleting rows and columns
 - Usage of Cut, Copy, Paste Commands
 - Filling up a cell
 - Undo command

2. Format a worksheet with

- Bold,Italic,Underline
- Font size,Colour, style
- Formatting numbers with Autofill, Selection Command, Currency format
- Specifying percentage(%) and Scientific notations
- Include Filter and Sort

3. Create a worksheet and do

- Freeze panes
 - Freeze rows
 - Freeze columns
- Printing a worksheet
 - Print preview
 - Margin setting
- Include Header and Footer
- 4. Using Date and Time
 - Entering current date
 - Using data arithmetic(adding and subtracting Dates)
 - Using Time functions

5. Open an Worksheet and create fields as follows

S.NO	Name of the Student	M1	M2	M3	M4	M5	Total	Avg	Result	Grade
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- Enter S.No, Name of the Student, Marks for 5 Students
- Find Total and average using formula.
- Find Result whether the students is pass or fail and also assign grade as per our university norms

6. Using Math functions

- Sum,Count, Average
- MAX, MIN
- MOD, ROUND, SORT
- Using Autosum

7. Apply Logical Function using IF/AND/OR/NOT

8. Create a chart

- Using Chart wizard
- Changing the chart type(Pie, Bar, Line)
- Inserting title for Area X,Y
- Changing Colors

9. Creating and Running a Macro

- Assigning button to a defined Macro
- Editing a Macro

10. Create a worksheet and use Vlookup () function to compare and insert various fields from another worksheet
| Subject Title | COMPUTER NETWORKS | Semester | IV |
|---------------|-------------------|----------------|----------|
| Subject Code | 22UDS06 | Specialization | NA |
| Туре | Core: Theory | L:T:P:C | 71:5:0:4 |

- 1. To understand the concept of Computer networks.
- 2. To impart knowledge about networking and internet devices.

CO Number	CO Statement	Knowledge Level
CO1	Remember the concept of networks and its types.	K1
CO2	Understanding the wireless communications.	K2
CO3	Understand and Apply data link protocols.	К3
CO4	Evaluate the network design issues.	K3,K4
CO5	Analyze the connection issues.	K5

Subject Title	COMPUTER NETWORKS	Semester	IV	
Subject Code	22UDS06	Specialization	NA	
Туре	Core: Theory	L:T:P:C	71:5:0:4	
Unit	Contents	•	Levels	Sessions
I	Introduction – Network Hardware - Softwar Models - OSI and TCP/IP Models - Exam Internet, ATM, Ethernet and Wireless LANs Layer - Theoretical Basis for Data Communic Transmission Media.	e - Reference ple Networks: - Physical ation - Guided	K1	15
Ш	Wireless Transmission - Communication Telephone System: Structure, Local Loop, T Multiplexing and Switching. Data Link Laye Issues - Error Detection and Correction.	Satellites - Frunks and er: Design	K2	15
ш	Elementary Data Link Protocols - Sliding Window Protocols - Data Link Layer in the Internet - Medium Access Layer - Channel Allocation Problem - Multiple Access Protocols - Bluetooth.		К3	15
IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms - IP Protocol - IP Addresses - Internet Control Protocols.		K3,K4	15
V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection - Simple Transport Protocol - Internet Transport Protocols (ITP) - Network Security: Cryptography.		K5	11
	Learning Resources			
Text Books	1. A. S. Tanenbaum, —Computer Networks ^{II} , Prentice-Hall of India 2008, 4th Edition.			
Reference Books	 Stallings, -Data and Computer Communications , Pearson Education 2012, 7th Edition. B. A. Forouzan, -Data Communications and Networking , Tata McGraw Hill 2007, 4th Edition. F. Halsall, -Data Communications, Computer Networks and Open Systems , Pearson Education 2008. 			
Website / Link	https://nptel.ac.in/courses/106106091/			

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	М	М	S
CO3	S	L	L	М
CO4	М	S	М	S
CO5	S	L	S	S

Mapping with Programme Outcomes

S- Strong , M- Medium , L-Low

Subject Title	R- PROGRAMMING LAB	Semester	IV
Subject Code	22UDSP04	Specialization	NA
Туре	Core: Practical	L:T:P:C	45:0:3:2

- 1. To impart Practical Training in R commands.
- 2. Familiarize the arrays and vectors.
- 3. Build data frames.
- 4. Provide knowledge on Graphs.

LIST OF PROGRAMS:

1. Demonstrate the usage of Numbers and Vectors in R

2. Simple manipulations on Numbers and Vectors, Objects- modes and attributes, Ordered and unordered Factors.

3. Implement the concepts of Arrays and Matrices.

4. Demonstrate the usage of Data Frames and Lists and its attributes -attach, detach, scan and importing a file.

- 5. Implement the concept of grouping and conditional execution on Data Frames and Lists
- 6. Demonstrate the usage of apply() functions.
- 7. Implement the usage of dplyr package
- 8. Utilize a lattice package to plot 1D, 2D and 3D plots for a given dataset.
- 9. Utilize ggplot2 package to plot 1D, 2D and 3D plots for a given dataset.
- 10. Demonstrate Pearson correlation and regression analysis.

Subject Title	BIG DATA ANALYSIS	Semester	IV
Subject Code	22UDS07	Specialization	NA
Туре	Elective : Theory	L:T:P:C	71:5:0:4

- 1. To provide an overview of an exciting growing field of big data analytics, analyse big data
- 2. To provide an overview like Hadoop, NoSql Map-Reduce
- 3. Learn fundamental techniques and principles in achieving big data analytics

CO Number	CO Statement	Knowledge Level
CO1	Know about the R programming	K1
CO2	Tools in big data analytics using Hadoop	K2
CO3	Data model in big data analytics using NoSql	K1,K3
CO4	Understanding and Know about Map Reduce Programming	K3,K4
CO5	Gain more knowledge about Hadoop streaming with R	K5

Subject Title	BIG DATA ANALYSIS	Semester	IV	
Subject Code	22UDS07	Specialization	NA	
Туре	Elective: Theory L:T:P:C		71:5:0:4	
Unit	Contents		Levels	Sessions
Ι	Introduction to R Programming : Operato Statement and Functions—Matrices—Arrays— Frame Graphs in R Programming R Ag Correlation and Regression Analysis.	rs Control -Lists Data pply Family	K1	15
П	INTRODUCTION TO BIG: Introduction to Big Data, Big Data characteristics, types of Big Data, Traditional vs. Big Data business approach, Bigdata Challenges, Case Study of Big Data Solutions.		K1	11
III	HADOOP: Introducing Hadoop – Why Hadoop – Why not RDBMS – RDBMS versus Hadoop – History of Hadoop – Hadoop Overview – Hadoop Distributed File System (HDFS) – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN – Interacting with Hadoop Ecosystem		K2	15
IV	No SQL DATA MODEL: Introduction to NoSQL – NoSQL Business Drivers – NoSQL Data Architectural Patterns – Variations of NoSQL Architectural Patterns – Using NoSQL to Manage Big data – Case study of NoSQL		K1,K3	15
V	MAP REDUCE Programming: Introduction to MapReduce – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression.		K3,K4	15
	Learning Resources			
Text Books	 Sandhya Arora , Latesh Malik , —R Programming for beginnersl,Universities PressIInis)Pvt Limited 2020 Radha Shankarmani, M Vijayalakshmi, -Big Data Analyticsl, Wiley publications,first Edition 2016. Seema Acharya, Subhashini Chellappan, -Big Data and Analyticsl, Wiley Publication, first edition. Reprint in 2016. 			

Reference Books	 Michael Minelli, Michelle Chambers, and AmbigaDhiraj, Big Data, -Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businessesl, Wiley, 2013 Bill Franks, Taming, -The Big Data Tidal Wave: Finding Opportunities In Huge Data Streams With Advanced Analyticsl, Wiley
Website /	https://en.wikipedia.org > wiki > Big_data
Link	https://www.tutorialspoint.com/big_data_analytics/r_introduction.htm

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	М	S	S
CO2	М	S	S	S
CO3	S	S	М	S
CO4	S	S	S	М
CO5	S	S	S	М

S- Strong , M- Medium , L-Low

B.Sc.(Computer Science) / BCA / B.Sc.(Information Science)/Data Science

Semester IV: Add-on Course Internship Programme

OBJECTIVES:

- To make students acquire practical knowledge by going to a company and learn in a live environment
- To make students learn team work and work ethics
- To make students to know the recent trends in Web/Mobile Application Development, Networking or any other area relevant to their study
- To make students analyze their skills and interests
- To help students examine academic and career goals

OUTCOME:

At the end of this internship programme the students will be able to

- apply theory to real life
- work as a part of team
- learn from the company experts
- learn latest trending technologies
- come out with a high morale
- enrich CV

About the internship programme: The internship programme provides students with practical, real-world experience and a valuable complement to their academic training. It enhances the students' skills in problem solving by making him/her work in a live environment in which systematic problem solving methods are practised.

Duration: Internship requires students to spend a minimum of 15 days (during vacation) employed, full-time, as IT interns or trainees during vacation at the end of fourth semester. During this period, they are engaged in work of direct relevance to their programme of study.

Areas: Some of the fields that are open to students include:

- Online Publishing and Editing
- Online Advertising
- Web / Mobile Application Development
- E-Marketing / Online Marketing
- Any other field related to Computer Science / Applications / Information Science

Certificate: A certificate is to be obtained from the organization in which the student undergoes internship programme. This certificate is to be submitted to the college within fifteen days after the college reopens for the next semester.**Credits:** The Internship programme does not carry any credit.

Subject Title	DATA VISUALIZATION TECHNIQUES	Semester	V
Subject Code	22UDS08	Specialization	NA
Туре	Core: Theory	L:T:P:C	71:5:0:4

- 1. Students will explore story telling with data by develop skills to both design and critique visualization.
- 2. Understand why visualization is an important part of data analysis by understands the components involved in visualization design.
- 3. Exploring the type of data impacts and type of visualization.

CO Number	CO Statement	Knowledge Level
CO1	Introduction to Data Visualization.	K1
CO2	Data Management for data visualization.	K2
CO3	Data sources and Data processing for data visualization.	K1,K3
CO4	Advanced Data processing and Basic Charting.	K3,K4
CO5	Interactivity Charting and Storyboard.	K5

Subject Title	DATA VISUALIZATION TECHNIQUES	Semester	V	
Subject Code	22UDS08 Specialization NA			
Туре	Core: Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	Introduction to Data Visualization Why Data Visualization? What Can You Pictures Are More Persuasive, Different Shade visualization, Start Sketching Your Data Story Tools for data visualization and demonstration	Believe? Some as of the Truth in a, Recommended of Tools.	K1	11
Π	Data Management for data visualization Select Your Spreadsheet Tools, Download to Format, Make a Copy of a Google Sheet, Sha Sheets, Upload and Convert to Google S Addresses in Google Sheets, Collect Data with Sort and Filter Data, Calculate with Formulas, with Pivot Tables Match Columns with Spreadsheet Versus Relational Database	o CSV or ODS are Your Google Sheets, Geocode n Google Forms, Summarize Data th VLOOKUP,	K2	15
ш	Data sources and Data processing for data visualization Open Data Repositories, Source Your Data, Recognize Bad Data Smart Cleanup with Google Sheets, Find and Replace with Blank, Transpose Rows and Columns, Split Data into Separate Columns, Combine Data into One Column, souring data and processing data for Banking data, Retail data and Healthcare data.		K1,K3	15
IV	Advanced Data processing and Basic Charting Extract Tables from PDFs with Tabula, Clean Data with OpenRefine, Set Up OpenRefine, Load Data and Start a New Project, Convert Dollar Amounts from Text to Numbers, Cluster Similar Spellings Precisely Describe Comparisons, Normalize Your Data Chart Design Principles, Deconstruct a Chart, Some Rules Are More Important Than Others, Chart Aesthetics, Google Sheets Charts, Bar and Column Charts		K3,K4	15
V	Interactivity Charting and Storyboard Visualization: Histograms, Pie, Line, and Datawrapper Charts, Annotated Charts, Range and Bubble Charts. Map Design Principles: I Map, Clarify Point-Versus-Polygon Data, Ma Not Two, Choose Smaller Geographies for C Storyboard: Build a Narrative on a Sto Attention to Meaning, Acknowledge Sources Decide on Your Data Story Format	d Area Charts, e Charts, Scatter Deconstructing a p One Variable, Choropleth Maps oryboard, Draw and Uncertainty	K5	15

	Learning Resources
Text Books	-Hands-On Data Visualization- by Jack Dougherty, Ilya Ilyankou
Reference Books	 The Truthful Art: Data, Charts, and Maps for Communication Pearson Education, 2016. Few, Stephen -Show Me the Numbers: Designing Tables and Graphs to Enlighten Second edition, Burlingame, CA: Analytics Press, 2012.
Website / Link	https://www.analyticsvidhya.com/blog/2021/06/must.known-data- visyalisation.techniques-for-data-science/

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	М	М	S
CO3	S	L	L	М
CO4	М	S	М	S
CO5	S	L	S	S

S- Strong , M- Medium , L-Low

Subject Title	MACHINE LEARNING	Semester	V
Subject Code	22UDS09	Specialization	NA
Туре	Core: Theory	L:T:P:C	71:5:0:4

- 1. To study the basics of machine learning.
- 2. Learn about supervised and unsupervised learning techniques
- 3. Learning how to build a machine learning model from the scratch.
- 4. To understand the Implementation of genetic algorithms.

CO Number	CO Statement	Knowledge Level
CO1	Introduction to machine learning	K1
CO2	Probabilistic and Stochastic Models	K2
CO3	Supervised learning	K1,K3
CO4	Unsupervised learning	K3,K4
CO5	Modelling, evaluation and Genetic algorithms	K5

Subject Title	MACHINE LEARNING	Semester	V	
Subject Code	22UDS09	Specialization	NA	
Туре	Core: Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
Ι	Introduction to machine learning: Introduction machine learning, Applications of Mac Perspectives and issues in machine learning, Tearning, basic types of data in machine learning, structure of data, data preprocessing. Perform accuracy, precision, recall, sensitivity, specific Bias Variance decomposition.	ction, Types of hine Learning, Cools in machine rning, exploring mance metrics - ity, AUC, RoC,	K1	11
п	Probabilistic and Stochastic Models: Baye Bayes theorem, Concept learning, Maximum E optimal classifier, Gibbs algorithm, Naive E Expectation maximization and Gaussian Mixtur Hidden Markov models.	sian Learning – ikelihood, Bayes Bayes classifier, re Models,	K2	15
III	Supervised learning: Introduction, Regingeregression, Classification: Decision tree Neighbours, Support Vector Machine, Log Naïve Bayes, Random Forest. Artificial N Introduction, Perceptrons, multi-layer networks propagation.	ression, Linear es, k-Nereast istic regression, leural Network: s and back	K1,K3	15
IV	Unsupervised learning: Introduction, Unsupervised Cluster Analysis, K-mea Hierarchical clustering. Dimension reduction: Component Analysis, Linear Discriminant Anal	Supervised vs ans clustering, Principal lysis.	K3,K4	15
V	Modelling, evaluation and Genetic algorithm model, Training a model, evaluating a mod model. Genetic Algorithms – Representing hyp operators and Fitness function and selection, St applications of the Genetic Algorithm.	ns: Building the el, improving a pothesis, Genetic imple	К5	15
	Learning Resources			
Text Books	 SaikatDutt, Subramanian Chandramouli, A Pearson Education. Chapters 1-3, 6-10. (u. 2. ShaiShalev-Shwartz, Shai Ben-David, -Ur Theory to Algorithms, Cambridge Univer III,IV) T. Hastie, R. Tibshirani and J. Friedman 	mit Kumar Das, - nit I,II,III,IV,V) aderstanding Mach rsity Press. Chap , -Elements of S	-Machine hine Learr ters 20, 2 . tatistical I	Learning∥, hing: From 3-24 (Unit Learning∥,
Reference				

B.Sc., I	Data Science	Syllabus under	CBCS Pattern	with effect from	2022-2023 Onwards
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B.Sc.,	Data Science	Syllabus under	CBCS Pattern	with effect from	2022-2023 Onwards
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Books	Springer.
	2. Charu C. Aggarwal, -DATA CLUSTERING Algorithms and Applications , CRC
	Press, 2014.
	3. C. Bishop, –Pattern Recognition and Machine Learning ^{II} , Springer.
	4. Ethem Alpaydin,"Introduction to Machine Learning, MIT Press, Prentice Hall
	of India, Third Edition 2014.
Website /	www.geeksforgeeks.org/machine-learning/
Link	

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	М	М	S
CO3	S	L	М	М
CO4	М	S	М	S
CO5	S	М	S	S

S- Strong , M- Medium , L-Low

Subject Title	DATA VISUALIZATION LAB	Semester	IV
Subject Code	22UDSP05	Specialization	NA
Туре	SBEC: Practical	L:T:P:C	45:0:3:2

COURSE OBJECTIVE:

To enable the students to know the fundamentals of Data processing, Building chart and creating storyboard.

LIST OF PROGRAMS:

- Demonstration of Data visualization software: Power BI or Tableau Public or Google Data Studio (Choose any one tool to conduct this lab)
- 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: superstore dataset/Big mart dataset)
- 4. Data Processing: Data transformation of data on the chosen platform (Dataset: superstore dataset/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.
- Building Basic chart (Bar, line, stack and clustered charts) on the chosen platform (Dataset: superstore dataset/Big mart dataset)
- 8. Building Basic chart (pie, scatter plot, bubble chart) on the chosen platform (Dataset: superstore dataset/Big mart dataset)
- 9. Building Advanced chart (Map chart, heat maps) on the chosen platform (Dataset: superstore dataset/Big mart dataset) Show: Add bubble on the chart
- 10. Creating a storyboard on the choose platform

Subject Title	INTERNET OF THINGS	Semester	V
Subject Code	22UDS10	Specialization	NA
Туре	Elective : Theory	L:T:P:C	71:5:0:4

- 1. Use of Devices, Gateways and Data Management in IoT.
- 2. Design IoT applications in different domain and be able to analyze their performance
- 3. Implement basic IoT applications on embedded platform.

CO Number	CO Statement	Knowledge Level
CO1	Remember IoT and Web technology.	K1
CO2	Understanding M2M to IoT.	K2
CO3	Apply IoT Architecture.	К3
CO4	Evaluate IoT Applications.	K4
CO5	Implement IoT Privacy, Security and	K5
	Governance.	

Subject Title	INTERNET OF THINGS	Semester	V	
Subject Code	22UDS10	Specialization	NA	
Туре	Elective : Theory	L:T:P:C	71:5:0:4	ł
Unit	Contents		Levels	Sessions
I	IoT& Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on ResearchTopics			15
п	M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.			15
Ш	IoT Architecture -State of the Art – Introduct art, Architecture. Reference Model- Introduce Model and architecture, IoT reference Model Architecture- Introduction, Functional View View, Deployment and Operational View, Oth architectural views	ion, State of the ction, Reference , IoT Reference w, Information her Relevant	K3	15
IV	IoT Architecture Introduction, IoT applicatio Future Factory Concepts, Brownfield IoT, Smar Applications, Four Aspects in your Business Value Creation from Big Data and Seriali Retailing Industry, IoT For Oil and GasIndust IoT Application and Value for Industry, Hom eHealth.	ns for industry: rt Objects, Smart to Master IoT, zation, IoT for try, Opinions on ne Management,	K4	15
v	Internet of Things Privacy, Security an Introduction, Overview of Governance, Priva Issues, Contribution from FP7 Projects, Se andTrust in IoT-Data-Platforms for Smart Ci Towards a Secure Platform, Smartie Approach. Aggregation for the IoT in Smart Cities, Securit	nd Governance cy and Security ecurity, Privacy ities, First Steps Data y	К5	11
	Learning Resources			

Text Books	Vijay Madisetti and ArshdeepBahga, -Internet of Things: (A Hands-on Approach) I, Universities Press (INDIA) Private Limited 2014, 1 st Edition.		
Reference Books	 Michael Miller, -The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the Worldl, Pearson Education2015. Francis da Costa, -Rethinking the Internet of Things: A Scalable Approach to Connecting Everythingl, Apress Publications 2013, 1stEdition. WaltenegusDargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practicel, Wiley 2014. CunoPfister, -Getting Started with the Internet of Thingsl, O"Reilly Media2011. 		
Website /Link	1.https://github.com/connectIOT/iottoolkit 2.https://www.arduino.cc/ 3.https://www.zettajs.org/		

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	М	М	L
CO2	S	М	М	L
CO3	S	М	М	М
CO4	М	L	S	М
CO5	S	L	М	L

S- Strong , M- Medium , L - Low

Subject Title	NO SQL LAB	Semester	V
Subject Code	22UDSP06	Specialization	NA
Туре	Core: Lab	L:T:P:C	60:0:4:2

- 1. To impart Practical Training in NoSQL commands.
- 2. Familiarize the MongoDB query
- 3. Build applications.
- 4. Provide knowledge on Bronx.

LIST OF PROGRAMS:

- 1. Write a MongoDB query to display all the documents in the collection restaurants.
- 2. Write a MongoDB query to display the fields restaurant_id, name, borough and cuisine for all the documents in the collection restaurant.
- 3. Write a MongoDB query to display the fields restaurant_id, name, borough and cuisine, but exclude the field _id for all the documents in the collection restaurant.
- 4. Write a MongoDB query to display the fields restaurant_id, name, borough and zipcode, but exclude the field _id for all the documents in the collection restaurant
- 5. Write a MongoDB query to display the entire restaurant which is in the borough Bronx.
- 6. Write a MongoDB query to display the first 5 restaurant which is in the borough Bronx.
- 7. Write a MongoDB query to display the next 5 restaurants after skipping first 5 which are in the borough Bronx.
- 8. Write a MongoDB query to find the restaurants who achieved a score more than 90
- 9. Write a MongoDB query to find the restaurants that achieved a score, more than 80 but less than 100.
- 10. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Wil' as first three letters for its name.

Subject Title	WEB DESIGNING USING HTML	Semester	V
Subject Code	22UDSSP03	Specialization	NA
Туре	SBEC : Practical	L:T:P:C	30:0:2:2

- 1. To enable the students to design and develop the WEB PAGES.
- 2. To qualify the students working with tags in table .
- 3. To improve creative thinking in forms, lists and frames.

LIST OF PROGRAMS

- 1. Write HTML code to develop a web page that contains the different background and foreground color, with various styles.
- 2. Write HTML code to create a Webpage that contains an Image at its left hand side of the page when user clicks on the image; it should open another web page that displays the details of that image.
- 3. Create a web Page using HREF tag having the attribute ALINK, VLINK etc.
- 4. Create a web page, when user clicks on the link it should go to the bottom of the page.
- 5. Write a HTML code to create a web page of pink color and display moving message in red color.
- 6. Create a web page, showing an ordered list of name of your five friends and unordered list of any five your hobbies.
- 7. Create a HTML document containing a nested list showing the content page of any book.
- 8. Create a student mark list in HTML using Tables.
- 9. Create a HTML page to demonstrate the usage of Frames. Choose the content of the page on your own.
- 10. Design an application for pay slip through HTML forms

COURSE OUTCOME:

On successful completion of the course, the students will

- 1. Understand the features in HTML.
- 2. Select and apply tags for create text, list and table.
- 3. Combine multiple features in forms, frames and texts.

Subject Title	DIGITAL MARKETING	Semester	VI
Subject Code	22UDS11	Specialization	NA
Туре	Core : Theory	L:T:P:C	86:6:0:4

- 1. To identify core concepts of marketing and the role of marketing in business and society.
- 2. To acquire Knowledge of social, legal, ethical and technological forces on marketing decision-making.
- 3. Appreciation for the global nature of marketing and appropriate measures to operate effectively in international settings.

CO Number	CO Statement	Knowledge Level
CO1	Ability to develop marketing strategies based on product, price, place and promotion objectives.	K1
C02	Ability to create an integrated marketing communications plan which includes promotional strategies and measures of effectiveness.	K2
C03	Ability to communicate the unique marketing mixes and selling propositions for specific product offerings.	К.3
CO4	Ability to construct written sales plans and a professional interactive oral sales presentation.	K4
CO5	Ability to formulate marketing strategies that incorporate psychological and sociological factors which influence consumers.	К5

Subject Title	DIGITAL MARKETING	Semester	VI	
Subject Code	22UDS11	Specialization	NA	
Туре	Elective : Theory	L:T:P:C	86:6:0:4	4
Unit	Contents		Levels	Sessions
I	Introduction to think – Digital Marketing Strategy –Introduction –Key terms and Concepts – What is Marketing – What is Digital Marketing - Understanding Marketing Strategy – The Building Blocks of Marketing Strategy – Crafting a Digital Marketing Strategy – Case Study		K1	18
II	Market Research – Introduction – Key terms and Concepts – the Importance of Market Research – Key Concepts in Market Research – Online Research Methodologies – Justifying the Cost of Research – tools for the trade – Advantages and Challenges			18
ш	Content Marketing Strategy – Introduction – Key Terms and Concepts – Defining Content Marketing – Startegic Building Blocks – Content Creation – Content Channel Distribution – Tools for the Trade – Advantages and Challenges		К3	18
IV	User Experience Design – Introduction – Key Terms and Concepts – Understanding UX design – Core principles of UX design – Mobile UX – Step –by-step guide to UX design – Tools of the trade – Case Study		K4	16
v	Web development and Design – Introduction – Key terms and concepts – Web design – Web Development – Mobile Development – Step-by-step guide to building a website – Case Study		K5	16
	Learning Resources			
Text Books	1. Rob Stokes, le-Marketing the Essential guide to marketing in a digital worldl, 5th Edition, 2017.			
Reference Books	https://ondigitalmarketing.com/learn/odm/			
Website /Link	https://mailchip.com/marketing-glossary/digital-marketing/			

CO Number	PO1	PO2	PO3	PO4
CO1	S	Μ	S	S
CO2	М	S	S	S
CO3	S	S	М	S
CO4	S	S	S	М
CO5	S	S	S	S

Mapping with Programme Outcomes

S- Strong, M- Medium, L-Low

Subject Title	SOFT SKILLS	Semester	VI
Subject Code	22UDSS01	Specialization	NA
Туре	SBEC : Theory	L:T:P:C	86:6:0:4

- 1. To understand the nature of technical communication.
- 2. To understand the listening process and job interviews.
- 3. To improve the presentation skills.

CO Number	CO Statement	Knowledge Level
CO1	To understand the nature of technical communication.	K1
CO2	To understand the listening process	K1,K2
CO3	To implement the interview process	К3
CO4	To understand the group discussion	K3,K4
CO5	To improve the presentation skills	K5

Subject Title	SOFT SKILLS	Semester	VI	
Subject Code	22UDSS01	Specialization	NA	
Туре	SBEC : Theory	L:T:P:C	86:6:0:4	ļ
Unit	Contents		Levels	Sessions
I	Nature of technical communication: Stages of communication – Channels of communication – Nature of technical communication – Importance and need for technical communication – Technical communication skills.			15
II	The Listening process: Types of listening – I purpose – Barriers to listening– The speech proce and oral skills – Body language.	Listening with a ess – Conversion	K1,K2	17
Ш	Job interviews: Pre – interview preparation techniques – Interview questions – Answering strategies – Frequently asked interview questions – Projecting a positive image – Alternative interview formats.			18
IV	Group Discussion: Nature of group discussion – Characteristics of successful group discussions – Selection group discussion – Group discussion strategies – Techniques for individual contribution – Group interaction strategies.			18
V	Presentation Skills: Planning the presentation – Preparing the presentation – Organizing your presentation – Rehearsing the presentation – Improving delivery			18
	Learning Resources			
Text Books	-Effective Technical Communication , M. Ashraf Rizvi, Tata McGraw – Hill Publishing.			
Reference Books	 -Communication Skills^I, Sanjay Kumar, Pusp Lata, Oxford Higher Education, Second edition Personality development & Soft skills^I, Barun.K.Mithra, Oxford Higher education 			
Website / Link	https://www.monster.com/srticle/soft-skills-you-r	need/		

CO Number	PO1	PO2	PO3	PO4
CO1	S	М	L	L
CO2	S	М	L	L
CO3	S	М	L	М
CO4	М	S	L	S
CO5	S	М	М	L

Mapping with Programme Outcomes

S- Strong, M- Medium, L-Low

PRACTICAL – VIII MINI PROJECT III YEAR / VI SEM

OBJECTIVES:

The aim of the mini project is that the student has to understand the real time software development environment. The student should gain a thorough knowledge in the problem and language / software which he/she has selected for their project work.

Mini Project Planning:

B.Sc Computer Science / Data Science/BCA- Mini Project is an involved exercise, which has to be planned well in advance. The topic should be chosen in the beginning of final year itself. Related reading training and discussions of project should be completed in the first term of final year.

I Selection of Team

To meet the stated objectives, it is imperative that mini project is done through a team effort. Though it would be ideal to select the team members at random and this should be strongly recommended, due to practical consideration students may also be given the choice of forming themselves into teams with Two members. A team leader shall be selected. Team shall maintain the minutes of meeting of the team members and ensure that tasks have been assigned to every team member in writing. Team meeting minutes shall form a part of the project report. Even if students are doing project as groups, each one must independently take different modules of the work and must submit the report.

II Selection of Tools

No restrictions shall be placed on the students in the choice of platform/tools/languages to be utilized for their project work, though open source is strongly recommended, wherever possible. No value shall be placed on the use of tools in the evaluation of the mini project.

III Project Evaluation:

Continuous Internal Assessment	:	80 Marks
Evaluation (External)	:	80 Marks
Viva-voce (jointly)	:	40 Marks

There shall be a common written examination conducted for all the candidates in each group together for a minimum of 10 minutes.

- (i) Requirement Specification of Project
- (ii) Design of Project
- (iii) Testing and Implementation of Project

IV REGULATIONS OF PROJECT WORK

- Three copies of the project report must be submitted by each student..
- The final outer dimensions of the project report shall be 21cm X 30 cm.
- Only hard binding should be done. The text of the report should be set in 12 pt,

Times New Roman, 1.5 spaced.

- Headings should be set as follows: CHAPTER HEADINGS 16 pt, Arial, Bold, All caps, Centered.
- Section Headings 14 pt Bookman old style, Bold, Left adjusted.
- Section Sub-heading 12 pt, Bookman old style.
- Title of figures tables etc are done in 12 point, Times New Roman, Italics, centered.
- Only 1.5 space need be left above a section or subsection heading and no space may be left after them.
- References shall be IEEE format (see any IEEE magazine for detail) While doing the project keep note of all books you refer, in the correct format and include them in alphabetical order in your reference list.
- The Candidate should submit the filled in format as given in Annexure-I to the department for approval during the First Week of December.
- Periodically the project should be reviewed.
- A Sample format is enclosed in Annexure-II.
- Format of the Title page and Certificate are enclosed in Annexure III.
- The students may use power point presentation during their viva voce examination.

ANNEXURE - I

PERIYAR UNIVERSITY

Name of the College	:
Programme	:
Name of the Student	:
Register Number	:
Title of the Project Work	:
Address of Organization / Institution	:

Name of the Internal Guide	:
Qualification	:

Place :

Date :

Signature of Internal Guide

CONTENTS

Chapter

ANNEXURE II

Page No.

COLLEGE BONAFIDE CERTIFICATE

ACKNOWLEDGEMENT

SYNOPSIS

- 1. INTRODUCTION
- 1.1 ORGANIZATION PROFILE (optional)
- 1.2 SYSTEM SPECIFICATION
- 1.2.1 HARDWARE SPECIFICATION
- 1.2.2 SOFTWARE SPECIFICATION
- 2. SYSTEM STUDY
- 2.1 EXISTING SYSTEM
- 2.1.1 DESCRIPTION
- 2.1.2 DRAWBACKS
- 2.2 PROPOSED SYSTEM
- 2.2.1 DESCRIPTION
- 2.2.2 FEATURES
- 3. SYSTEM DESIGN AND DEVELOPMENT
- 3.1 FILE DESIGN
- 3.2 INPUT DESIGN
- 3.3 OUTPUT DESIGN
- 3.4 CODE DESIGN
- 3.5 DATABASE DESIGN
- 3.6 SYSTEM DEVELOPMENT
- 3.6.1 DESCRIPTION OF MODULES

(Detailed explanation about the project work)

- 4. TESTING AND IMPLEMENTATION
- 5. CONCLUSION

6. BIBLIOGRAPHY

APPENDICES

- A. DATA FLOW DIAGRAM
- B. TABLE STRUCTURE
- C. SAMPLE CODE
- D. SAMPLE INPUT
- E. SAMPLE OUTPUT

A. Format of the title page

TITLE OF THE PROJECT WORK

A Project Work submitted in partial fulfillment of the

requirements for the award of the degree of

Bachelor of Science in Data Science

to

Periyar University, Salem - 11

By

NAME OF THE STUDENT

REG. NO.



COLLEGE NAME (AFFILIATED TO PERIYAR UNIVERSITY)

PLACE with Pin Code

MONTH – YEAR

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Name and Address of the Internal Guide

Date

CERTIFICATE

This is to certify that the Project Work entitled ______

Internal Guide

ENDORSED

Head of the Department

Date of Viva-voce:

Internal Examiner

External Examiner

ELECTIVE I

Subject Title	PAPER – I SOFTWARE ENGINEERING	Semester	V
Subject Code	22UDSE01	Specialization	NA
Туре	Elective : Theory	L:T:P:C	71:5:0:4

- 1. To introduce the software development life cycles.
- 2. To introduce concepts related to structured and objected oriented analysis & design.
- 3. To provide an insight into UML and software testing techniques.

CO	CO Statement	Knowledge Level
Number	CO Statement	Kilowieuge Level
CO1	Remember the basic concepts of software	K1
	Engineering.	
CO2	Understanding requirement analysis.	K1,K2
CO3	Apply software design.	К3
CO4	Evaluate with UML.	K4
CO5	Implement coding and testing.	K5

Subject Title	PAPER – I SOFTWARE ENGINEERING	Semester	V	
Subject Code	22UDSE01	Specialization	NA	
Туре	Elective : Theory	L:T:P:C	71:5:0:4	ŀ
Unit	Contents		Levels	Sessions
Ι	Introduction – Evolution – Software Development projects – Emergence of Software Engineering. Software Life cycle models – Waterfall model – Rapid Application Development – Agile Model – Spiral ModelK115			15
II	Requirement Analysis and Specification – Analysis – SRS – Formal System Specification	Gathering and	K1,K2	15
III	Software Design - Overview - Characteristics - Cohesion & Coupling - Layered design - Approaches Function Oriented Design - Structured Analysis - DFD - Structured Design - Detailed designK315			
IV	Object Modeling using UML – OO concepts – UML – Diagrams – Use case, Class, Interaction, Activity, State Chart – PostscriptK4			15
V	Coding & Testing - coding - Review - Documentation - Testing - Black-box, White-box, Integration, OO Testing, Smoke testing.K5			11
	Learning Resources			
Text Books	Rajib Mall, -Fundamentals of Software Engineering ^{II} , PHI 2018, 5th Edition.			
Reference Books	 Roger S. Pressman, -Software Engineering - A Practitioner's Approach , McGraw Hill 2010, 7th Edition. Pankaj Jalote, -An Integrated Approach to Software Engineering , Narosa Publishing House 2011, 3rd Edition. 			
Website / Link	NPTEL online course – Software Engineering - https://nptel.ac.in/courses/106105182/ – – Software – –			

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Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	М	М	L
CO2	S	М	L	L
CO3	S	М	М	L
CO4	М	S	L	L
CO5	S	М	М	L

S- Strong , M- Medium , L-Low

Subject Title	PAPER – II COMPUTER GRAPHICS	Semester	V
Subject Code	22UDSE02	Specialization	NA
Туре	Elective : Theory	L:T:P:C	86:6:0:4

- 1. To understand about Computer Graphics.
- 2. To familiar with scan and I/O devices.
- 3. To be exposed to 2D Transformations and clipping.

CO	CO Statement	Knowledge Level		
Number	CO Statement	Knowledge Dever		
CO1	Remember the basic concepts of Graphics	K1		
	system.			
CO2	Understanding scan system and I/O Devices.	K2		
CO3	Apply 2D Transformations.	К3		
CO4	Evaluate 3D Transformations.	K4		
CO5	Implement visual surface techniques.	K5		
Subject Title	PAPER – II COMPUTER GRAPHICS	Semester	V	
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Subject Code	22UDSE02	Specialization	NA	
Туре	Elective : Theory	L:T:P:C	86:6:0:4	L
Unit	Contents		Levels	Sessions
Ι	Overview of graphics Systems: Video Disp Refresh Cathode-Ray tubes Raster – Scan Disp Scan Displays – Color CRT Monitors –Dire tubes Flat – Panel Displays Three – Dimension Devices. Stereoscopic and Virtual – Reality Sys	play Device – plays Random – ct view Storage nal Viewing tems.	K1	15
п	Raster – Scan Systems Video Controller – Systems Video Controller – Random-Scan S device – Keyboard Mouse – Trackball and Joysticks – Data Glove – Digitizers- Image So Panels – Light pens. Voice Systems – Hard- Line Drawing Algorithms DDA Algorithms – C Algorithm Properties of Ellipses	K2	17	
Ш	Two Dimensional Geometric Transformations - Translation – Rotation – S Representations and Homogeneous Coordi Transformations Reflections Two Dimension Windows to view point coordinate Transformat Operations – Point Clipping – Line Clipping – – Text Clipping – Exterior Clipping.	К3	18	
IV	Three Dimensional Concepts: Three Dimensional Display method – Parallel projection – Depth cueing - visible line and surface – Three Dimensional Geometric and modeling Transformations: Translation – Rotation - Scaling – Composite Transformations. Three Dimensional Viewing: Viewing pipeline – Viewing Coordinates – Projections – Parallel Projections – Perspective Projections			18
V	Visible Surface Detection Methods : Classi Surface Detection Algorithms – Back Face Det Buffer Method – A-Buffer Method – Scan line sorting method – BSP tree method – Area Subdi	K5	18	
	Learning Resources			
Text Books	Donald Hearn &M.Pauline Baker , -Computer C	Jraphics ,2 nd Edit	ion, 1996	
Reference Books	John f. Hughes, Andries Van Dam, Morgan Foley, Steven K. Feiner, Kurt Akeley, - <i>Comput</i>	Mcguire, David I	F. Sklar, iples and	James D. Practice∥

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	3rd <i>Edition</i> , Pearson Education,2014.
Website /	1.www.javatpoint.com/computer-graphics
Link	2.www.taylorfrancis.com

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	М	S	М	L
CO2	S	М	М	М
CO3	S	М	L	L
CO4	М	S	L	М
CO5	S	S	М	L

S- Strong , M- Medium , L-Low

Subject Title	PAPER III	Semester	V
	DATA MINING		
Subject Code	22UDSE03	Specialization	NA
Туре	Elective : Theory	L:T:P:C	71:5:0:4

- 1. To introduce the basic concepts and techniques of Data Mining.
- 2. To study the basic concepts of cluster analysis.
- 3. To study a set of typical clustering methodologies, algorithms and applications.

CO Number	CO Statement	Knowledge Level
C01	Remember the basic concepts of data mining	K1
	and data preprocessing.	
CO2	Understanding the data mining primitives.	K2
CO3	Apply mining association rule.	К3
CO4	Evaluate classification and Prediction.	K4
CO5	Implement cluster analysis.	К5

Subject Title	PAPER III DATA MINING	Semester	V	
Subject Code	22UDSE03	Specialization	NA	
Туре	Elective : Theory	L:T:P:C	71:5:0:4	ļ
Unit	Contents		Levels	Sessions
I	Introduction: Data mining application – data mining data mining case studies- the future of data mining software - Association rules mining: basics- ta algorithm- Apriori algorithm – improve the of Apriori algorithm – mining frequent pattern wi generation (FP-growth) – performance evaluation of	ing techniques – ag – data mining ask and a naïve efficient of the thout candidate of algorithms.	K1	11
п	Classification : Introduction – decision tree – over fitting and pruning - DT rules- Naive bayes method- estimation predictive accuracy of classification methods - other evaluation criteria for classification method–classification software.			15
III	Cluster analysis: cluster analysis – types of data – computing distances-types of cluster analysis methods- partitioned methods – hierarchical methods – density based methods – dealing with large databases – quality and validity of cluster analysis methods - cluster analysis software.			15
IV	Web data mining: Introduction- web ter characteristics- locality and hierarchy in the we mining-web usage mining- web structure mining software - Search engines: Search engines funct engines architecture – ranking of web pages.	rminology and eb- web content g – web mining ionality- search	K4	15

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V	Data warehousing: Introduction – Operational data sources- data warehousing - Data warehousing design – Guidelines for data warehousing implementation - Data warehousing metadata - Online analytical processing (OLAP): Introduction – OLAP characteristics of OLAP system – Multidimensional view and data cube - Data cube implementation - Data cube operations OLAP implementation guidelines.	К5	15	
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	Learning Resources
Text Books	G.K. Gupta, -Introduction to Data mining with case studies ^{II} , 2 nd Edition, PHI Private limited, New Delhi, 2011
Reference Books	Arun K Pujari, —Data Mining Techniques ^{II} , 10 th impression, University Press, 2008.
Website /Link	 NPTEL & MOOC courses titled Data Mining <u>https://nptel.ac.in/courses/106105174/</u> <u>http://cecs.louisville.edu/datamining/PDF/0471228524.pdf</u>

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	М	-
CO2	S	L	М	S
CO3	S	М	L	М
CO4	М	S	-	S
CO5	S	L	М	S

S- Strong , M- Medium , $L-Low % \mathcal{M}^{(n)}(\mathcal{M})$

ELECTIVE II

Subject Title	PAPER – I WEB TECHNOLOGY	Semester	VI
Subject Code	22UDSE04	Specialization	NA
Туре	Elective : Theory	L:T:P:C	71:5:0:4

- 1. To understand the fundamental concepts and role of Web Technology.
- 2. To learn the Process of CSS.
- 3. To understand the web pages.
- 4. To gain insight on script objects.

CO Number	CO Statement	Knowledge Level
CO1	Understand the structure of the documents in Web.	K1
CO2	Remember and understand the table handling tags.	K2
CO3	Understand and organize CSS.	K1,k3
CO4	Implement scripts in web page.	K3,K4
CO5	Evaluate script objects.	K5

Subject Title	PAPER – I WEB TECHNOLOGY	Semester	VI	
Subject Code	22UDSE04	Specialization	NA	
Туре	Elective : Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
Ι	Structuring Documents for the Web: Introdu XHTML, Basic Text Formatting, Presentat Phrase Elements, Lists, Editing Text, Core Attributes, Attribute Groups. Links and Na Links, Creating Links with the <a> Element, A Links. Images, Audio, and Video: Adding In Element, Using Images as Links Image the Right Image Format, Adding Flash, Vide your web pages.	icing HTML and ional Elements, e Elements and avigation: Basic dvanced E- mail nages Using the Maps, Choosing eo and Audio to	K1	15
II	Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables. Forms: Introducing Forms, Form Controls, Sending Form Data to the Server. Frames: Introducing Frameset, <frame/> Element, Creating Links Between Frames, Setting a Default Target Frame Using <base/> Element, Nested Framesets, Inline or Floating Frames with <iframe>.</iframe>			15
Ш	Cascading Style Sheets: Introducing CSS, Wh CSS Rules. CSS Properties: Controlling Text, ⁷ Text Pseudo Classes, Selectors, Lengths, Intro Model. More Cascading Style Sheets: Links Outlines, The :focus and :activate Pseudo cl Content, Miscellaneous Properties, Addi Positioning and Layout wit, Page Layout CSS,	here you can Add Text Formatting, oducing the Box s, Lists, Tables, asses Generated tional Rules, Design Issues.	K1,K3	15
IV	Java Script: How to Add Script to Your Page Data Types – Statements and Operators, Co Conditional Statements, Loop Statements – Fu Message box, Dialog Boxes, Alert Boxes, Prompt Boxes	es, Variables and ontrol Structures, unctions - Confirm Boxes,	K3,K4	15
v	Working with JavaScript: Practical Tips for JavaScript Objects: Window Object - Doc Browser Object - Form Object - Navigator obje - Events, Event Handlers, Forms - Val Enhancements, JavaScript Libraries.	Writing Scripts, nument object - ect Screen object lidations, Form	К5	11
	Learning Resources			
Text Books	Jon Duckett, -Beginning HTML, XHTML, CS Publishing	S and Java script	I, Wiley	
Reference Books	1.Chris Bates, -Web Programming∥, Wiley Pub	lishing 3d Editior	1.	

	2. M. Srinivasan, -Web Technology: Theory and Practicell, Pearson Publication
Website/ Link	www.tutorialspoint.com/internet_technologies/index.htm

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	М	М	S
CO3	S	L	L	М
CO4	М	S	М	S
CO5	S	L	S	S

Mapping with Programme Outcomes

S- Strong , M- Medium , L-Low

Subject Title	PAPER - II CLOUD COMPUTING	Semester	VI
Subject Code	22UDSE05	Specialization	NA
Туре	Elective : Theory	L:T:P:C	71:5:0:4

COURSE OBJECTIVE:

This course gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of software	K1
	Engineering.	
CO2	Understanding requirement analysis.	K1,K2
CO3	Apply software design.	К3
CO4	Evaluate with UML.	K4
CO5	Implement coding and testing.	K5

Subject Title	PAPER - II CLOUD COMPUTING	Semester	VI	
Subject Code	22UDSE03	Specialization	NA	
Туре	Elective : Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	Cloud Computing Overview Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling ,Rapid elasticity, Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.			15
Π	Cloud Insights 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			15
III	Cloud Architecture- Layers and Models Layers in cloud architecture, Software as a S features of SaaS and benefits, Platform as a Se features of PaaS and benefits, Infrastructure a IaaS), features of IaaS and benefits, Serv challenges and risks in cloud adoption. Cloud d model: Public clouds – Private clouds – Comm Hybrid clouds - Advantages of Cloud computing	К3	15	
IV	Cloud Simulators- CloudSim and GreenCloud Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim, Introduction to GreenCloud		K4	15
V	Introduction to VMWare Simulator 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.		K5	11
	Learning Resources		70 1 T T	1.
Text Books	 -Cloud computing a practical approach - Anthony T.Velte, Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill, New Delhi – 2010 -Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Oue 2008 		elte ou Work	
Reference Books	 -Cloud computing for dummies I- Judith Hu Kaufman ,Fern Halper, Wiley Publishing, In -Cloud Computing (Principles and Paradigm James Broberg, Andrzej Goscinski, John Wiley 	rwitz , Robin Bl ac, 2010 as)∥, Edited by F iley & Sons, Inc	oor , Marci Rajkumar B . 2011	a Suyya,

Website /	https://www.visma.com/cloud-technology/
Link	

Т

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	М	М	L
CO2	S	М	L	L
CO3	S	М	М	L
CO4	М	S	L	L
CO5	S	М	М	L

S- Strong , M- Medium , $L-Low % \mathcal{L}^{(m)}(\mathcal{L})$

Subject Title	PAPER – III DEEP LEARNING	Semester	VI
Subject Code	22UDSE06	Specialization	NA
Туре	Elective : Theory	L:T:P:C	71:5:0:4

- 1. To understand the complexity of Deep Learning algorithms and their limitations
- 2. Confidently applying common Deep Learning algorithms in practice and implementing their own.
- **3.** To perform experiments in Deep Learning using real-world data. To understand the fundamental concepts and role of Web Technology.

CO Number	CO Statement	Knowledge Level
CO1	Understand the Deep Learning and ANN	K1
CO2	Understand the activation function	K2
CO3	Understand the CNN	K1,k3
CO4	Understand the unsupervised or generative learning.	K3,K4
CO5	Applications.	K5

Subject Title	PAPER – III DEEP LEARNING	Semester	VI	
Subject Code	22UDSE06	Specialization	NA	
Туре	Elective : Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	Basics of Neural Networks Basic Concept of Neurons – Perceptron Al Forward and Backpropagation Networks. Perc Rule, Gradient Descent Rule, Restricted Boltz Deep Belief Networks.	gorithm – Feed ceptron Training mann Machines,	K1	15
п	Activation Functions: Sigmoid,ReLU, Hyperbolic Fns, Softmax, Optimization and Regularization: Adam optimization, Overfitting and Capacity, Cross Validation, Feature Selection, Regularization Hyperparameter tuning		K2	15
ш	Convolutional Neural Networks CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning – Recurrent and Recursive Nets – Recurrent Neural Networks – Deep Recurrent Networks – Recursive Neural Networks – Applications.		K1,K3	15
IV	Deep auto encoders- introduction – Use of autoencoders – stacked denoising autoencoders – deep networks for unsupervised or generative learning.		K3,K4	15
V	Applications of deep learning – Image processing, Natural Language Processing – speech recognition, video analytics.		К5	11
	Learning Resources			
Text Books	 Goodfellow, I., Bengio, Y., and Courville, A., -Deep Learningll, MIT Press, 2016. Chapters 5-7,9-10,14,20.(Unit I-IV) Li Deng and Dong Yu ., -Deep Learning Methods and Applications, Foundations and Trends[®] in Signal Processingl, 2014. Chapters 7-8,10 (unit V). 			
Reference Books	 Yegnanarayana, B., -Artificial Neural Networksl, PHI Learning Pvt. Ltd, 2009. Bishop, C. ,M., -Pattern Recognition and Machine Learningl, Springer, 2006. 		, 2009. 2006.	
Website/ Link	https://neuralnetworksand deeplearning.com			

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	М	М	S
CO3	S	L	L	М
CO4	М	S	М	S
CO5	S	L	S	S

Mapping with Programme Outcomes

S- Strong, M- Medium, L-Low

Subject Title	PAPER – I SOFTWARE PROJECT MANAGEMENT	Semester	VI
Subject Code	22UDSE07	Specialization	NA
Туре	Elective : Theory	L:T:P:C	86:6:0:4

- 1. To define and highlight importance of software project management.
- To formulate and define the software management.
 To evaluate metrics & strategy in managing projects.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of software	K1
	project management.	
CO2	Understanding domain processes in project	K1,K2
	management.	
CO3	Apply task and activities.	К3
CO4	Evaluate issues in resource management.	K3,K4
CO5	Implement quality requirements.	K5

Subject Title	PAPER – I SOFTWARE PROJECT MANAGEMENT	Semester	VI	
Subject Code	22UDSE07	Specialization	NA	
Туре	Elective : Theory	L:T:P:C	86:6:0:4	ļ
Unit	Contents		Levels	Sessions
I	Introduction to Competencies - Product Developr - Management Skills - Product Developmen Software Development Process and models - T International Organization for Standardization.	nent Techniques t Life Cycle - The SEI CMM -	K1	15
П	Managing Domain Processes - Project Selection Models -Project Portfolio Management - Financial Processes - Selecting a Project Team - Goal and Scope of the Software Project -Project Planning - Creating the Work Breakdown Structure - Approaches to Building a WBS - Project Milestones - Work Packages - Building a WBS for Software.		K1,K2	17
III	Tasks and Activities - Software Size and Reuse Estimating - The SEI CMM - Problems and Risks - Cost Estimation - Effort Measures - COCOMO: A Regression Model - COCOMO II - SLIM: A Mathematical Model - Organizational Planning - Project Roles and Skills Needed.		К3	18
IV	Project Management Resource Activities - Organizational Form and Structure - Software Development Dependencies - Brainstorming - Scheduling Fundamentals - PERT and CPM Leveling Resource Assignments - Map the Schedule to a Real Calendar - Critical Chain Scheduling.		K3,K4	18
V	Quality: Requirements – The SEI CMM - Guidelines - Challenges - Quality Function Deployment - Building the Software Quality Assurance - Plan - Software Configuration Management: Principles - Requirements - Planning and Organizing - Tools - Benefits - Legal Issues in Software - Case Study		К5	18
	Learning Resources			
Text Books	Robert T. Futrell, Donald F. Shafer, Linda I. Managementl, Pearson Education Asia 2002.	Safer, -Quality S	Software	Project
Reference Books	 PankajJalote, -Software Project Management in Practicell, Addison Wesley2002. Hughes, -Software Project Managementll, Tata McGraw Hill 2004, 3rdEdition. 			
Website / Link	NPTEL & MOOC courses titled Software Project https://nptel.ac.in/courses/106/105/106105218/	Management		

B.Sc., Data Science Syllabus under CBCS Pattern with effect from 2022-2023 Onwards

B.Sc., Data Science Syllabus under CBCS Pattern with effect from 2022-2023 Onwards <u>Mapping with Programme Outcomes</u>

CO Number	PO1	PO2	PO3	PO4
CO1	S	М	L	L
CO2	S	М	L	L
CO3	S	М	L	М
CO4	М	S	L	S
CO5	S	М	М	L

S- Strong , M- Medium , L-Low

Subject Title	PAPER – II MOBILE COMPUTING	Semester	VI
Subject Code	21UDSE08	Specialization	NA
Туре	Elective : Theory	L:T:P:C	71:5:0:4

- 1. To make the student to understand the concepts of mobile computing.
- 2. Get familiar with the network protocol stack.
- 3. To be exposed to Ad-Hoc networks.
- 4. Gain knowledge about different mobile platforms and application development.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of mobile	K1
	computing.	
CO2	Understanding mobile IP.	K1,K2
CO3	Apply Mobile Telecommunication system.	K3
CO4	Evaluate mobile adhoc system.	K4
CO5	Implement mobile operating system.	K5

Subject Title	PAPER – II MOBILE COMPUTING	Semester	VI	
Subject Code	22UDSE08	Specialization	NA	
Туре	Elective : Theory	L:T:P:C	71:5:0:4	Ļ
Unit	Contents		Levels	Sessions
Ι	Introduction-Mobile Computing – Mobile wireless Networking – Mobile Computing Characteristics of Mobile computing – Stru Computing Application. MAC Protocols – W IssuesFixed Assignment Schemes – Randon Schemes – Reservation Based Schemes	Computing Vs Applications – acture of Mobile Vireless MAC n Assignment	K1	11
п	Mobile Internet Protocol and Transport Layer-Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.		K1,K2	15
ш	Mobile Telecommunication System-Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Tele communication System (UMTS).		К3	15
IV	Mobile Ad-Hoc Networks-Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET–Security.		K4	15
V	Mobile Platforms and Applications-Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – M-Commerce – Structure– Pros & Cons – Mobile Payment System – Security Issues.			15
	Learning Resources			
Text Books	Prasant Kumar Pattnaik, Rajib Mall, -Fundamentals of Mobile Computingl, PHI Learning Pvt. Ltd, New Delhi 2012.			
Reference Books	 Jochen H. Schller, -Mobile Communications^{II}, Pearson Education, New Delhi, 2007, 2ndEdition. Dharma PrakashAgarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd.2005. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, -Principles of Mobile Computing^{II}, Springer 2003. 			

Website /	NPTEL & MOOC courses titled MobileComputing
Link	1.https://nptel.ac.in/courses/106/106/106106147/
	2.https://www.smartzworld.com/notes/mobile-computing-pdf-notes-mc-notes-pdf/

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	М	S	М	L
CO2	S	М	М	L
CO3	S	М	М	L
CO4	М	S	М	L
CO5	S	М	L	L

S- Strong, M- Medium, L-Low

Subject Title	PAPER – III NETWORK SECURITY	Semester	VI
Subject Code	22UDSE09	Specialization	NA
Туре	Elective : Theory	L:T:P:C	86:6:0:4

- 1. To Understand OSI security architecture.
- 2. To acquire fundamental knowledge of finite fields and number theory.
- 3. To Understand various block cipher and stream cipher models.
- 4. Study the principles of symmetric & public key crypto systems.
- 5. To learn the system security practices.

CO Number	CO Statement	Knowledge Level
CO1	Remember the OSI Security Architecture.	K1
CO2	Understanding Number theory and finite fields.	K2
CO3	Apply Block Ciphers and Data Encryption Std.	К3
CO4	Evaluate Public Key Cryptography and RSA.	K4
CO5	Implement Hash functions.	K5

Subject Title	PAPER – III NETWORK SECURITY	Semester	VI		
Subject Code	22UDSE09	Specialization	NA		
Туре	Elective : Theory	L:T:P:C	86:6:0:4		
Unit	Contents		Levels	Sessions	
I	OSI Security Architecture – Security attack mechanisms – Network security Model – Clas techniques: Symmetric cipher model, Substitut Transposition techniques – Rotor machines – St	ts, services and ssical encryption ion techniques – teganography	K1	14	
II	Number theory and finite fields: The Euclide Modular arithmetic - Groups, Rings and Fields the Form GF (p) – Polynomial arithmetic – p Fermat's and eulers theorems	an algorithm – – Finite fields of rime numbers –	K2	18	
III	Block Ciphers and Data Encryption Standard: Traditional block cipher structure – Data Encryption – Strengths of DES – Block Cipher Design Principles – Advanced EncryptionK318Standard – AES structure – AES transformation functions – AES Key expansion – implementationImplementationImplementation				
IV	Public Key Cryptography and RSA – Principles of Public-key Crypto systems – RSA algorithm - Diffie – Hellman Key exchange - Elgamal Cryptographic SystemK4				
V	Hash functions – Applications – two simple I Hash functions based on Cipher block chainin Algorithm (SHA)	hash functions – g - Secure Hash	K5	18	
Tort	Learning Resources				
Books	Pearson Education 2013,6 th Edition.		pres anu l	1 1acuct II,	
Reference Books	 Behrouz A. F-erouzan, -Cryptography & Network Securityll, Tata McGraw Hill 2007. Man Young Rhee, -Internet Security: Cryptographic Principles, Algorithms and Protocolsl, Wiley Publications 2003. Charles Pfleeger, -Security in Computingll, Prentice Hall of India 2006, 4th Edition. Ulysess Black, -Internet Security Protocolsl, Pearson Education Asia 2000. Charlie Kaufman and Radia Perlman, Mike Speciner, -Network Security, Private Communication in Public Worldl, PHI 2002, 2nd Edition. 				
Website /Link	1.NPTEL & MOOC courses titled Network Sec 2. <u>https://nptel.ac.in/courses/106/105/106105031/</u>	urity			

B.Sc., Data Science Syllabus under CBCS Pattern with effect from 2022-2023 Onwards

B.Sc., Data Science Syllabus under CBCS Pattern with effect from 2022-2023 Onwards <u>Mapping with Programme Outcomes</u>

CO Number	PO1	PO2	PO3	PO4
CO1	S	М	М	L
CO2	S	М	L	L
CO3	S	М	L	L
CO4	М	L	S	М
CO5	S	М	М	L

S- Strong , M- Medium , L-Low

B.Sc., Data Science Syllabus under CBCS Pattern with effect from 2022-2023 Onwards NON MAJOR ELECTIVE COURSE (NMEC) - I

Subject Title	PAPER – I BASICS OF COMPUTERS	Semester	III
Subject Code	22UDSN01	Specialization	NA
Туре	NMEC: Theory	L:T:P:C	26:2:0:2

- 1. To understand the basics of computers.
- 2. To prepare the students for analyze data processing.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of computers.	K1
CO2	Understand number system.	K2
CO3	Demonstrate the functions of computer system.	К3
CO4	Study the input and output system.	K4
CO5	Analyze data processing.	K5

Subject Title	PAPER – I BASICS OF COMPUTERS	Semester	III	
Subject Code	22UDSN01	Specialization	NA	
Туре	NMEC: Theory	L:T:P:C	26:2:0:2	
Unit	Contents		Levels	Sessions
I	Introduction to Computer: Introduction – Type – Characteristics of Computers. Generations of Computers. Generations of Computers – Third Generation – Second Generation – Third Generation – Fifth Generation. Classification Computers: Introduction – Microcomputers – Per – Portable Computers – Mini Computers – Sup Main Frames.	es of computers Computers: First eration – Fourth on of Digital rsonal Computer per Computers –	K1	5
II	Number System: Introduction – Decimal Number System – Binary Number System – Binary-Decimal Conversion – Decimal Binary Conversion – Binary Addition – Binary Subtraction – Complements – 9's Complement – 10's Complement – 1's Complements – 2's Complements – BCD - Bits, Bytes, Words – Octal – Hexadecimal Number System.K2			
III	Anatomy of Digital Computer : Functions and Components of Computer – Central Processing Unit – Control Unit – Arithmetic – Logic Unit – Memory – Registers – Addresses. Memory Units: RAM, ROM, PROM, EPROM, EEPROM, and Flash Memory			5
IV	Input Devices: Introduction – Keyboard – Mouse – Connections – Mouse pad – Trackball – joyst Tablet – Scanners – Digital Camera – MICR – OC Code Reader – Speech Input Device- Touch Scree Light Pen. Output Devices: Introduction Classification of Monitors – Monochrome – Gray Digital Monitor – Analog Monitor – Characterist Printers.	K4	5	
V	Computer Software: Introduction – Operating System – Utilities – Compiler and Interpreters – Word Processor – Spreadsheets – Presentation Graphics – DBMS – Programming Languages: Machine Language – Assembly Language – High level language – Types of High Level Language. Data Processing: Data VS Information – File Processing – Sequential File Processing – Direct Access File Processing.			6
	Learning Resources			
Text Books	Alexis Leon and Mathews Leon, -Fundamentals of Computer Science and Communication Engineering ^{II} , Leon Techworld, 1998.			
Reference Books	 B. Ram and Sanjay Kumar, -Computer Fundan International Publishers, 2014. Pradeep K Sinha, Priti Sinha, -Computer Fund 	nentals∥, 5 th Editio amentals∥, BPB P	on, New A Publication	.ge 1s, 2004.

B.Sc.,	Data Sci	ience Sy	yllabus u	inder	CBCS	Pattern	with	effect	from	2022-	2023	Onwards

	3. Anita Goel, —Computer Fundamentals ^{II} , 1 st Edition, Pearson Education India, 2010.
Website/	https://www.gopeaople.edu/blog/the_basics_of_computer_science_how_to_get_started/
Link	www.tutorialspoint.com>basics_of_computer

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	М	М	
CO2	М	М	-	S
CO3	S	М	L	М
CO4	М	S	М	-
CO5	S	М	-	L

S- Strong , M- Medium , L-Low

B.Sc., Data Science Syllabus under CBCS Pattern with effect from 2022-2023 Onwards NON MAJOR ELECTIVE COURSE (NMEC) - I

Subject Title	PAPER – II COMPUTER APPLICATIONS FOR AUTOMATION	Semester	III
Subject Code	22UDSN02	Specialization	NA
Туре	NMEC: Theory	L:T:P:C	26:2:0:2

- 1. To acquire knowledge on editor, spread sheet, slide preparation.
- 2. To improve creative thinking in presentation software.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of computers.	K1
CO2	Understand MS word.	K2
CO3	Demonstrate the functions of MS excel.	К3
CO4	Study the basics of MS power point.	K4
CO5	Analyze data processing with MS Access.	K5

Subject Title	PAPER – II COMPUTER APPLICATIONS FOR AUTOMATION	Semester	ш		
Subject Code	22UDSN02	NA			
Туре	NMEC: Theory	L:T:P:C	26:2:0:2	2	
Unit	Contents		Levels	Sessions	
Ι	Introduction to Computers: Introduction- Importan Anatomy	ice- History-	K1	5	
II	MS-Word: Basics –Do's and Don'ts – Menus – Co Bars – Icons – Word Formatting Tool Bar	mmands – Tool	K2	5	
III	MS-Excel: Basics – Do's and Don'ts – Menus – Co Bars – Icons	ommands – Tool	K3	5	
IV	MS-PowerPoint: Basics – Menus – Tool Bars – Na	K4	5		
V	MS-Access: Introduction – Parts of an Window: – Data Base – Table Wizard – Renaming – Saving the Relationships – Query – Form – Reports – Exiting	K5	6		
	Learning Resources				
Text Books	Sanjay Saxena, -MS-Office 2000 for everyone∥, Vikas Publishing House Pvt. Ltd, Reprint 2006				
	1. Nellai Kannan, -MS-Office ^{II} , Nels Publications, 3 rd Edition, 2004.				
Reference Books	 2. John Walkenbach, Herb Tyson, Michael R.Groh, Faithe Wempen and Lisa A.Bucki , – Microsoft Office 2010 Bible –, Wiley India Pvt. Ltd , Reprint 2010 				
Website/	 https://ptgmedia.pearsoncmg.com/images/9780 es/9780735623026.pdf https://www.dit.ie/media/ittraining/msoffice/N 	0735623026/samp 40AC Excel 201	lepag 6 Core. r	odf	
Link	 https://ptgmedia.pearsoncmg.com/images/9780 es/9780735697799.pdf 2010 	0735697799/samp	lepag		

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	М	М	
CO2	S	М	-	-
CO3	S	S	L	М
CO4	М	S	М	-
CO5	S	М	M-	L

S- Strong, M- Medium, L – Low

Subject Title	PAPER – I BASICS OF INTERNET	Semester	IV
Subject Code	22UDSN03	Specialization	NA
Туре	NMEC: Theory	L:T:P:C	26:2:0:2

NON MAJOR ELECTIVE COURSE (NMEC) – II

- 1. To improve the skills of surfing internet.
- 2. To prepare the students for developing webpage using HTML.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of Internet.	K1
CO2	Understand internet technologies.	K2
CO3	Demonstrate tags in HTML.	К3
CO4	Study the basics of create list and tables.	K4
CO5	Analyze frames and forms.	K5

Subject Title	PAPER – I BASICS OF INTERNET	Semester	IV	
Subject Code	22UDSN03	Specialization	NA	
Туре	NMEC: Theory	L:T:P:C	26:2:0:2	2
Unit	Contents		Levels	Sessions
Ι	Introduction To The Internet: Computer in Networking – Internet -E-mail – Resource Sha World Wide Web – Telnet – Bulletin Board Area Information Service.	n Business – ring – Gopher – Service – Wide	K1	5
II	Internet Technologies: Modem - Internet addressing – Physical connections – Telephone Lines – Internet browsers – Internet Explorer – Netscape Navigator.			5
III	Introduction to HTML: Designing a home page – HTML documents – Anchor tag – Hyper Links. Traditional text and formatting			5
IV	Types of lists: Ordered, Unordered – Nesting Lists – Other tags: Marquee, HR, BR- Using Images – Creating Hyperlinks ,Tables: Creating basic Table, Table elements, Caption – Table and cell alignment – Rowspan, Colspan – Cell padding			5
V	Frames: Frameset – Targeted Links – No fra Input, Text area, Select, Option.	me – Forms :	K5	6
	Learning Resources			
Text Books	 C Xavier, -World Wide Web with HTML, Tata McGraw Hill Education, 2000. H.M.Deital, P.J. Deital,—Internet and World Wide Web – How to Program, 4th Edition -PHI Learning 			
Reference Books	Laura Lemay, -HTML Complete Reference, Te. HTML ^I .	ach Yourself Web	Publishir	ng with
Website/ Link	https://www.codecademy.com/learn/learn-html/	/		

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	М	
CO2	S	М	-	-
CO3	S	S	М	L
CO4	М	S	L	-
CO5	S	L	M-	L

S- Strong, M- Medium, L – Low

NON MAJOR ELECTIVE COURSE (NMEC) – II

Subject Title	PAPER – II IMAGE EDITING TOOL	Semester	IV
Subject Code	22UDSN04	Specialization	NA
Туре	NMEC: Theory	L:T:P:C	26:2:0:2

- 1. To impart Practical Training in PHOTOSHOP image editing Tool.
- 2. Familiarize the different text and filter effects.
- 3. Build programs using stamp tools.
- 4. Provide knowledge on working with several layouts.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of Photoshop.	K1
CO2	Understand the working with images.	K2
CO3	Demonstrate the layering in Photoshop.	k3
CO4	Implement the layer style.	K4
CO5	Analyze the action concept.	K5

Subject Title	PAPER – II IMAGE EDITING TOOL	Semester	IV	
Subject Code	22UDSN04	Specialization	NA	
Туре	NMEC: Theory	L:T:P:C	26:2:0:2	2
Unit	Contents		Levels	Sessions
I	Getting Started with Photoshop CS5: Launching Photoshop CS5 - Exploring the Interface - Using Screen Modes - Opening an Existing Image - Opening an Image Using Adobe Bridge - Exploring Commonly Used Tools in the Tools Panel - Creating a New Document - Saving a Document - Reverting a Document - Selecting a Workspace - Creating a New Workspace - Deleting a Workspace - Working with Panels in Photoshop CS5 - Keyboard Shortcuts and Menu Settings - Customizing Preferences			5
п	Working with Images: Differences between Bitmap and Vector Images - Understanding Image Resolution Editing Images - Different Color Modes in Photoshop CS5 - Making Color Adjustments - File Formats in Photoshop CS5 - Creating a PDF File in Photoshop CS5 - Importing a PDF File into Photoshop CS5 - Making a Selection with Selections Tools - Modifying a Selection- Transforming a Selection - Transforming Pixels			5
Ш	Mastering Layers in Photoshop CS5:Exploring L Working with Layers -Organizing Layers Workin and Blend Modes - Working with Adjustment Lay Photoshop CS5 - Setting the Current Foreground Colors - Filling a Selection with the Current For Using the Content-Aware Feature - Exploring Drav Exploring Painting Tools - Exploring Retouching T	AYERS Panel - ng with Opacity ers - Masking in and Background eground Color - ving Tools - ools.	К3	5
IV	Working with Layer Styles and Filter Effects: Under Styles - Working with Smart Objects - Understandi	erstanding Layer ng Filters.	K4	5
V	Animation, 3D, and Printing in Photoshop CS5:Wo Actions - Working with Automate Commands - Photoshop - Working with Animation in Photoshop in Photoshop CS5.	orking with Exploring 3D in p CS5 - Printing	К5	6
	Learning Resources			
Text Books	C Kogent Learning Solutions Inc,-Photoshop CS5 i New Delhi, 2012.	n Simple Steps∥, l	Dreamtec	h Press,
Reference Books	 Brie Gyncild, -Ado be Photoshop CS6 Classroo Press/Peachpit, 2012 Lisa Danae Dayley, Brad Dayley, -Adobe Phot Ltd. Edward Bailey, -Photoshop: 7 Ways to Use Ad space Independent Publishing Platform 	om in a Book∥, Ac oshop Cs6 Bible∥, obe Photoshop Lil	lobe , Wiley In ke a Pro∥,	dia Pvt Create
Website/ Link	1. <u>www.online_image_editor.com</u> 2. <u>www.cs5_on_demand_sampler.pdf</u>			

B.Sc.	Data Science	Syllabus under	CBCS Pattern	with effect from	2022-2023 Onwards
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CO Number	PO1	PO2	PO3	PO4
CO1	S	М	L	
CO2	S	М	-	L
CO3	S	М	L	L
CO4	М	S	L	L
CO5	S	L	-	М

Mapping with Programme Outcomes

S- Strong , M- Medium , L-Low

Subject Title	SEMESTER I/III PAPER – I FUNDAMENTALS OF COMPUTERS	Semester	I/III
Subject Code	22UDSA01	Specialization	NA
Туре	Allied: Theory	L:T:P:C	86:6:0:4

- 1. To Understand the basics of computers.
- 2. To prepare the students for the analyze of data processing.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of computers.	K1
CO2	Understand the number system.	K2
CO3	Demonstrate the functions of computer system.	k3
CO4	Study the input and output system.	K4
CO5	Analyze of data processing.	K5

Subject Title	SEMESTER I/III PAPER – I FUNDAMENTALS OF COMPUTERS	Semester	I/III	
Subject Code	22UDSA01	Specialization	NA	
Туре	Allied: Theory	L:T:P:C	86:6:0:4	
Unit	Contents		Levels	Sessions
Ι	Introduction to Computer: Introduction – Types – Characteristics of Computers. Generations of Con Generation – Second Generation – Third Generatio Generation – Fifth Generation. Classification of Di Introduction – Microcomputers – Personal Comp Computers – Mini Computers – Super Computers –	s of computers mputers: First on – Fourth gital Computers: puter – Portable - Main Frames.	K1	17
п	Number System: Introduction – Decimal Number System – Binary Number System – Binary-Decimal Conversion – Decimal Binary Conversion – Binary Addition – Binary Subtraction – Complements – 9's Complement – 10's Complement – 1's Complements – 2's Complements – BCD - Bits, Bytes, Words – Octal Havadecimal Number System			17
ш	Anatomy of Digital Computer : Functions and Components of Computer – Central Processing Unit – Control Unit – Arithmetic – Logic Unit – Memory – Registers – Addresses. Memory Units: RAM, ROM, PROM, EPROM, EEPROM, And Flash Memory.			17
IV	Input Devices: Introduction – Keyboard – Mouse – Connections – Mouse pad – Trackball – joyst Tablet – Scanners – Digital Camera – MICR – OC Code Reader – Speech Input Device- Touch Scree Light Pen. Output Devices: Introduction – Monitor of Monitors – Monochrome – Gray Scale – Color – – Analog Monitor – Characteristics of monitor – Pr	 Types of Mice tick – Digitizing CR – OMR – Bar en – Touch Pad – r – Classification Digital Monitor rinters. 	K4	17
v	Computer Software:Introduction – Operating Syst Compiler and Interpreters – Word Processor – Spr Presentation Graphics – DBMS – Programming La Machine Language – Assembly Language – High Types of High Level Language. Data Processing: I Information – File Processing – Sequential File Pro Access file Processing.	tem – Utilities – readsheets – anguages: level language – Data VS Decessing – Direct	К5	18
	Learning Resources			
Text Books	Alexis Leon and Mathews Leon, -Fundamentals of Communication Engineering ^{II} , Leon Techworld, 19	Computer Science	e and	
Reference Books	 B Ram and Sanjay Kumar, -Computer Fundame International Publishers, 2014. Pradeep K Sinha, PritiSinha, -Computer Fundamentals. 1st Edition 	entals , 5 th Edition mentals , BPB Pul	n, New Ag blications	ge , 2004.
	Anna Goer, —Computer Fundamentals, 1 Edition		m mula, 2	/010/

B.Sc.,	Data Sc	ience Syllabus	under CBCS	Pattern with	effect from	2022-2023	Onwards
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Website/	1.https://www.gopeople.edu/blog/the_basics_of_computer_science_how_to_get_started						
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Link	2.www.tutorialspoint.com-basics_of_computer						

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	М	М	
CO2	М	М	-	S
CO3	S	М	L	М
CO4	М	S	М	-
CO5	S	М	-	L

S- Strong, M- Medium, L-Low

Subject Title	COMPUTER APPLICATIONS IN OFFICE	Semester	II/IV
Subject Code	22UDSA02	Specialization	NA
Туре	Allied: Theory	L:T:P:C	56:4:0:4

COURSE OBJECTIVE:

- 1. To improve the quality of students in office automation process.
- 2. To prepare the students for various ability to prepare reports and presentations.

CO Number	CO Statement	Knowledge Level
C01	Remember the basics of MS word.	K1
CO2	Understand MS word.	K2
CO3	Demonstrate the functions of MS excel.	k3
CO4	Study the basics of MS excel workbooks.	K4
CO5	Analyze of data processing with MS power point.	K5

Subject Title	COMPUTER APPLICATIONS IN OFFICE	Semester	II/IV	
Subject Code	22UDSA02	Specialization	NA	
Туре	Allied: Theory	L:T:P:C	56:4:0:4	
Unit	Contents		Levels	Sessions
Ι	MS Word Exploring Word 2007: Working in the Word Environment – Opening, Moving Around in, and closing Document – Creating and Saving A Document – Previewing and Printing Document – Editing and Proofreading Documents: Making Changes to document – Inserting Saved Text – Finding the Most Appropriate Word – Reorganizing a Document Outline – Finding and Replacing Text – Correcting spelling and Grammatical errors – Finalizing Document			10
Π	MS Word Changing the Look of Text: Quickly Formatting Text and Paragraphs – Manually changing the look of characters – Manually changing the look of paragraphs – Creating and modifying Lists-Presenting Information in Columns and Tables : Presenting Information in Columns – Creating Tabular List – Presenting Information in a Table – Formatting Table Information – Performing Calculations in a Table- Using a Table to control Page Layout			10
III	MS Excel Setting Up a Workbook : Creating Workbooks – Modifying Workbooks - Modifying Worksheets – Working with Data and Data Tables : Entering and Revising Data – Moving Data within a Workbook- Finding and Replacing Data – Correcting and Expanding Upon Worksheet Data – Defining a Table – Performing Calculations on Data : Naming Groups of Data – Creating Formulas to Calculate Values – Summarizing Data that meets Specific Conditions –Finding and Correcting Errors in Calculations- Changing Document Appearance			12
IV	MS-Access: Introduction – Parts of an Window: - Data Base – Table Wizard – Renaming – Saving Relationships – Query – Form – Reports – Exiting	Creating a New g the Database – g MS-Access	K4	12
V	MS PowerPoint Starting a New Presentation – Working with Slide Text : Entering Text – Editing Text – Adding and Manipulating Text Boxes –Correcting and Sizing text – Checking Spelling – Finding and replacing text and fonts – Changing the size, Alignment, Spacing – Adjusting the Slide Layout, Order and Look : Changing the Layout of a slide – Rearranging Slides in a Presentation – Applying a theme -Switching to a Different Color Scheme – Adding Shading and texture to the background of a slide – Delivering a Presentation Electronically.			12
	Learning Resources			
Text Books	1Step by Step 2007 Microsoft Office System Private ltd.Newdelhi 2009	-Joyce Cox and	Гeam ,PH	I learning

B.Sc., Data Science Syllabus under CBCS Pattern with effect from 2022-2023 Onwards

	2. Sanjay Saxena, -MS-Office 2000 for everyone ^{II} , Vikas Publishing House Pvt. Ltd, Reprint 2006
Reference	1. NellaiKannan, -MS-Officell, Nels Publications, 3 rd Edition, 2004.
Books	2. John Walkenbach, Herb Tyson, Michael R.Groh, FaitheWempen and Lisa A.Bucki,
	- Microsoft Office 2010 Bible -, Wiley India Pvt. Ltd , Reprint 2010
	https://ptgmedia.pearsoncmg.com/images/9780735623026/samplepages/978073562302
Website/	6.pdf
Link	https://www.dit.ie/media/ittraining/msoffice/MOAC_Excel_2016_Core. pdf
	https://ptgmedia.pearsoncmg.com/images/9/80/3569//99/samplepages/9/80/3569//9
	9.pdf 2010

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	М	М	М
CO2	S	М	L	М
CO3	S	S	L	М
CO4	М	S	L	М
CO5	S	М	M-	L

S- Strong, M- Medium, L-Low

Subject Title	OFFICE AUTOMATION LAB	Semester	II/IV
Subject Code	22UDSAP01	Specialization	NA
Туре	Allied: Practical	L:T:P:C	30:0:2:2

COURSE OBJECTIVE:

- 1. To enable the students to design and develop the Office applications.
- 2. To qualify the students working in editor, spread sheet and slide preparation.
- 3. To improve creative thinking in presentation software

LIST OF PROGRAMS

I. MS-WORD

- 1. Text Manipulation: Write a paragraph about your institution and Change the font size and type, Spell check, Aligning and justification of Text.
- 2. Bio data: Prepare a Bio-data.
- 3. Find and Replace: Write a paragraph about yourself and do the following. Find and Replace Use Numbering Bullets, Footer and Headers.
- 4. Tables and manipulation: Creation, Insertion, Deletion (Columns and Rows). Create a mark sheet.
- 5. Mail Merge: Prepare an invitation to invite your friends to your birthday party. Prepare at least five letters.

II. MS-EXCEL

- 1. Data sorting-Ascending and Descending (both numbers and alphabets).
- 2.Mark list preparation for a student.
- 3.Individual Pay Bill preparation.
- 4. Invoice Report preparation.
- 5.Drawing Graphs. Take your own table.

III. MS-POWERPOINT

1. Create a slide show presentation for a seminar.

2. Preparation of Organization Charts.

3. Create a slide show presentation to display percentage of marks in each semester for all students

4. Use bar chart (X-axis: Semester, Y-axis: % marks).

5. Use different presentation template different transition effect for each slide.

COURSE OUTCOME:

On successful completion of the course, the students will

- 1. Understand the features in MS Word.
- 2. Select and apply worksheet and functions in MS EXCEL.
- 3. Combine multiple features in MS POWER POINT to prepare presentations.

Subject Title	DATABASE SYSTEMS	Semester	I/III
Subject Code	22UDSA03	Specialization	NA
Туре	Allied: Theory	L:T:P:C	86:6:0:4

COURSE OBJECTIVE:

- 1. To improve the understanding of database theory and practices.
- 2. To prepare the students implement database manipulation in SQL.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of Database.	K1
CO2	Understand Database Systems Concept and Architecture.	K2
CO3	Demonstrate the functions of the Relational Data Model and SQL.	К3
CO4	Study the basics of Basics SQL.	K4
CO5	Analyze advanced SQL commands and statements.	K5

Subject Title	DATABASE SYSTEMS	Semester	I/III	
Subject Code	22UDSA03	Specialization	NA	
Туре	Allied: Theory	L:T:P:C	86:6:0:4	
Unit	Contents		Levels	Sessions
Ι	Introduction to Databases – Introduction - Chara Database Approach -Advantages of Using the DBM Brief History of Database Applications.	Acteristics of the MS Approach -A	K1	15
п	Database Systems Concept and Architecture Schemas, and Instances - Three Schema Archit Independence - Database Languages and Interfaces System Environment - Centralized and Client/Serv for DBMSs- Classification of Database Management	: Data Models, ecture and Data The Database ver Architectures nt Systems.	K2	17
III	The Relational Data Model and SQL - Database Constraints - Relational Model Concepts- Key concepts - Relational Model Constraints and Relational Database Schemas - Update Operations, Transactions, and Dealing with Constraint Violations.			18
IV	Basic SQL - SQL Data Definition and Data Types - Specifying Constraints in SQL - Basic Retrieval Queries in SQL - INSERT, DELETE, and UPDATE Statements in SQL - Additional Features of SQL.			18
v	More SQL: Complex Queries, Triggers, Views, and Schema Modification - More Complex SQL Retrieval Queries - Specifying Constraints as Assertions and Actions as Triggers -Views (Virtual Tables) in SQL.			18
	Learning Resources			
Text Books	RamezElmasri and Shamkant B. databasesystems ,6 th Edition, Addison-Wesley Publ	Navathe, -Fi	undament	als of
Reference Books	Raghu Ramakrishnan, Madison, JohannesGehrke, — 3 rd Edition, McGraw-Hill Higher Education, 2003.	Database Manager	ment Syste	ems∥,
Website/ Link	1.www.db-book.com/db7 2.www.mheducation.co.in			

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	М	М
CO2	S	М	L	S
CO3	S	М	L	М
CO4	М	S	М	М
CO5	S	М	L	L

S- Strong , M- Medium , L - Low

Subject Title	E-COMMERCE TECHNIQUES	Semester	II/IV
Subject Code	22UDSA04	Specialization	NA
Туре	Allied: Theory	L:T:P:C	56:4:0:4

COURSE OBJECTIVE:

- 1. To improve the understanding of E-COMMERCE and E -payments.
- 2. To prepare the students implement HTML and E- mail creation.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of Ecommerce and Indian Business	K1
CO2	Understand WWW.	K2
CO3	Demonstrate the E payment system.	К3
CO4	Study the basics the Web Designing.	K4
CO5	Analyze Email components.	K5

Subject Title	E-COMMERCE TECHNIQUES	Semester	II/IV	
Subject Code	22UDSA04	Specialization	NA	
Туре	Allied: Theory L:T:P:C		56:4:0:4	
Unit	Contents		Levels	Sessions
Ι	History of E-commerce and Indian Business Context: E-Commerce –Emergence of the Internet – Emergence of the WWW – Advantages of E-Commerce – Transition to E-Commerce in India – The Internet and India – E-transition Challenges for Indian Corporate. Business Models for E-commerce: Business Model – E- business Models Based on the Relationship of Transaction Parties - E-business Models Based on the Relationship of Transaction Types.		K1	12
п	Enabling Technologies of the World Wide Web: World Wide Web – Internet Client-Server Applications – Networks and Internets – Software Agents – Internet Standards and Specifications – ISP.E- Marketing : Traditional Marketing – Identifying Web Presence Goals – Online Marketing – E-advertising – E-branding.			12
ш	E-Payment Systems: Main Concerns in Internet Banking – Digital Payment Requirements – Digital Token-based e-payment Systems – Classification of New Payment Systems – Properties of Electronic Cash – Cheque Payment Systems on the Internet. Information systems for Mobile Commerce: Introduction – Wireless Applications – Cellular Network – Wireless Spectrum – Technologies for Mobile Commerce – Wireless Technologies.			12
IV	HTML and Web Designing: Brief History of HTML – HTML Tags – Table Creation – Hyperlink – Reference – Headings – Alignment - Simple Web Page Creation.			10
V	E-mail: Email – Email Components - use of Email–Email creation– browsing–search engines–downloads.		К5	10
	Learning Resources			
Text Books	 P.T.Joseph, -E-Commerce - An Indian Perspectivell, 4th Edition, PHI Learning, 2012. C Xavier, -World Wide Web Design with HTMLl, 13th Reprint, Tata McGraw Hill, 2006. 			
	3. A.Leon and M.Leon, -Introduction to Information Technology∥, 1 st Edition, Vijay Nicole Publications, 2013.			
Reference Books	 David Whiteley, -E-Commerce Strategy, T Edition, Tata Mc-Graw-Hill, 2001. 	echnologies and	Applicat	ions , 1 st
	2. Kamalesh K Bajaj and Debjani Nag, -E-Comm	erce – The cutting	gedge of I	Business∥,

	2 nd Edition, Tata McGraw-Hill Education, 2005.	
	3. Alexis Leon and Mathews Leon, -Internet for Everyonell, 15 th Anniversary Edition,	
	Leon Tech world, UBS Publications, 2012.	
	4. RitendraGoel, -e-commercell, New Age International Publishers, 2016.	
Website/ Link	1.https://e_commerce_pdf_download.peatix.com/	
	2.www.tutorialpoints.com/html	
	3.https://books.google.com/books/about/a//_wide_web_design_with_html.html?id=6apo	
	xl=z4nwc	

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	М	L	L
CO2	S	М	L	L
CO3	S	М	L	L
CO4	М	S	М	М
CO5	S	М	М	L

S- Strong , M- Medium , $L-Low % \mathcal{M}^{(n)}(\mathcal{M})$

Paper should be handled and valued by Computer/Dara Science Department.

Subject Title	ALLIED PRACTICAL - II HTML PROGRAMMING	Semester	II/IV
Subject Code	22UDSAP02	Specialization	NA
Туре	Allied: Practical	L:T:P:C	30:0:2:2

COURSE OBJECTIVE:

- 1. To enable the students to design and develop the WEB PAGES.
- 2. To qualify the students working with tags in table .
- 3. To improve creative thinking in forms, lists and frames.

LIST OF PROGRAMS

- 1. Write HTML code to develop a web page that contains the different background and foreground color, with various styles.
- 2. Write HTML code to create a Webpage that contains an Image at its left hand side of the page when user clicks on the image; it should open another web page that displays the details of that image.
- 3. Create a web Page using HREF tag having the attribute ALINK, VLINK etc.
- 4. Create a web page, when user clicks on the link it should go to the bottom of the page.
- 5. Write a HTML code to create a web page of pink color and display moving message in red color.
- 6. Create a web page, showing an ordered list of name of your five friends and unordered list of any five your hobbies.
- 7. Create a HTML document containing a nested list showing the content page of any book.
- 8. Create a student mark list in HTML using Tables.
- 9. Create a HTML page to demonstrate the usage of Frames. Choose the content of the page on your own.
- 10. Design an application for pay slip through HTML forms

COURSE OUTCOME:

On successful completion of the course, the students will

- 1. Understand the features in HTML.
- 2. Select and apply tags for create text, list and table.
- 3. Combine multiple features in forms, frames and texts.

Note: For University Practical Exam, both Internal and External Examiners should be appointed fromDepartment of Computer Science/Data Science.