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 problem-solving.

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 real-life 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)
B	100 to 200 words (Answer any Two out of five questions &One question from each unit)	2X5 = 10 (Analytical type questions)
C	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 Question 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.

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

SEMESTER	I	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	2	2	10
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	26	24	25	27	155

COURSE OF STUDY AND SCHEME OF EXAMINATION

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

Part	Subject Code	Subject Title	Hours		Credits	Marks		
			Lect.	Lab		CIA	EA	Total
SEMESTER III								
III	21UFTA03	Tamil III	6	-	3	25	75	100
III	22UDS04	Core IV: Data Science	4	-	5	25	75	100
III	22UDS05	Core V: Operating System	4	-	5	25	75	100
III	22UDSP03	Practical III: Data Science with Python Lab	-	3	2	40	60	100
III		Allied III Statistical Methods Paper I	7	-	4	25	75	100
III		Allied Practical	-	-	-	-	-	-
III	22UDSSP01	SBEC I- Data Analytics with Spread Sheet Lab	-	2	3	40	60	100
IV		NMSDC-II – II Programming Essentials for Employability(Fundamentals of Coding and Cloud	2	-	2	25	75	100
IV	NMEC-I	Non –Major Elective – I	2	-	2	25	75	100
	Total		**25**	**5**	**26**	**230**	**570**	**800**
SEMESTER IV								
III	21UFTA03	Tamil IV	6	-	3	25	75	100
III	22UDS06	Core VI : Computer Networks	5	-	5	25	75	100
III	22UDSP04	Practical IV: R- Programming Lab	-	3	2	40	60	100
III	22UDS07	Core VII : Big Data Analysis	5	-	4	25	75	100
III		Allied IV: Statistical Methods Paper II	5	-	4	25	75	100
III		Allied –Practical	-	2	2	40	60	100
III								
IV	**NMSDC**	Computational skills for employability- Oracle Cloud Architecture	**2**	**-**	**2**	**25**	**75**	**100**
IV	NMEC – II	Non –Major Elective – II	2	-	2	25	75	100
IV	Add-on	Add-on Course Internship Programme	-	-	-	-	-	-
	Total		**25**	**5**	**24**	**230**	**570**	**800**

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

SEMESTER V

III	22UDS08	Core VIII : Data Visualization Techniques	4	-	4	25	75	100
III	22UDS09	Core IX : Machine Learning	4	-	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
IV		NMSDC –III Emerging Technology for Employability –II `(Machine Learning/PBL Android app Development	2	-	2	25	75	100
	Total		**20**	10	**25**	**245**	**555**	**800**

SEMESTER VI

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 Tools for Employability**	**2**	**-**	**2**	**25**	**75**	**100**
III		Elective II	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

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

Elective – II

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

Elective – III

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

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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	SEM	SUB CODE	SUBJECT TITLE	Lect. Hours	Credit	MARKS		
						CIA	EA	TOTAL
SEMESTER –III & IV								
IV	III	22UDSN01	NMEC I: Basics of Computers	2	2	25	75	100
		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

Part	Semester	Subject Title	Hours		Credits	Marks		
			Lecture	LAB		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

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.		CREDIT	MARKS		
			Lect.	Lab		CIA	EA	TOTAL
III	I /III 22UDSA01	Allied Paper – I Fundamentals of Computers	6	-	4	25	75	100
	II/IV 22UDSA02	Allied Paper – II 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)

PART	SEMESTER	TITLE OF THE SUBJECT	Hrs.		CREDIT	MARKS		
			Lect.	Lab		CIA	EA	TOTAL
III	I /III 22UDSA03	Allied Paper – I Database Systems	6	-	4	25	75	100
	II/IV 22UDSA04	Allied Paper – II 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

First Year

PART	SEMESTER	TITLE OF THE SUBJECT	Hrs.		CREDIT	MARKS		
			Lect.	Lab		CIA	EA	TOTAL
III	I	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

Second Year

PART	SEMESTER	TITLE OF THE SUBJECT	Hrs.		CREDIT	MARKS		
			Lect.	Lab		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	I
Subject Code	22UDS01	Specialization	NA
Type	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	I	
Subject Code	22UDS01	Specialization	NA	
Type	Core: Theory	L:T:P:C	86:6:0:5	
Unit	Contents		Levels	Sessions
I	**Introduction to Computer**: Introduction to Systems - Computer 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.		K1	15
II	**Syntax and Styles:** Data types – Literal – Numeric literal – Boolean literal – String literal – Variable – Operators and Expressions – Expressions and Order of evaluation – Numbers – Functions applicable to all types of numbers – Sample programs. **Control flow**: If Statement – While statement – For statement – Break statement – Continue statement – Pass statement – Entry controlled loop – Counter Controlled Loop – Condition Controlled Loop – Nested loops – Sample programs. **Lists:** Arrays – Sequences – Using lists – List assignment and equivalence – List bounds – List slicing – List cloning – Nested lists – List comprehensions – Lists and functions – Prime generation with a list – Adding list elements – Mutability – List unpacking – Stack – Queue – Functional Programming – Sample programs.		K2	11

III	**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 functions – Passing arguments – Keyword Arguments –Default 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.	**K2,K3**	**20**
IV	**Modules:** Introduction – Importing modules – Creating modules – Use of _ _name_ _ - Name Spacing – Reloading module – Sample Programs. **Object oriented programming principles. Packages**: Introduction to PIP – Installing packages via PIP – Using Python Packages – Absolute and Relative Imports – Namespace package – Sample Programs. **Strings and regular expressions.**	**K3,K4**	**20**
V	**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 – Handling Exceptions – Try Keyword – Finally Keyword – 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**.	**K5**	**20**
	Learning Resources		
Text Books	1. Satyanarayana, Radhika Mani, Jagadesh ,‖Python Programming ―, Universities press (India) Pvt. Ltd 2018 2. Bill Lubanovic, ―Introducing Python‖, O"Reilly, First Edition-Second Release, 2014.		

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

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

Subject Title	PRACTICAL – PYTHON LAB	Semester	I
Subject Code	22UDSP01	Specialization	NA
Type	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	II
Subject Code	22UDS02	Specialization	NA
Type	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	II	
Subject Code	22UDS02	Specialization	NA	
Type	Core: Theory	L:T:P:C	56:4:0:5	
Unit	Contents		Levels	Sessions
I	Introduction of algorithms, analyzing algorithms, Arrays : Representation of Arrays, Implementation of Stacks and queues, Application of Stack: Evaluation of Expression - Infix to postfix Conversion - Multiple stacks and Queues, Sparse Matrices.		K1	12
II	Linked list : Singly Linked list - Linked stacks and queues - polynomial addition - More on linked Lists - Doubly linked List and Dynamic Storage Management - Garbage collection and compaction.		K2	12
III	Trees: Basic Terminology - Binary Trees - Binary Tree representations - Binary trees - Traversal - More on Binary Trees - Threaded Binary trees - counting Binary trees. Graphs: Terminology and Representations - Traversals, connected components and spanning Trees, Single Source Shortest path problem.		K2,K3	12
IV	Symbol Tables : Static Tree Tables - Dynamic Tree Tables - Hash Tables Hashing Functions - overflow Handling. External sorting : Storage Devices -sorting with Disks : K-way merging - sorting with tapes.		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		K5	10
	Learning Resources			
Text Books	1. Ellis Horowitz, Sartaj Shani, ―Fundamentals of Data Structures‖, Galgotia publication.			
Reference Books	1. ―Data structures Using C‖ Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J.Augenstein, Kindersley (India) Pvt. Ltd., 2. ―Data structure and Algorithms‖, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, Pearson Education Pvt. Ltd.,			

Website/ Link	1. www.freetechbooks.com/a-practical-introduction-to-data-structures-and-algorithm-analysis-thirdedition-c-version-t804.html 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	M	M	S
CO3	S	L	L	M
CO4	M	S	M	S
CO5	S	L	S	S

S- Strong , M- Medium , L – Low

Subject Title	RELATIONAL DATABASE MANAGEMENT SYSTEMS	Semester	II
Subject Code	22UDS03	Specialization	NA
Type	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	II	
Subject Code	22UDS03	Specialization	NA	
Type	Core: Theory	L:T:P:C	41:3:0:5	
Unit	Contents		Levels	Sessions
I	Introduction: Database System Applications-Purpose of Database Systems-View of Data-Database Languages-Transaction Management-Database Architecture-Database users and Administrators. Relational Model: Structure of Relational Databases – Database Design – ER Model-Overview of the Design Process – The Entity – relationship Model – Constraints – Entity Relationship Diagrams.		K1	10
II	Relational Algebra Operations –Relational Languages: The Tuple Relational Calculus –The Domain Relational Calculus – SQL: Background – Data Definition – Basic Structure of SQL Queries – Set Operations – Aggregate Functions – Null Values – Nested Sub-Queries – Views – Modification of the Database.		K2	7
III	Data Normalization: Pitfalls in Relational Database Design – Decomposition – Functional Dependencies – Normalization – First Normal Form – Second Normal Form – Third Normal Form – Boyce-Codd Normal Form – Fourth Normal Form – Fifth Normal Form – Denormalization – Database Security: Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges – Data Encryption.		K2,K3	8
IV	PL/SQL: A programming Language: History - Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQ L IN PL/SQL – Data Manipulation-		K3,K4	8

	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.		
V	PL/SQL Composite Data Types: Records – Tables – V arrays. Named Blocks: Procedures – Functions – Packages - Triggers – Data Dictionary Views.	**K5**	**8**
	Learning Resources		
Text Books	1. ―Database System Concepts‖,Abraham Silberschatz, Henry F.Korth, S.Sudarshan, TMH 5th Edition (Units – I,II) 2. ―Fundamentals of Database Management Systems‖, Alexis Leon, Mathews Leon, Vijay Nicole Imprints Private Limited. (Unit-III) 3. ―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 reprint, Vijay Nicole Publications, 2009.		
Website / Link	• https://www.w3schools.com/sql • https://www.tutorialspoint.com/sql • https://livesql.oracle.com		

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	M	M	S
CO3	S	L	L	M
CO4	M	S	M	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
Type	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.
7. 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
Type	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	
Type	Core: Theory	L:T:P:C	71:5:0:5	
Unit	Contents		Levels	Sessions
I	Introduction: Data Science- A Brief History of Data Science - A History of Data Analysis -The Emergence and Evolution of Data Science. Where Is Data Science Used?:What Are Data, and What Is a Data Set?: Perspectives on Data. A Data Science Ecosystem: Moving the Algorithms to the Data - The Traditional Database or the Modern Traditional Database.		K1	15
II	Learning from Data with Your Machine: Defining Machine Learning and Its Processes -Learning Styles - Selecting algorithms based on function. Math, Probability, and Statistical Modeling: Exploring Probability and Inferential Statistics - Quantifying Correlation -Reducing Data Dimensionality with Linear Algebra - Introducing Time Series Analysis.		K2	15
III	Data Visualizations: The Big Three - Picking the Most Appropriate Design Style – Selecting the Appropriate Data Graphic Type - Web-Based Applications for Visualization Design: Designing Data Visualizations for Collaboration - Visualizing Spatial Data with 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		K3,K4	15
V	Matplotlib for Visualization, Seaborn Library for Visualization, SciPy Library for Statistics		K5	11
	Learning Resources			
Text Books	1. John D. Kelleher and Brendan Tierney, ―Data Science‖, 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 Dummies‖, 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 Python‖,1st Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at https://automatetheboringstuff.com/)			

Reference Books	1. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, ―Introducing Data Science‖, Manning Publications Co, 2016. 2. Ramesh Sharda, DursunDelen, Efraim Turban, ―Business Intelligence, Analytics, and Data Science: A Managerial Perspective‖, Pearson Education, Fourth edition, 2019. 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
Website/ Link	1. https://www.edureka.co/blog/what-is-data-science 2. https://www.en.m.wikipedia.org/wiki/data_science

Mapping with Programme Outcomes

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

Subject Title	OPERATING SYSTEM	Semester	III
Subject Code	22UDS05	Specialization	NA
Type	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	III	
Subject Code	22UDS05	Specialization	NA	
Type	Core: Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	Introduction – History of operating system- Different kinds of operating system – Operation system concepts - System calls- Operating system structure.		K1	11
II	Processes and Threads: Processes – threads – thread model and usage – inter process communication.		K2	15
III	Scheduling - Memory Management: Memory Abstraction – Virtual Memory - page replacement algorithms.		K1,K3	15
IV	Deadlocks: Resources- introduction to deadlocks – deadlock detection and recovery – deadlocks avoidance – deadlock prevention. Multiple processor system: multiprocessors – multi computers.		K3,K4	15
V	Input/Output: principles of I/O hardware - principles of I/O software. Files systems: Files – directories - files systems implementation – File System Management and Optimization.		K5	15
	Learning Resources			
Text Books	Andrew S. Tanenbaum, ―Modern Operating Systems‖, 2ndEdition, PHI private Limited, New Delhi, 2008.			
Reference Books	1. William Stallings, ―Operating Systems – Internals & Design Principles‖, 5th Edition, Prentice – Hall of India private Ltd, New Delhi, 2004. 2. Sridhar Vaidyanathan, ―Operating System‖, 1st Edition,Vijay Nicole Publications, 2014.			
Website / Link	1. www.wikipedia.org/wiki/Operating_system 2. http://www.freetechbooks.com/introduction-to-operating-systems-t340.html			

Mapping with Programme Outcomes

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

- 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
Type	Core: Theory	L:T:P:C	71:5:0:4

COURSE OBJECTIVE:

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.	K3
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	
Type	Core: Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	Introduction – Network Hardware - Software - Reference Models - OSI and TCP/IP Models - Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer - Theoretical Basis for Data Communication - Guided Transmission Media.		K1	15
II	Wireless Transmission - Communication Satellites - Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues - Error Detection and Correction.		K2	15
III	Elementary Data Link Protocols - Sliding Window Protocols - Data Link Layer in the Internet - Medium Access Layer - Channel Allocation Problem - Multiple Access Protocols - Bluetooth.		K3	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‖, Prentice-Hall of India 2008, 4th Edition.			
Reference Books	1. Stallings, ―Data and Computer Communications‖, Pearson Education 2012, 7th Edition. 2. B. A. Forouzan, ―Data Communications and Networking‖, Tata McGraw Hill 2007, 4th Edition. 3. F. Halsall, ―Data Communications, Computer Networks and Open Systems‖, Pearson Education 2008.			
Website / Link	NPTEL & MOOC courses titled Computer Networks https://nptel.ac.in/courses/106106091/			

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

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

COURSE OBJECTIVE:

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
Type	Elective : Theory	L:T:P:C	71:5:0:4

COURSE OBJECTIVE:

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	
Type	Elective: Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	**Introduction to R Programming**: Operators-- Control Statement and Functions—Matrices—Arrays—Lists-- Data Frame-- Graphs in R Programming-- R Apply Family Correlation and Regression Analysis.		K1	15
II	**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	1. Sandhya Arora , Latesh Malik , ―R Programming for beginners‖,Universities PressIInis)Pvt Limited 2020 2. Radha Shankarmani, M Vijayalakshmi, ―Big Data Analytics‖, Wiley publications,first Edition 2016. 3. Seema Acharya, Subhashini Chellappan, ―Big Data and Analytics‖, Wiley Publication, first edition. Reprint in 2016.			

Reference Books	1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, Big Data, ―Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses‖, Wiley, 2013 2. Bill Franks, Taming, ―The Big Data Tidal Wave: Finding Opportunities In Huge Data Streams With Advanced Analytics‖, Wiley

Website / Link	https://en.wikipedia.org › wiki › Big_data https://www.tutorialspoint.com/big_data_analytics/r_introduction.htm

Mapping with Programme Outcomes

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

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
Type	Core: Theory	L:T:P:C	71:5:0:4

COURSE OBJECTIVE:

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	
Type	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 Believe? Some Pictures Are More Persuasive, Different Shades of the Truth in visualization, Start Sketching Your Data Story, Recommended Tools for data visualization and demonstration of Tools.		K1	11
II	**Data Management for data visualization** Select Your Spreadsheet Tools, Download to CSV or ODS Format, Make a Copy of a Google Sheet, Share Your Google Sheets, Upload and Convert to Google Sheets, Geocode Addresses in Google Sheets, Collect Data with Google Forms, Sort and Filter Data, Calculate with Formulas, Summarize Data with Pivot Tables Match Columns with VLOOKUP, Spreadsheet Versus Relational Database		K2	15
III	**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 Area Charts, Datawrapper Charts, Annotated Charts, Range Charts, Scatter and Bubble Charts. Map Design Principles: Deconstructing a Map, Clarify Point-Versus-Polygon Data, Map One Variable, Not Two, Choose Smaller Geographies for Choropleth Maps **Storyboard**: Build a Narrative on a Storyboard, Draw Attention to Meaning, Acknowledge Sources and Uncertainty Decide on Your Data Story Format		K5	15

	Learning Resources
Text Books	—Hands-On Data Visualization— by Jack Dougherty, Ilya Ilyankou
Reference Books	1. —The Truthful Art: Data, Charts, and Maps for Communication‖, Pearson Education, 2016. 2. 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	M	M	S
CO3	S	L	L	M
CO4	M	S	M	S
CO5	S	L	S	S

S- Strong , M- Medium , L – Low

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

COURSE OBJECTIVE:

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	
Type	Core: Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	**Introduction to machine learning:** Introduction, Types of machine learning, Applications of Machine Learning, Perspectives and issues in machine learning, Tools in machine learning, basic types of data in machine learning, exploring structure of data, data preprocessing. Performance metrics - accuracy, precision, recall, sensitivity, specificity, AUC, RoC, Bias Variance decomposition.		K1	11
II	**Probabilistic and Stochastic Models:** Bayesian Learning – Bayes theorem, Concept learning, Maximum likelihood, Bayes optimal classifier, Gibbs algorithm, Naive Bayes classifier, Expectation maximization and Gaussian Mixture Models, Hidden Markov models.		K2	15
III	**Supervised learning:** Introduction, Regression, Linear regression, Classification: Decision trees, k-Nereast Neighbours, Support Vector Machine, Logistic regression, Naïve Bayes, Random Forest. Artificial Neural Network: Introduction, Perceptrons, multi-layer networks and back propagation.		K1,K3	15
IV	**Unsupervised learning:** Introduction, Supervised vs Unsupervised Cluster Analysis, K-means clustering, Hierarchical clustering. Dimension reduction: Principal Component Analysis, Linear Discriminant Analysis.		K3,K4	15
V	**Modelling, evaluation and Genetic algorithms:** Building the model, Training a model, evaluating a model, improving a model. Genetic Algorithms – Representing hypothesis, Genetic operators and Fitness function and selection, Simple applications of the Genetic Algorithm.		K5	15
	Learning Resources			
Text Books	1. SaikatDutt, Subramanian Chandramouli, Amit Kumar Das, ―Machine Learning‖, Pearson Education. **Chapters 1-3, 6-10. (unit I,II,III,IV,V)** 2. ShaiShalev-Shwartz, Shai Ben-David, ―Understanding Machine Learning: From Theory to Algorithms‖, Cambridge University Press. **Chapters 20, 23-24 (Unit III,IV)**			
Reference	1. T. Hastie, R. Tibshirani and J. Friedman, ―Elements of Statistical Learning‖,			

Books	Springer. 2. Charu C. Aggarwal, ―DATA CLUSTERING Algorithms and Applications‖, CRC Press, 2014. 3. C. Bishop, ―Pattern Recognition and Machine Learning‖, Springer. 4. Ethem Alpaydin,"Introduction to Machine Learning‖, MIT Press, Prentice Hall of India, Third Edition 2014.
Website / Link	www.geeksforgeeks.org/machine-learning/

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

Subject Title	DATA VISUALIZATION LAB	Semester	IV
Subject Code	22UDSP05	Specialization	NA
Type	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:

1. Demonstration of Data visualization software: Power BI or Tableau Public or Google Data Studio (Choose any one tool to conduct this lab)
2. Data Sourcing and migration of data on the chosen platform (Dataset: Superstore Sales Dataset/Big mart dataset)
3. Data Processing: check for missing values and imputation on the chosen platform (Dataset: 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.
7. 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
Type	Elective : Theory	L:T:P:C	71:5:0:4

COURSE OBJECTIVE:

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.	K3
CO4	Evaluate IoT Applications.	K4
CO5	Implement IoT Privacy, Security and Governance.	K5

Subject Title	INTERNET OF THINGS	Semester	V	
Subject Code	22UDS10	Specialization	NA	
Type	Elective : Theory	L:T:P:C	71:5:0:4	
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.		K1	15
II	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.		K2	15
III	IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views		K3	15
IV	IoT Architecture Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and GasIndustry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.		K4	15
V	Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy andTrust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security		K5	11
	Learning Resources			

Text Books	Vijay Madisetti and ArshdeepBahga, ―Internet of Things: (A Hands-on Approach)‖, Universities Press (INDIA) Private Limited 2014, 1st Edition.
Reference Books	1. Michael Miller, ―The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World‖, Pearson Education2015. 2. Francis da Costa, ―Rethinking the Internet of Things: A Scalable Approach to Connecting Everything‖, Apress Publications 2013, 1stEdition. **3.** WaltenegusDargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice‖, Wiley 2014**.** 4. CunoPfister, ―Getting Started with the Internet of Things‖, 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	M	M	L
CO2	S	M	M	L
CO3	S	M	M	M
CO4	M	L	S	M
CO5	S	L	M	L

S- Strong , M- Medium , L – Low

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

COURSE OBJECTIVE:

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
Type	SBEC : 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.

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

COURSE OBJECTIVE:

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
CO2	Ability to create an integrated marketing communications plan which includes promotional strategies and measures of effectiveness.	K2
CO3	Ability to communicate the unique marketing mixes and selling propositions for specific product offerings.	K3
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.	K5

Subject Title	DIGITAL MARKETING	Semester	VI	
Subject Code	22UDS11	Specialization	NA	
Type	Elective : Theory	L:T:P:C	86:6:0:4	
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		K2	18
III	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		K3	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, ‖e-Marketing the Essential guide to marketing in a digital world‖, 5th Edition, 2017.			
Reference Books	https://ondigitalmarketing.com/learn/odm/			
Website /Link	https://mailchip.com/marketing-glossary/digital-marketing/			

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

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

COURSE OBJECTIVE:

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	K3
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	
Type	SBEC : Theory	L:T:P:C	86:6:0:4	
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.		K1	15
II	**The Listening process:** Types of listening – Listening with a purpose – Barriers to listening– The speech process – Conversion and oral skills – Body language.		K1,K2	17
III	**Job interviews:** Pre – interview preparation techniques – Interview questions – Answering strategies – Frequently asked interview questions – Projecting a positive image – Alternative interview formats.		K3	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.		K3,K4	18
V	**Presentation Skills:** Planning the presentation – Preparing the presentation – Organizing your presentation – Rehearsing the presentation – Improving delivery		K5	18
	Learning Resources			
Text Books	―Effective Technical Communication‖ , M. Ashraf Rizvi, Tata McGraw – Hill Publishing.			
Reference Books	1. ―Communication Skills‖, Sanjay Kumar, Pusp Lata, Oxford Higher Education, Second edition 2. Personality development & Soft skills‖, Barun.K.Mithra, Oxford Higher education			
Website / Link	https://www.monster.com/srticle/soft-skills-you-need/			

Mapping with Programme Outcomes

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

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

ANNEXURE III

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 emblem

COLLEGE NAME

(AFFILIATED TO PERIYAR UNIVERSITY)

PLACE with Pin Code

MONTH – YEAR

B. Format of the Certificate

Name and Address of the Internal Guide

Date

CERTIFICATE

This is to certify that the Project Work entitled _____ submitted in partial fulfillment of the requirements for the award of the degree of Bachelor of Science in Data Sciences to Periyar University, Salem is a record of bonafide work carried out by .....…… Reg. No. .....under my supervision and guidance.

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
Type	Elective : Theory	L:T:P:C	71:5:0:4

COURSE OBJECTIVE:

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 Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of software Engineering.	K1
CO2	Understanding requirement analysis.	K1,K2
CO3	Apply software design.	K3
CO4	Evaluate with UML.	K4
CO5	Implement coding and testing.	K5

Subject Title	PAPER – I SOFTWARE ENGINEERING	Semester	V	
Subject Code	22UDSE01	Specialization	NA	
Type	Elective : Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	Introduction – Evolution – Software Development projects – Emergence of Software Engineering. Software Life cycle models – Waterfall model – Rapid Application Development – Agile Model – Spiral Model		K1	15
II	Requirement Analysis and Specification – Gathering and Analysis – SRS – Formal System Specification		K1,K2	15
III	Software Design – Overview – Characteristics – Cohesion & Coupling – Layered design – Approaches Function Oriented Design – Structured Analysis – DFD – Structured Design – Detailed design		K3	15
IV	Object Modeling using UML – OO concepts – UML – Diagrams – Use case, Class, Interaction, Activity, State Chart – Postscript		K4	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*‖, PHI 2018, 5th Edition.			
Reference Books	1. Roger S. Pressman, ―*Software Engineering - A Practitioner's Approach*‖, McGraw Hill 2010, 7th Edition. 2. 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/			

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

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

COURSE OBJECTIVE:

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 Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of Graphics system.	K1
CO2	Understanding scan system and I/O Devices.	K2
CO3	Apply 2D Transformations.	K3
CO4	Evaluate 3D Transformations.	K4
CO5	Implement visual surface techniques.	K5

Subject Title	PAPER – II COMPUTER GRAPHICS	Semester	V	
Subject Code	22UDSE02	Specialization	NA	
Type	Elective : Theory	L:T:P:C	86:6:0:4	
Unit	Contents		Levels	Sessions
I	Overview of graphics Systems: Video Display Device – Refresh Cathode-Ray tubes Raster – Scan Displays Random – Scan Displays – Color CRT Monitors –Direct view Storage tubes Flat – Panel Displays Three – Dimensional Viewing Devices. Stereoscopic and Virtual – Reality Systems.		K1	15
II	Raster – Scan Systems Video Controller – Random – Scan Systems Video Controller – Random-Scan Systems – Input device – Keyboard Mouse – Trackball and Space ball . Joysticks – Data Glove – Digitizers- Image Scanners – Touch Panels – Light pens. Voice Systems – Hard-Copy Devices – Line Drawing Algorithms DDA Algorithms – Circle generating Algorithm Properties of Ellipses		K2	17
III	Two Dimensional Geometric Transformation: Basic Transformations - Translation – Rotation – Scaling – Matrix Representations and Homogeneous Coordinates – Other Transformations Reflections Two Dimensional Viewing : Windows to view point coordinate Transformations – Clipping Operations – Point Clipping – Line Clipping – Curve Clipping – Text Clipping – Exterior Clipping.		K3	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.		K4	18
V	Visible Surface Detection Methods : Classification Visible Surface Detection Algorithms – Back Face Detection – Depth – Buffer Method – A-Buffer Method – Scan line method – Depth sorting method – BSP tree method – Area Subdivision Method.		K5	18
	Learning Resources			
Text Books	Donald Hearn &M.Pauline Baker , ―Computer Graphics‖,2nd Edition, 1996			
Reference Books	John f. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, Kurt Akeley, ―*Computer Graphics* Principles and Practice‖			

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

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

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

COURSE OBJECTIVE:

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
CO1	Remember the basic concepts of data mining and data preprocessing.	K1
CO2	Understanding the data mining primitives.	K2
CO3	Apply mining association rule.	K3
CO4	Evaluate classification and Prediction.	K4
CO5	Implement cluster analysis.	K5

Subject Title	PAPER III DATA MINING	Semester	V	
Subject Code	22UDSE03	Specialization	NA	
Type	Elective : Theory	L:T:P:C	71:5:0:4	
Unit	**Contents**		**Levels**	**Sessions**
I	Introduction: Data mining application – data mining techniques – data mining case studies- the future of data mining – data mining software - Association rules mining: basics- task and a naïve algorithm- Apriori algorithm – improve the efficient of the Apriori algorithm – mining frequent pattern without candidate generation (FP-growth) – performance evaluation of algorithms.		K1	11
II	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.		K2	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.		K3	15
IV	Web data mining: Introduction- web terminology and characteristics- locality and hierarchy in the web- web content mining-web usage mining- web structure mining – web mining software - Search engines: Search engines functionality- search engines architecture – rankingof web pages.		K4	15

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.	**K5**	**15**

	Learning Resources
Text Books	G.K. Gupta, ―Introduction to Data mining with case studies‖, 2nd Edition, PHI Private limited, New Delhi, 2011
Reference Books	Arun K Pujari, ―Data Mining Techniques‖, 10th impression, University Press, 2008.
Website /Link	NPTEL & MOOC courses titled Data Mining 1. https://nptel.ac.in/courses/106105174/ 2. http://cecs.louisville.edu/datamining/PDF/0471228524.pdf

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

ELECTIVE II

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

COURSE OBJECTIVE:

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	
Type	Elective : Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	**Structuring Documents for the Web:** Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups. Links and Navigation: Basic Links, Creating Links with the <a> Element, Advanced E- mail Links. Images, Audio, and Video: Adding Images Using the <img> Element, Using Images as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your web pages.		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>.		K2	15
III	**Cascading Style Sheets:** Introducing CSS, Where you can Add CSS Rules. CSS Properties: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the Box Model. More Cascading Style Sheets: Links, Lists, Tables, Outlines, The :focus and :activate Pseudo classes Generated Content, Miscellaneous Properties, Additional Rules, Positioning and Layout wit, Page Layout CSS , Design Issues.		K1,K3	15
IV	**Java Script:** How to Add Script to Your Pages, Variables and Data Types – Statements and Operators, Control Structures, Conditional Statements, Loop Statements – Functions - Message box, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes		K3,K4	15
V	**Working with JavaScript:** Practical Tips for Writing Scripts, JavaScript Objects: Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Events, Event Handlers, Forms – Validations, Form Enhancements, JavaScript Libraries**.**		K5	11
	Learning Resources			
Text Books	Jon Duckett, ―Beginning HTML, XHTML, CSS and Java script‖ , Wiley Publishing			
Reference Books	1.Chris Bates, ―Web Programming‖, Wiley Publishing 3d Edition.			

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

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

Subject Title	PAPER - II CLOUD COMPUTING	Semester	VI
Subject Code	22UDSE05	Specialization	NA
Type	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 Engineering.	K1
CO2	Understanding requirement analysis.	K1,K2
CO3	Apply software design.	K3
CO4	Evaluate with UML.	K4
CO5	Implement coding and testing.	K5

Subject Title	PAPER - II CLOUD COMPUTING	Semester	VI	
Subject Code	22UDSE03	Specialization	NA	
Type	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.		K1	15
II	**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.		K1,K2	15
III	**Cloud Architecture- Layers and Models** Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.		K3	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			
Text Books	1. ―Cloud computing a practical approach‖ - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010 2. ―Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online‖ - Michael Miller - Que 2008			
Reference Books	1. ―Cloud computing for dummies‖- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010 2. ―Cloud Computing (Principles and Paradigms)‖, Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011			

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

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

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

COURSE OBJECTIVE:

1. To understand the complexityof 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	
Type	Elective : Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	**Basics of Neural Networks** Basic Concept of Neurons – Perceptron Algorithm – Feed Forward and Backpropagation Networks. Perceptron Training Rule, Gradient Descent Rule, Restricted Boltzmann Machines, Deep Belief Networks.		K1	15
II	**Activation Functions:** Sigmoid,ReLU, Hyperbolic Fns, Softmax, **Optimization and Regularization**: Adam optimization, Overfitting and Capacity, Cross Validation, Feature Selection, Regularization, Hyperparameter tuning.		K2	15
III	**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.		K5	11
	Learning Resources			
Text Books	1. Goodfellow, I., Bengio,Y., and Courville, A., ―Deep Learning‖, MIT Press, 2016. **Chapters 5-7,9-10,14,20.(Unit I-IV)** **2.** Li Deng and Dong Yu ., ―Deep Learning Methods and Applications, Foundations and Trends® in Signal Processing‖, 2014. **Chapters 7-8,10 (unit V).**			
Reference Books	1. Yegnanarayana, B., ―Artificial Neural Networks‖, PHI Learning Pvt. Ltd, 2009. 2. Bishop, C. ,M., ―Pattern Recognition and Machine Learning‖, Springer, 2006.			
Website/ Link	https://neuralnetworksand deeplearning.com			

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

ELECTIVE III

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

COURSE OBJECTIVE:

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of software project management.	K1
CO2	Understanding domain processes in project management.	K1,K2
CO3	Apply task and activities.	K3
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	
Type	Elective : Theory	L:T:P:C	86:6:0:4	
Unit	Contents		Levels	Sessions
I	Introduction to Competencies - Product Development Techniques - Management Skills - Product Development Life Cycle - Software Development Process and models - The SEI CMM - International Organization for Standardization.		K1	15
II	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.		K3	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		K5	18
	Learning Resources			
Text Books	Robert T. Futrell, Donald F. Shafer, Linda I. Safer, ―Quality Software Project Management‖, Pearson Education Asia 2002.			
Reference Books	1. PankajJalote, ―Software Project Management in Practice‖, Addison Wesley2002. 2. Hughes, ―Software Project Management‖, Tata McGraw Hill 2004, 3rd Edition.			
Website / Link	NPTEL & MOOC courses titled Software Project Management https://nptel.ac.in/courses/106/105/106105218/			

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

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

COURSE OBJECTIVE:

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 computing.	K1
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	
Type	Elective : Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	Introduction-Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC IssuesFixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes		K1	11
II	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
III	Mobile Telecommunication System-Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Tele communication System (UMTS).		K3	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.		K5	15
	Learning Resources			
Text Books	Prasant Kumar Pattnaik, Rajib Mall, ―Fundamentals of Mobile Computing‖, PHI Learning Pvt. Ltd, New Delhi 2012.			
Reference Books	1. Jochen H. Schller, ―Mobile Communications‖, Pearson Education, New Delhi, 2007, 2nd Edition. 2. Dharma PrakashAgarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd.2005. 3. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, ―Principles of Mobile Computing‖, Springer 2003.			

Website / Link	NPTEL & MOOC courses titled MobileComputing 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	M	S	M	L
CO2	S	M	M	L
CO3	S	M	M	L
CO4	M	S	M	L
CO5	S	M	L	L

S- Strong , M- Medium , L – Low

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

COURSE OBJECTIVE:

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 securitypractices.

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.	K3
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	
Type	Elective : Theory	L:T:P:C	86:6:0:4	
Unit	Contents		Levels	Sessions
I	OSI Security Architecture – Security attacks, services and mechanisms – Network security Model – Classical encryption techniques: Symmetric cipher model, Substitution techniques – Transposition techniques – Rotor machines – Steganography		K1	14
II	Number theory and finite fields: The Euclidean algorithm – Modular arithmetic - Groups, Rings and Fields – Finite fields of the Form GF (p) – Polynomial arithmetic – prime numbers – Fermat's and eulers theorems		K2	18
III	Block Ciphers and Data Encryption Standard: Traditional block cipher structure – Data Encryption – Strengths of DES – Block Cipher Design Principles – Advanced Encryption Standard – AES structure – AES transformation functions – AES Key expansion – implementation		K3	18
IV	Public Key Cryptography and RSA – Principles of Public-key Crypto systems – RSA algorithm - Diffie – Hellman Key exchange - Elgamal Cryptographic System		K4	18
V	Hash functions – Applications – two simple hash functions – Hash functions based on Cipher block chaining - Secure Hash Algorithm (SHA)		K5	18
	Learning Resources			
Text Books	William Stallings, ―Cryptography and Network Security: Principles and Practice‖, Pearson Education 2013,6th Edition.			
Reference Books	1. Behrouz A. F-erouzan, ―Cryptography & Network Security‖, Tata McGraw Hill 2007. 2. Man Young Rhee, ―Internet Security: Cryptographic Principles, Algorithms and Protocols‖, Wiley Publications 2003. 3. Charles Pfleeger, ―Security in Computing‖, Prentice Hall of India 2006, 4th Edition. 4. Ulysess Black, ―Internet Security Protocols‖, Pearson Education Asia 2000. 5. Charlie Kaufman and Radia Perlman, Mike Speciner, ―Network Security, Private Communication in Public World‖, PHI 2002, 2nd Edition.			
Website /Link	1. NPTEL & MOOC courses titled Network Security 2. https://nptel.ac.in/courses/106/105/106105031/			

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

NON MAJOR ELECTIVE COURSE (NMEC) - I

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

COURSE OBJECTIVE:

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.	K3
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	
Type	NMEC: Theory	L:T:P:C	26:2:0:2	
Unit	Contents		Levels	Sessions
I	Introduction to Computer: Introduction – Types of computers – Characteristics of Computers. Generations of Computers: First Generation – Second Generation – Third Generation – Fourth Generation – Fifth Generation. Classification of Digital Computers: Introduction – Microcomputers – Personal Computer – Portable Computers – Mini Computers – Super Computers – Main Frames.		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	5
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		K3	5
IV	Input Devices: Introduction – Keyboard – Mouse – Types of Mice – Connections – Mouse pad – Trackball – joystick – Digitizing Tablet – Scanners – Digital Camera – MICR – OCR – OMR – Bar Code Reader – Speech Input Device- Touch Screen – Touch Pad – Light Pen. Output Devices: Introduction – Monitor – Classification of Monitors – Monochrome – Gray Scale – Color – Digital Monitor – Analog Monitor – Characteristics of monitor – 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.		K5	6
	Learning Resources			
Text Books	Alexis Leon and Mathews Leon, ―Fundamentals of Computer Science and Communication Engineering‖, Leon Techworld, 1998.			
Reference Books	1. B. Ram and Sanjay Kumar, ―Computer Fundamentals‖, 5th Edition, New Age International Publishers, 2014. 2. Pradeep K Sinha, Priti Sinha, ―Computer Fundamentals‖, BPB Publications, 2004.			

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

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

NON MAJOR ELECTIVE COURSE (NMEC) - I

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

COURSE OBJECTIVE:

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.	K3
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	III	
Subject Code	22UDSN02	Specialization	NA	
Type	NMEC: Theory	L:T:P:C	26:2:0:2	
Unit	Contents		Levels	Sessions
I	Introduction to Computers: Introduction- Importance- History- Anatomy		K1	5
II	MS-Word: Basics –Do's and Don'ts – Menus – Commands – Tool Bars – Icons – Word Formatting Tool Bar		K2	5
III	MS-Excel: Basics – Do's and Don'ts – Menus – Commands – Tool Bars – Icons		K3	5
IV	MS-PowerPoint: Basics – Menus – Tool Bars – Navigation		K4	5
V	MS-Access: Introduction – Parts of an Window: - Creating a New Data Base – Table Wizard – Renaming – Saving the Database – Relationships – Query – Form – Reports – Exiting MS-Access		K5	6
	Learning Resources			
Text Books	Sanjay Saxena, ―MS-Office 2000 for everyone‖, Vikas Publishing House Pvt. Ltd, Reprint 2006			
Reference Books	1. Nellai Kannan, ―MS-Office‖, Nels Publications, 3rd Edition, 2004. 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/ Link	1. https://ptgmedia.pearsoncmg.com/images/9780735623026/samplepages/9780735623026.pdf 2. https://www.dit.ie/media/ittraining/msoffice/MOAC_Excel_2016_Core. pdf 3. https://ptgmedia.pearsoncmg.com/images/9780735697799/samplepages/9780735697799.pdf 2010			

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

NON MAJOR ELECTIVE COURSE (NMEC) – II

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

COURSE OBJECTIVE:

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.	K3
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	
Type	NMEC: Theory	L:T:P:C	26:2:0:2	
Unit	Contents		Levels	Sessions
I	Introduction To The Internet: Computer in Business – Networking – Internet -E-mail – Resource Sharing – Gopher – World Wide Web – Telnet – Bulletin Board Service – Wide Area Information Service.		K1	5
II	Internet Technologies: Modem - Internet addressing – Physical connections – Telephone Lines – Internet browsers – Internet Explorer – Netscape Navigator.		K2	5
III	Introduction to HTML: Designing a home page – HTML documents – Anchor tag – Hyper Links. Traditional text and formatting		K3	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		K4	5
V	Frames: Frameset – Targeted Links – No frame – Forms : Input, Text area, Select, Option.		K5	6
	Learning Resources			
Text Books	1. C Xavier, ―World Wide Web with HTML‖, Tata McGraw Hill Education, 2000. 2. 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, Teach Yourself Web Publishing with HTML‖.			
Website/ Link	https://www.codecademy.com/learn/learn-html/			

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	M	---
CO2	S	M	-	-
CO3	S	S	M	L
CO4	M	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**
Type	**NMEC: Theory**	**L:T:P:C**	**26:2:0:2**

COURSE OBJECTIVE:

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	
Type	NMEC: Theory	L:T:P:C	26:2:0:2	
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.		K1	5
II	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.		K2	5
III	Mastering Layers in Photoshop CS5:Exploring LAYERS Panel - Working with Layers -Organizing Layers Working with Opacity and Blend Modes - Working with Adjustment Layers - Masking in Photoshop CS5 - Setting the Current Foreground and Background Colors - Filling a Selection with the Current Foreground Color - Using the Content-Aware Feature - Exploring Drawing Tools - Exploring Painting Tools - Exploring Retouching Tools.		K3	5
IV	Working with Layer Styles and Filter Effects: Understanding Layer Styles - Working with Smart Objects - Understanding Filters.		K4	5
V	Animation, 3D, and Printing in Photoshop CS5:Working with Actions - Working with Automate Commands - Exploring 3D in Photoshop - Working with Animation in Photoshop CS5 - Printing in Photoshop CS5.		K5	6
	Learning Resources			
Text Books	C Kogent Learning Solutions Inc,―Photoshop CS5 in Simple Steps‖, Dreamtech Press, New Delhi, 2012.			
Reference Books	1. Brie Gyncild, ―Ado be Photoshop CS6 Classroom in a Book‖, Adobe Press/Peachpit, 2012 2. Lisa Danae Dayley, Brad Dayley, ―Adobe Photoshop Cs6 Bible‖, Wiley India Pvt Ltd. 3. Edward Bailey, ―Photoshop: 7 Ways to Use Adobe Photoshop Like a Pro‖, Create space Independent Publishing Platform			
Website/ Link	1. www.online_image_editor.com 2. www.cs5_on_demand_sampler.pdf			

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

ALLIED OPTION I

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

COURSE OBJECTIVE:

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	
Type	Allied: Theory	L:T:P:C	86:6:0:4	
Unit	Contents		Levels	Sessions
I	Introduction to Computer: Introduction – Types of computers – Characteristics of Computers. Generations of Computers: First Generation – Second Generation – Third Generation – Fourth Generation – Fifth Generation. Classification of Digital Computers: Introduction – Microcomputers – Personal Computer – Portable Computers – Mini Computers – Super Computers – Main Frames.		K1	17
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	17
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.		K3	17
IV	Input Devices: Introduction – Keyboard – Mouse – Types of Mice – Connections – Mouse pad – Trackball – joystick – Digitizing Tablet – Scanners – Digital Camera – MICR – OCR – OMR – Bar Code Reader – Speech Input Device- Touch Screen – Touch Pad – Light Pen. Output Devices: Introduction – Monitor – Classification of Monitors – Monochrome – Gray Scale – Color – Digital Monitor – Analog Monitor – Characteristics of monitor – Printers.		K4	17
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.		K5	18
	Learning Resources			
Text Books	Alexis Leon and Mathews Leon, ―Fundamentals of Computer Science and Communication Engineering‖, Leon Techworld, 1998.			
Reference Books	1. B Ram and Sanjay Kumar, ―Computer Fundamentals‖, 5th Edition, New Age International Publishers, 2014. 2. Pradeep K Sinha, PritiSinha, ―Computer Fundamentals‖, BPB Publications, 2004. Anita Goel, ―Computer Fundamentals‖, 1st Edition, Pearson Education India, 2010\			

Website/ Link	1. https://www.gopeople.edu/blog/the_basics_of_computer_science_how_to_get_started 2. www.tutorialspoint.com-basics_of_computer

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

Subject Title	COMPUTER APPLICATIONS IN OFFICE	Semester	II/IV
Subject Code	22UDSA02	Specialization	NA
Type	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
CO1	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	
Type	Allied: Theory	L:T:P:C	56:4:0:4	
Unit	**Contents**		**Levels**	**Sessions**
I	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		K1	10
II	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.		K2	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.		K3	12
IV	MS-Access: Introduction – Parts of an Window: - Creating a New Data Base – Table Wizard – Renaming – Saving the Database – Relationships – Query – Form – Reports – Exiting 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.		K5	12
	Learning Resources			
Text Books	1. ―Step by Step 2007 Microsoft Office System‖ -Joyce Cox and Team ,PHI learning Private ltd,Newdelhi 2009			

	2. Sanjay Saxena, ―MS-Office 2000 for everyone‖, Vikas Publishing House Pvt. Ltd, Reprint 2006
Reference Books	1. NellaiKannan, ―MS-Office‖, Nels Publications, 3rd Edition, 2004. 2. John Walkenbach, Herb Tyson, Michael R.Groh, FaitheWempen and Lisa A.Bucki , ― Microsoft Office 2010 Bible ―, Wiley India Pvt. Ltd , Reprint 2010
Website/ Link	https://ptgmedia.pearsoncmg.com/images/9780735623026/samplepages/9780735623026.pdf https://www.dit.ie/media/ittraining/msoffice/MOAC_Excel_2016_Core. pdf https://ptgmedia.pearsoncmg.com/images/9780735697799/samplepages/9780735697799.pdf 2010

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

Subject Title	OFFICE AUTOMATION LAB	Semester	II/IV
Subject Code	22UDSAP01	Specialization	NA
Type	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.

ALLIED OPTION II

Subject Title	DATABASE SYSTEMS	Semester	I/III
Subject Code	22UDSA03	Specialization	NA
Type	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.	K3
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	
Type	Allied: Theory	L:T:P:C	86:6:0:4	
Unit	Contents		Levels	Sessions
I	Introduction to Databases – Introduction - Characteristics of the Database Approach -Advantages of Using the DBMS Approach -A Brief History of Database Applications.		K1	15
II	Database Systems Concept and Architecture : Data Models, Schemas, and Instances - Three Schema Architecture and Data Independence - Database Languages and Interfaces- - The Database System Environment - Centralized and Client/Server Architectures for DBMSs- Classification of Database Management 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.		K3	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.		K4	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.		K5	18
	Learning Resources			
Text Books	RamezElmasri and Shamkant B. Navathe, ―Fundamentals of databasesystems‖,6th Edition, Addison-Wesley Publication, 2011.			
Reference Books	Raghu Ramakrishnan, Madison,JohannesGehrke,―Database Management Systems‖, 3rd Edition, McGraw-Hill Higher Education, 2003.			
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	M	M
CO2	S	M	L	S
CO3	S	M	L	M
CO4	M	S	M	M
CO5	S	M	L	L

S- Strong , M- Medium , L – Low

Subject Title	E-COMMERCE TECHNIQUES	Semester	II/IV
Subject Code	22UDSA04	Specialization	NA
Type	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.	K3
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	
Type	Allied: Theory	L:T:P:C	56:4:0:4	
Unit	Contents		Levels	Sessions
I	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
II	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.		K2	12
III	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.		K3	12
IV	HTML and Web Designing: Brief History of HTML – HTML Tags – Table Creation – Hyperlink – Reference – Headings – Alignment - Simple Web Page Creation.		K4	10
V	E-mail: Email – Email Components - use of Email–Email creation–browsing–search engines–downloads.		K5	10
	Learning Resources			
Text Books	1. P.T.Joseph, ―E-Commerce - An Indian Perspective‖, 4th Edition, PHI Learning, 2012. 2. C Xavier, ―World Wide Web Design with HTML‖, 13th Reprint, Tata McGraw Hill, 2006. 3. A.Leon and M.Leon, ―Introduction to Information Technology‖, 1stEdition, Vijay Nicole Publications, 2013.			
Reference Books	1. David Whiteley, ―E-Commerce Strategy, Technologies and Applications‖, 1st Edition, Tata Mc-Graw-Hill, 2001. 2. Kamalesh K Bajaj and Debjani Nag, ―E-Commerce – The cutting edge of Business‖,			

	2nd Edition, Tata McGraw-Hill Education, 2005. 3. Alexis Leon and Mathews Leon, ―Internet for Everyone‖, 15th Anniversary Edition, Leon Tech world, UBS Publications, 2012. 4. RitendraGoel, ―e-commerce‖, 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=6apoxl=z4nwc

Mapping with Programme Outcomes

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

S- Strong , M- Medium , L – Low

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
Type	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.