DEPARTMENT OF COMPUTER SCIENCE WITH DATA ANALYTICS

Nallamuthu Gounder Mahalingam College
(Autonomous)
(An ISO 9001:2015 Certified Institution)
Re-Accredited with 'B' Grade by NAAC
Pollachi-642001

RATIFIED SYLLABUS

B.Sc. COMPUTER SCIENCE WITH DATA ANALYTICS

BATCH 2024-2027

NGM COLLEGE

Vision

Our dream is to make the College an institution of excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong, spiritually evolved and culturally rich citizens to contribute to the holistic development of the self and society.

Mission

Training students to become role models in academic arena by strengthening infrastructure, upgrading curriculum, developing faculty, augmenting extension services and imparting quality education through an enlightened management and committed faculty who ensure knowledge transfer, instill research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

DEPARTMENT OF COMPUTER SCIENCE WITH DATA ANALYTICS

Vision

To prepare the next generation of practitioners and researchers for a data centric world and to achieve the academic excellence and research in the field of Data Science and Analytics at the national and global levels.

Mission

- To develop professionals who are skilled in the area of Data science and analytics
- To impart quality and value-based education and contribute towards the innovation of computing expert systems.
- To apply new advancements in high performance computing hardware and software

Program Educational Objectives

Program Educational Objectives (PEOs)	
The B.Sc. Computer Science with Data Analytics program describe accomplishments that graduates are expected to attain within five to seven years after graduation.	
PEO1	Develop in depth understanding of the key technologies in data science and business analytics: data mining, machine learning, visualization techniques, predictive modeling, and statistics
PEO2	Apply principles of Data Science to the analysis of business problem
PEO3	Demonstrate knowledge of statistical data analysis techniques utilized in business decision making.
PEO4	To enhance communicative skill and inculcate the spirit through professional activities and to solve the complex problems in data analysis
PEO5	To embed human values and professional ethics in the young minds and contribute towards nation building

Program Outcomes:

Programme Outcomes (POs)	
On successful completion of the B.Sc. Computer Science with Data Analytics	
PO1	**Disciplinary knowledge:** Capable to apply the knowledge of mathematics, algorithmic principles and computing fundamentals in the modeling and design of computer based systems of varying complexity.
PO2	**Scientific reasoning/ Problem analysis:** Ability to critically analyze, categorizes, formulate and solve the problems that emerges in the field of computer science with Data Analytics
PO3	**Problem solving:** Able to provide software solutions for complex Data Analysis problems or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations
PO4	**Environment and sustainability:** Understand the impact of software solutions in environmental and societal context and strive for sustainable development
PO5	**Modern tool usage:** Use contemporary techniques, skills and tools necessary for integrated solutions
PO6	**Ethics:** Function effectively with social, cultural and ethical responsibility as an individual or as a team member with positive attitude**.**
PO7	**Cooperation / Team Work:** Function effectively as member or leader on multidisciplinary teams to accomplish a common objective.
PO8	**Communication Skills**: An ability to communicate effectively with diverse types of audience and also able to prepare and present technical documents to different groups.
PO9	**Self-directed and Life-long Learning:** Graduates will recognize the need for self-motivation to engage in lifelong learning to be in par with changing technology
PO10	**Research:** Enhance the research culture and uphold the scientific integrity and objectivity.

Program Specific Outcomes:

Program Specific Outcomes (PSOs)	
After the successful completion of **B.Sc. Computer Science with Data Analytics** program, the students are expected to	
PSO1	**Latest Technology Exposure:** Impart education with domain knowledge and key technologies in data science and business analytics like data mining, machine learning, No SQL, visualization techniques, predictive modeling, and statistics effectively and efficiently in par with the expected quality standards for Data analyst professional.
PSO2	**Critical Thinking:** Ability to apply the mathematical, technical and critical thinking skills in the discipline of Data analytics to find solutions for complex problems.

Mapping

PEOs / POs \ PSOs	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	H	H	H	L	L
PO2	H	H	H	L	L
PO3	H	H	H	H	L
PO4	L	M	M	M	L
PO5	M	M	M	H	M
PO6	L	L	M	H	L
PO7	M	M	M	H	M
PO8	L	L	L	H	M
PO9	M	M	M	H	L
PO10	M	M	M	M	L
PSO1	H	H	H	M	L
PSO2	H	H	H	H	M

B.SC. COMPUTER SCIENCE WITH DATA ANALYTICS

(FOR THE CANDIDATES ADMITTED FROM THE ACADEMIC YEAR 2024 - 2025 ONWARDS)

I to VI SEMESTERS

SCHEME OF EXAMINATIONS

SEMESTER - I										
Part	**Subject Code**	**Title of the Paper**	**Hrs. / Week**		**Hrs. / Sem.**	**Exam Hrs.**	**Maximum Marks**		**Total Marks**	**Credits**
			L	**P**	**T**		**Internal**	**External**		
I	24UTL1C1	Tamil Paper-I	5	-	75	3	25	75	100	3
	24UHN1C1	Hindi Paper-I								
	24UFR1C1	French Paper-I								
II	24UEN101 / 24UEN102	Communication Skills – I (Level I) / Communication Skills – I (Level II)	5	-	75	3	25	75	100	3
III	24UDA101	**Core Course I:** Programming in C	5		75	3	25	75	100	4
	24UDA102	**Core Course II:** Digital Electronics	4		60	3	25	75	100	4
	24UDA1A1/ 24UDA1A2	**Generic Elective – Allied I:** Mathematical Foundation for Data Science/ Numerical Methods	4		60	3	25	75	100	4
	24UDA103	**Core Course Lab I:** Programming Lab in C		4	60	3	20	30	50	2
IV	24EVS101	**AECC I:** Environmental Studies	2	-	30	2	-	50	50	2
	24HEC101	Human Excellence - Personal Values & SKY Yoga Practice - I	1	-	15	2	20	30	50	1
V		Extension Activities – Annexure I	-	-	-	-	-	-	-	-
EC		Online Course (Optional) (MOOC / NPTEL / SWAYAM)								Grade
Total			**30**						**650**	**23**

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course
CC – Core Course; GE – Generic Elective; AECC - Ability Enhancement Compulsory Course

SEMESTER - II										
Part	**Subject Code**	**Title of the Paper**	**Hrs. / Week**		**Hrs. / Sem.**	**Exam Hrs.**	**Maximum Marks**		**Total Marks**	**Credits**
			L	**P**	**T**		**Internal**	**External**		
I	24UTL2C2	Tamil Paper-II	5	-	75	3	25	75	100	3
	24UHN2C2	Hindi Paper-II								
	24UFR2C2	French Paper-II								
II	24UEN202 / 24UEN203	Communication Skills – II (Level I) / Communication Skills – II (Level II)	5	-	75	3	25	75	100	3
III	24UDA204	**Core Course III:** Java Programming	4		60	3	25	75	100	4
	24UDA205	**Core Course IV:** Data Structures	4		60	3	25	75	100	4
	24UDA2A1/ 24UDA2A2	**Generic Elective Allied II:** Statistics and Probability/ Optimization Techniques	4		60	3	25	75	100	4
IV	24UDA206	**Core Course Lab II:** Programming Lab in Java		5	75	3	20	30	50	2
	24UDA2S1/ 24UDA2S2	**SEC I: Naan Mudhalvan** Data Analysis using Excel/ Microsoft Office Automation Tools		2	30	2	-	50	50	2
	24HEC202	Human Excellence - Family Values & SKY Yoga Practice - II	1		15	2	20	30	50	1
V		Extension Activities - Annexure I	-	-	-	-	-	-	-	-
EC	24CMM201	Manaiyiyal Mahathuvam - I			15 Hrs.	2	-	50	50	Grade
	24CUB201	Uzhavu Bharatham - I			15 Hrs.	2	-	50	50	Grade
		Online Course (Optional) (MOOC / NPTEL / SWAYAM)								Grade
	24UDA2VA	**VAC I:**			30 Hrs.					2*
					45 Hrs.					3*
Total			**30**						**650**	**23**

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course
CC – Core Course; GE – Generic Elective; AECC - Ability Enhancement Compulsory Course;
SEC – Skill Enhancement Course

SEMESTER - III										
Part	**Subject Code**	**Title of the Paper**	**Hrs. / Week**		**Hrs. / Sem.**	**Exam Hrs.**	**Maximum Marks**		**Total Marks**	**Credits**
			L	**P**	**T**		**Internal**	**External**		
I	24UTL3C3	Tamil Paper-III	3	-	45	3	25	75	100	3
	24UHN3C3	Hindi Paper-III								
	24UFR3C3	French Paper-III								
II	24UEN3C3	Communication Skills – III	3	-	45	3	25	75	100	3
III	24UDA307	**Core Course V:** Problem Solving using Python	5		75	3	25	75	100	4
	24UDA308	**Core Course VI:** RDBMS	4		60	3	25	75	100	4
	24UDA3A1/ 24UDA3A2	**Generic Elective-Allied III:** Introduction to Linear Algebra/ Applied Statistics	4		60	3	25	75	100	4
	24UDA309	**Core Course Lab III** Programming Lab in Python		4	60	3	20	30	50	2
	24UDA310	**Core Course Lab IV**: RDBMS Lab		4	60	3	20	30	50	2
IV	24UDA3N1/ 24UDA3N2	**NME I:** Web Designing using HTML and CSS/ Adobe Photoshop		2	30	2	-	50	50	2
	24HEC303	Human Excellence - Professional Values & Ethics - SKY Yoga Practice - III	1	-	15	2	20	30	50	1
V		Extension Activities - Annexure I	-	-	-	-	-	-	-	-
EC	24CMM302	Manaiyiyal Mahathuvam - II			15 Hrs.	2	-	50	50	Grade
	24CUB302	Uzhavu Bharatham - II			15 Hrs.	2	-	50	50	Grade
Total			**30**						**700**	**25**

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course
CC – Core Course; GE – Generic Elective; VAC-Department Specific Value-Added Course;
*Extra Credits;

SEMESTER - IV										
Part	**Subject Code**	**Title of the Paper**	**Hrs. / Week**		**Hrs. / Sem.**	**Exam Hrs.**	**Maximum Marks**		**Total Marks**	**Credits**
			L	**P**	**T**		**Internal**	**External**		
I	24UTL4C4	Tamil Paper-IV	3	-	45	3	25	75	100	3
	24UHN4C4	Hindi Paper-IV								
	24UFR4C4	French Paper-IV								
II	24UEN4C4	Communication Skills – IV	3	-	45	3	25	75	100	3
III	24UDA411	**Core Course VII:** R Programming	4		60	3	25	75	100	3
	24UDA412	**Core Course VIII:** Data Mining & Warehousing	4		60	3	25	75	100	3
	24UDA4A1/ 24UDA4A2	**Generic Elective-Allied IV:** Introduction to Data Science / Business Intelligence	4		60	3	25	75	100	3
	24UDA413	**Core Course Lab V:** Programming Lab in R		4	60	3	20	30	50	2
	24UDA414	**Core Course Lab VI** Data Mining Lab		3	45	3	20	30	50	2
IV	24UDA4S1/ 24UDA4S2	**SEC II: Naan Mudhalvan** UI Web Development/ Exploratory Data Analysis		2	30	2	-	50	50	2
	24UDA4N1/ 24UDA4N2	**NME II**: Data Analysis using Excel/ Microsoft Office Automation Tools		2	30	2	-	50	50	2
	24HEC404	Human Excellence - Social Values & SKY Yoga Practice - IV	1	-	15	2	20	30	50	1
V		Extension Activities - Annexure I	-	-	-	-	-	-	50	1
EC	24CMM403	Manaiyiyal Mahathuvam - III			15 Hrs.	2	-	50	50	Grade
	24CUB403	Uzhavu Bharatham - III			15 Hrs.	2	-	50	50	Grade
	24UDA4VA	**VAC II:**			30 Hrs.					2*
					45 Hrs.					3*
Total			**30**						**800**	**25**

SEMESTER - V									
Part	**Subject Code**	**Title of the Paper**	**Hrs. / Week**		**Hrs. / Sem.**	**Exam Hrs.**	**Maximum Marks**		**Total Marks**	**Credits**
			L	**P**	**T**		**Internal**	**External**		
III	24UDA515	**Core Course IX:** Big Data Analytics	6			3	25	75	100	4
	24UDA516	**Core Course X:** Data Visualization	6			3	25	75	100	4
	24UDA5E1 / 24UDA5E2 / 24UDA5E3	**Discipline Specific Elective I:** Computer Networks / IOT/ Cybersecurity	5			3	25	75	100	4
	24UDA517	**Core Course Lab VII**: Big Data Lab		5		3	20	30	50	3
	24UDA518	**Core Course Lab VIII:** Data Visualization Lab		5		3	20	30	50	3
IV	24UDA5S1/ 24UDA5S2	**SEC III:** Quantitative Aptitude/AI and Chatbot development using Python	2			2	-	50	50	2
	24HEC505	Human Excellence - National Values & SKY Yoga Practice - V	1	-		2	20	30	50	1
EC	24CSD501	Soft Skills Development - I								Grade
	24GKL501	General Awareness - Self Study	SS		-	2	-	50	50	Grade
	24UDA5AL	**ALC - I** : Data Mining using Weka Tool	SS					100	100	Credits**
Total			**30**						500	21

Discipline Specific Elective (DSE) – I

24UDA5E1: Computer Networks
24UDA5E2: IOT
24UDA5E3: Cybersecurity

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course
CC – Core Course; DSE – Discipline-Specific Elective; SEC – Skill Enhancement Course
ALC-Advanced Learner Course (Optional)

*Extra Credits; **Credits – Based on course content maximum of 4 credits

SEMESTER - VI										
Part	**Subject Code**	**Title of the Paper**	**Hrs. / Week**		**Hrs. / Sem.**	**Exam Hrs.**	**Maximum Marks**		**Total Marks**	**Credits**
			L	**P**	**T**		**Internal**	**External**		
III	24UDA619	**Core Course XI:** Full Stack Development	5			3	25	75	100	4
	24UDA6E4 / 24UDA6E5 / 24UDA6E6	**Discipline Specific Elective II:** Machine Learning Algorithms/ Predictive Analysis/ Social Media Analysis	5			3	25	75	100	4
	24UDA6E7 / 24UDA6E8 / 24UDA6E9	**Discipline Specific Elective III:** Cloud Computing/ Next Generation Database/ Block chain Technology	5			3	25	75	100	4
	24UDA620	**Core Course Lab IX** Full Stack Development Lab		6		3	20	30	50	2
	24UDA621	**Core Course Lab X:** Machine Learning Lab		6		3	20	30	50	2
	24UDA622	**Core Course XII:** Major Project					25	75	100	4
IV	24UDA6S1/ 24UDA6S2	**SEC IV: Naan Mudhalvan** Gen AI and Prompt Engineering / Industry 4.0		2		2	-	50	50	2
	24HEC606	Human Excellence - Global Values & SKY Yoga Practice - VI	1	-		2	20	30	50	1
EC	24CSD602	Soft Skills Development - II								Grade
	24UDA6AL	**ALC - II**: Software Engineering	SS					100	100	Credits**
Total			**30**						**600**	**23**
Grand Total									**3900**	**140**

Discipline Specific Elective (DSE) – II ##

24UDA6E4: Machine Learning
24UDA6E5: Predictive Analysis
24UDA6E6: Social Media Analysis

Discipline Specific Elective (DSE) – III ###

24UDA6E7: Cloud Computing
24UDA6E8: Next Generation Database
24UXX6E9: Block chain Technology

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course
CC – Core Course; DSE – Discipline-Specific Elective; SEC – Skill Enhancement Course
ALC-Advanced Learner Course (Optional)
*Extra Credits; **Credits – Based on course content maximum of 4 credits

List of Abbreviations:

CC – Core Course
GE – Generic Elective
AECC – Ability Enhancement Compulsory Course
SEC – Skill Enhancement Course
DSE – Discipline-Specific Elective
VAC –Value Added Course
ALC – Advanced Learner Course

Grand Total = 3900; Total Credits = 140

Question Paper Pattern

(Based on Bloom's Taxonomy)

K1-Remember; **K2**- Understanding; **K3**- Apply; **K4**-Analyze; **K5**- Evaluate

1. Theory Examinations: 75 Marks (Part I, II, & III)

(i) Test- I & II, ESE:

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1 - 10)	A (Q1 – 5 MCQ) (Q6 – 10 Define / Short Answer / MCQ)	10 * 1 = 10	MCQ / Define	**75**
K3 (Q11-15)	B (Either or pattern)	5 * 5 = 25	Short Answers	
K4 & K5 (Q16 – 20)	C (Either or pattern)	5 * 8 = 40	Descriptive/ Detailed	

2. Theory Examinations: 38 Marks (3 Hours Examination) (Part III: If applicable)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1 - 10)	A (Q 1 – 10 MCQ)	10 * 1 = 10	MCQ	**50 (Reduced to 38)**
K3 (Q11 – 15)	B (Either or pattern)	5 * 3 = 15	Short Answers	
K4 & K5 (Q16-20)	C (Either or pattern)	5 * 5 = 25	Descriptive/ Detailed	

3. Theory Examinations: 38 Marks (2 Hours Examination) (Part IV: If applicable)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1-10)	A (Q1 – 5 MCQ) (Q6–10 Define / Short Answer)	10 * 1 = 10	MCQ / Define	**50 (Reduced to 38)**
K3, K4 & K5 (Q11-15)	B (Either or pattern)	5 * 8 = 40	Descriptive/ Detailed	

4. Practical Examinations:

Paper	Maximum Marks	Marks for		Components for CIA		
		CIA	CEE	Tests	Observation Note	Record Note
Practical (Core / Elective)	50	20	30	10	05	05
Practical (Core / Elective)	75	30	45	20	05	05
Practical (Core / Elective)	100	40	60	30	05	05

5. Project:

Paper	Maximum Marks	Marks for		
		CIA	CEE	
			Evaluation	Viva-voce
Project	100	25	50	25
Project	150	40	75	35
Project	200	50	100	50

***** CIA – Continuous Internal Assessment & CEE – Comprehensive External Examinations

Components of Continuous Internal Assessment (CIA)

THEORY

Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;

Components		Calculation	CIA Total
Test 1	75	(75+75+15+10)/7	25
Test 2 / Model	75		
Assignment / Digital Assignment	15		
Others*	10		

*Others may include the following: Seminar / Socratic Seminars, Group Discussion, Role Play, APS, Class participation, Case Studies Presentation, Field Work, Field Survey, Term Paper, Workshop / Conference Participation, Presentation of Papers in Conferences, Quiz, Report / Content Writing, etc.

Maximum Marks: 50; CIA Mark: 12; CEE Mark: 38; (Part III: If applicable)

Components		Calculation	CIA Total
Test 1	50	(50+50+10+10)/10	12
Test 2 / Model	50		
Assignment / Digital Assignment	10		
Seminar	10		

PROJECT

Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;

Components		Calculation	CIA Total
Review I	5	5+5+5+10	25
Review II	5		
Review III	5		
Report Submission	10		

Maximum Marks: 200; CIA Mark: 50; CEE Mark: 150;

Components		Calculation	CIA Total
Review I	10	10+ 10+10+20	50
Review II	10		
Review III	10		
Report Submission	20		

** Components for 'Review' may include the following:*

Originality of Idea, Relevance to Current Trend, Candidate Involvement, and Presentation of Report for Commerce, Management & Social Work.

Synopsis, System Planning, Design, Coding, Input form, Output format, Preparation of Report & Submission for Computer Science cluster.

Continuous Internal Assessment for Project

For Computer Science Cluster

Maximum Marks: 100 Marks

Components for CIA: 25 Marks

Criterion	Mode of Evaluation	Marks	Total
I	Synopsis, Company Profile, System Specification, Existing System, Proposed System OR (For Android Developments) Planning Stage	05	25
II	Supporting Diagrams like system flowchart, ER, DFD, Usecase and Table Design OR UI and UX Design Application Architect and Prototyping	05	
III	Coding, Input forms, Output format, Testing OR Development, Testing	05	
IV	Preparation of Report & Submission	10	

Components for CEE: 75 Marks

Components for CEE	Marks	Total	Grand Total
Evaluation			75
Title Relevance of the Industry/Institute	10	50	
Technology	10		
Design and Development Publishing	10		
Testing, Report	20		
Viva Voce			
Project Presentation	10	25	
Q&A Performance	15		

COMPUTER SCIENCE PROJECT and VIVA VOCE

Guidelines

Introduction

The title of the project work and the organization will be finalized at the end of the fifth Semester. Each student will be assigned with a Faculty for guidance. The Project work and coding will be carried by using the facility of the computer science lab as well as in the organization. The periodical review will be conducted to monitor the progress of the project work. The project report will be prepared and submitted at the end of the semester. An external examiner appointed by the Controller of Examination will conduct the viva voce examination along with a respective guide.

Area of Work

- Web Based Development
- Mobile app development
- Website development
- IoT Projects
- Big Data and Data Mining Projects
- Cloud Computing Projects
- Networking Projects

- Artificial Intelligence and Machine learning Projects
- Data Analytics Projects using Python, R, Tableau etc.
- System Software
- Web Security Projects
- Image Processing

Methodology

Arrangement of Contents:

The sequence in which the project report material should be arranged and bound is as follows:

1. Cover Page & Title Page
2. Bonafide Certificates
3. Declaration
4. Acknowledgement
5. Synopsis
6. Table of Contents
7. Chapters
8. Appendix
9. References

Format of Table of Contents

TABLE OF CONTENTS

Size of the Project

The Project Report contents should be a maximum of not exceeding 70 pages.

STUDENT SEMINAR EVALUATION RUBRIC

Grading Scale:

A	B	C	D
8-10	5-7	3-4	0-2

CRITERIA	A - Excellent	B - Good	C - Average	D - Inadequate
Organization of presentation	Information presented as an interesting story in a logical, easy-to-follow sequence	Information presented in logical sequence; easy to follow	Most of the information is presented in sequence	Hard to follow; sequence of information jumpy
Knowledge of the subject & References	Demonstrated full knowledge; answered all questions with elaboration **&** Material sufficient for clear understanding **AND** exceptionally presented	At ease; answered all questions **but** failed to elaborate **&** Material sufficient for clear understanding **AND** effectively presented	At ease with information; answered most questions **&** Material sufficient for clear understanding **but** not clearly presented	Does not have a grasp of information; answered only rudimentary Questions **&** Material not clearly related to the topic **OR** background dominated seminar
Presentation Skills using ICT Tools	Uses graphics that explain and reinforce text and presentation	Uses graphics that explain the text and presentation	Uses graphics that relate to text and presentation	Uses graphics that rarely support text and presentation
Eye Contact	Refers to slides to make points; engaged with the audience	Refers to slides to make points; eye contact the majority of the time	Refers to slides to make points; occasional eye contact	Reads most slides; no or just occasional eye contact
Elocution – (Ability to speak English language)	Correct, precise pronunciation of all terms The voice is clear and steady; the audience can hear well at all times	Incorrectly pronounces a few terms Voice is clear with few fluctuations; the audience can hear well most of the time	Incorrectly pronounces some terms Voice fluctuates from low to clear; difficult to hear at times	Mumbles and/or Incorrectly pronounces some terms Voice is low; difficult to hear

WRITTEN ASSIGNMENT RUBRIC

Grading Scale:

A	B	C	D	F
13-15	10-12	7-9	4-6	0-3

CRITERION	A - Excellent	B - Good	C - Average	D - Below Average	F - Inadequate
Content & Focus	Hits on almost all content exceptionally clear	Hits on most key points and the writing is interesting	Hits in basic content and writing are understandable	Hits on a portion of content and/or digressions and errors	Completely off track or did not submit
Sentence Structure & Style	∗ Word choice is rich and varies ∗ Writing style is consistently strong ∗ Students own formal language	∗ Word choice is clear and reasonably precise ∗ Writing language is appropriate to the topic ∗ Words convey intended message	∗ Word choice is basic ∗ Most writing language is appropriate to the topic ∗ Informal language	∗ Word choice is vague ∗ Writing language is not appropriate to the topic ∗ Message is unclear	∗ Not Adequate
Sources	Sources are cited and are used critically	Sources are cited and some are used critically	Some sources are missing	Sources are not cited	Sources are not at all cited
Neatness	Typed; Clean; Neatly bound in a report cover; illustrations provided	Legible writing, well-formed characters; Clean and neatly bound in a report cover	Legible writing, some ill-formed letters, print too small or too large; papers stapled together	Illegible writing; loose pages	Same as below standard
Timeliness	Report on time	Report one class period late	Report two class periods late	Report more than one week late	Report more than 10 days late

SEMESTER I

Course Objective

Programme Code:	B.Sc			**Programme Title:**	B. Sc Computer Science with Data Analytics	
Course Code:	24UDA101			**Title**	**Batch:**	2024 - 2027
					Semester:	I
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem** -	75	**Core Course I: Programming in C**	**Credits:**	4

To introduce the concepts of procedure-oriented programming and the various problem-solving skills and programming constructs of C programming

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remembering the history, importance and basic structure of C programming	K1
CO2	Interpret the concepts of variables, constants, operators and various types of expressions	K2
CO3	Apply the concept of Decision-making statements and looping constructs for solving basic programs	K3
CO4	Use the concepts of files and pointers inside a C program	K4
CO5	Develop programs incorporating all the C language constructs	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	M	L	H	H
CO3	M	H	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	L	H	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Introduction to Computing:** Components of a computer – Concepts of hardware and software – Art of programming through Algorithms and Flowcharts. **Overview of C:** History of C – Importance of C – Basic structure of C Program – Programming Style – Executing a C Program. **Constants, Variables and Data Type**s: Introduction - Character set - C tokens - keyword & Identifiers - Constants - Variables - Data types - Declaration of variables – Declaration of Storage Class - Assigning values to variables - Defining Symbolic Constants – Declaring a variable as constant – Declaring a variable as Volatile	14
Unit II	**Operators and Expressions:** Arithmetic, Relational, Logical, Assignment, Conditional, Bitwise, Special, Increment and Decrement operators- Arithmetic Expressions- Evaluation of expression- precedence of arithmetic operators- Type conversion in expression–operator precedence & associativity– Mathematical functions. **Managing Input and Output Operations**: Reading & Writing a character - Formatted input and output	14
Unit III	**Decision Making and Branching**: Introduction – simple if, if….else, nesting of if…else statements - else if ladder –The switch statement, The ?: Operator – The goto Statement. **Decision Making and Looping**: Introduction-The while statement- the do statement–the for statement- jumps in loops – Concise test Expression **Arrays:** Introduction – One dimensional array – Declaration of one dimensional array – Initialization of one dimensional array – Two dimensional array – Initializing two dimensional array – Multidimensional arrays – Dynamic arrays	15
Unit IV	**Character Arrays and Strings:** Introduction – Declaring and Initializing string variables – Reading String from terminal – Writing String to Screen – Arithmetic Operations on Characters – Putting Strings together – Comparison of two Strings – String handling functions – Table of Strings. **User-Defined Functions:** Introduction–Need for User-Defined Functions-A multi-function program – Elements of User-Defined Functions - Definition- Return values and their types – Function Calls– Function Declarations–Category of Functions-Nesting of Functions- Recursion – Passing Arrays to Functions – Searching and Sorting - Passing String to Functions - The Scope, Visibility and Life time of Variables- Multi file Programs **Structures and Unions:** Introduction – Defining a Structure – Declaring Structure variable – Accessing structure member – Structure Initialization – Copying and Comparing Structure Variables – Operations on Individual Members – Array of Structures – Arrays within Structures – Structures within Structures - Structures and Functions – Unions – Size of Structures – Bit Fields	16
Unit V	**Pointers:** Introduction- Understanding pointers-Accessing the address of a variable-Declaration and Initialization of pointer Variable – Accessing a variable through its pointer-Chain of pointers- Pointer Expressions – Pointer Increments and Scale factor- Pointers and Arrays- Pointers and Character Strings – Array of pointers – Function that return multiple values - Pointers as Function Arguments- Functions returning pointers – Pointers to Functions – Pointers and Structures. **File Management in C:** Introduction – Defining and opening a file – closing a file – Input/output operations on files – Error Handling during I/O operations – Random Access to files – Command Line Arguments	16
	Total Contact Hrs	**75**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E Balagurusamy	Programming in ANSI C	Tata McGraw-Hill, Eighth Edition	2019

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ashok N Kamthane	Programming with ANSI and Turbo C	Pearson	2002.
2	Henry Mullish & Hubert L. Cooper	The Spirit of C	Jaico,	1996

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B. Sc Computer Science with Data Analytics	
Course Code:	24UDA102			**Title**	**Batch:**	2024 - 2027
					Semester:	I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem** -	60	**Core Course II: Digital Electronics**	**Credits:**	4

Course Objective

To introduce the concepts of digital electronics like number systems, Logic Gates and Circuits, Boolean Algebra, Combinational logic circuits, sequential logic circuits and its applications.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Gain knowledge about the number systems and coding systems	K1
CO2	Understand about Boolean Algebra & its function, DeMorgans Theorems.	K2
CO3	Understand about Logic gates and circuits.	K3
CO4	Have knowledge on Combinational logic circuit.	K4
CO5	Learning Sequential logic circuits such as flip flop and counter	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	M	L	M	L	H	L	H	H
CO3	M	H	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	L	M	H
CO5	H	M	H	M	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**NUMBER SYSTEMS AND CODES** Binary Number System – Binary to Decimal Conversion – Decimal to Binary Conversion – Octal Numbers – Hexadecimal Numbers – ASCII code – Excess-3 Code – Gray code – Error Detection and Correction Codes	12
Unit II	**DIGITAL LOGIC** Basic Gates – NOT, OR, AND – Universal Logic Gates - NAND, NOR, DeMorgan‟s Theorem – Positive and Negative Logic. **ARITHMETIC CIRCUITS** Binary Addition –Binary Subtraction – unsigned binary numbers – signed magnitude numbers – 2s complement representation – 2s complement arithmetic - Arithmetic Building Blocks – Adder Subtractor	12
Unit III	**COMBINATIONAL LOGIC CIRCUITS** Boolean Laws and Theorems – Sum-of-Products Method – Truth Table to Karnaugh Map – Pairs, Quads and Octets – Karnaugh Simplifications – Don't Care Conditios – Product of Sums Method – Product of Sums Simplification	12
Unit IV	**DATA-PROCESSING CIRCUITS** Multiplexers – Demultiplexers – 1 of 16 Decoder – BCD to decimal decoder – Seven segment decoder – Encider – Exclusive OR gate **FLOP FLOPS** RS FlipFlop – Gated Flip Flop – Edge Triggered RS FlipFlop – Edge Triggered D Flip Flop – Edge Triggered JK Flip Flop – JK Master Slave FlipFlop	12
Unit V	**REGISTERS** Types of Registers – Serial In Serial Out – Serial In Parallel out – Parallel In Serial Out – Parallel In Parallel out **COUNTERS:** Asynchronous Counter – Synchronous Counter – Decade Counter – Digital Clock	12
	Total Contact Hrs	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Donald P Leech, Albert Paul Malvino, Goutam Saha	Digital Principals and Applications	Tata McGraw Hill Education Private limited, NEW DELHI, Seventh Edition	2011

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	V.K. Puri,	Digital Electronic circuits and Systems	Tata McGraw-Hill Publishing Company Limited	2007.
2	Dr. K. Meena	Principles of Digital Electronics	PHI Learning Private Limited, New Delhi,	2009.

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc,			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA1A1			**Title**	**Batch:**	2024 - 2027
				Generic Elective Allied I : Mathematical Foundation for Data Science	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem**	60		**Credits:**	4

Course Objective

- To know the concept of Mathematical logic
- To learn the concept of Relations
- To make the students to learn various functions
- To inculcate the knowledge in graph theory

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of equivalence formulas	K1
CO2	Work with normal forms,	K2
CO3	Understand the mathematical tools that are needed to solve optimization problems,	K3
CO4	Model the problems in computer science using graphs and trees	K4
CO5	Work with trees and fundamental circuits	K5

Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	L	H	H	H	M	L	M	L	M	M	H	H
CO2	H	M	M	H	H	L	M	L	M	L	H	H
CO3	M	H	M	H	M	M	H	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	L	H	M
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Mathematical logic:** Introduction – TF Statements – connectives – well formed formulae – Truth table of a formula – Tautology – Tautological implications and Equivalence of formulas – Functionally complete sets of connectives – Duality Law - Normal Forms –Principal Normal forms – Theory of inference – simple problems.. **Sections 9.1-9.13**	12
Unit II	**Relations:** Introduction – Cartesian product of two sets – Relations – Representation of a relation – Operations on relations – Equivalence Relation – Closures and Warshall's algorithm – Partitions and Equivalence Classes – simple problems. **Sections: 2.1-2.7**	12
Unit III	**Functions:** Introduction – Functions and operators – one-to-one and onto functions – Special Types of functions – Invertible functions - Composition of functions. **Mathematical induction:** Introduction Technique of proof – Mathematical induction – simple problems. Sections 3.1-3.5 and 4.1-4.2	12
Unit IV	**Graph theory:** Introduction- – Finite and Infinite graph – Incidence and degree – Isolated vertex, Pendant vertex and null graph. **Paths and Circuits:** Isomorphism – Sub graphs –Walks, Paths and Circuits – Connected Graphs, Disconnected Graphs and Components– Euler Graphs – more on Euler Graphs – Hamiltonian graphs and circuits – Travelling salesman problem. **Sections 1.1 to 1.5, 2.1,2.2,2.4 to 2.6,2.8 to 2.10** .	12
Unit V	**Graph theory**: **Trees and fundamental circuits**: Trees – Some properties of trees – Pendant vertices in a tree – Distance and Centers in a tree – Rooted and Binary trees – Spanning Trees. **Sections 3.1 to 3.5,3.7**	12
	Total Contact Hrs	**60**

*(**Note:** Theorems Statement only)*

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dr. M.K. Venkataraman, Dr. N. Sridharan and N. Chandrasekaran	Discrete Mathematics	Hill Edition	Reprint 2007.
2	Narasing Deo	Graph theory with application to engineering and computer science	Prentice-Hall of India Ltd. New Delhi-1.	2016.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	J.K. Sharma , .	Discrete Mathematics	Trinity Press 4th Edition	Reprint 2015
2	J.P. Tremblay and R. Manohar	Discrete Mathematical Structures with Applications to Computer Science	Hill Edition	Reprint 2007.

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Mr. S. Earnest RajaDurai Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc,			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA1A2			**Title**	**Batch:**	2024 - 2027
				Generic Elective – Allied I Numerical Methods	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objective

This course helps the students to have an in-depth knowledge of various advanced methods in numerical analysis. The students to use numerical techniques to get numerical solutions of equations like transcendental and non-linear differential equations when ordinary analytical methods fail.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the need of numerical analysis techniques in the areas of approximation theory, and recall some basic concepts.	K1
CO2	Apply the numerical methods for approximating the solution to problems of algebraic and transcendental equations, simultaneous linear equations.	K3
CO3	Estimating the value of a function for any intermediate value of the independent variable using Newton Forward and Backward interpolation Formula as well compute the derivatives using Newton's forward and backward difference formula and Sterling's formula.	K3
CO4	Solve the ordinary and partial differential equations by using Numerical method techniques like Taylors method, Euler's method, RungeKutta method etc.	K4
CO5	Enrich the knowledge of numerical techniques and getting insight of algorithmic approach.	K4

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	**H**	**H**	**H**	**H**	**M**	**L**	**M**	**L**	**M**	**M**	**H**	**H**
CO2	**H**	**M**	**M**	**H**	**H**	**L**	**M**	**L**	**M**	**L**	**H**	**H**
CO3	**M**	**H**	**M**	**H**	**M**	**M**	**H**	**M**	**M**	**L**	**H**	**H**
CO4	**M**	**H**	**M**	**H**	**M**	**L**	**H**	**L**	**M**	**L**	**H**	**M**
CO5	**H**	**M**	**H**	**H**	**L**	**L**	**M**	**L**	**M**	**H**	**H**	**H**

Units	Content	Hrs.
Unit I	**The solution of Numerical Algebraic and Transcendental Equations**: Introduction - The Bisection method - The iteration method - The method of false position (Regula Falsi Method) - Newton Raphson method. **Chapter 3: Sections: 1 - 5.** **Simultaneous Linear Algebraic Equations:** Introduction – Gauss Elimination Method – Gauss Jordan Method – Computation of the inverse of a Matrix using Gauss's Elimination Method. **Chapter 4: Sections: 1 – 3.**	12
Unit II	**Simultaneous Linear Algebraic Equations:** Iterative Methods - Gauss-Jacobi Method – Gauss-Seidal Method – *Comparison of Gauss elimination and Gauss-Seidal Iteration methods (Self study).* **Chapter 4: Sections: 6, 7.** **Interpolation**: Introduction - Linear interpolation - Gregory Newton Forward and Backward interpolation Formula - Equidistant terms with one or more missing values. **Chapter 6: Sections: 1 - 5.**	12
Unit III	**Numerical Differentiation**: Introduction - Newton's forward difference formula to compute the derivatives - Newton's backward difference formula to compute the derivatives - Derivatives using Stirling's formula. **Chapter 9: Sections: 1 - 4.** **Numerical Integration**: The Trapezoidal rule - Romberg's method - Simpson's one third rule - Practical applications of Simpson's rule. **Chapter 9: Sections: 8 -10 and 12.**	12
Unit IV	**Numerical Solution of Ordinary Differential Equations**: Solution by Taylor Series - Taylor Series method for higher order differential equations- Euler's method - Improved Euler's method - Modified Euler method - RungeKutta method - Second order RungeKutta Method - *Higher order RungeKutta methods (Self study)*. **Chapter 11: Sections: 6, 8, 10 - 15**.	12
Unit V	**Numerical Solution of Partial Differential Equations**: Elliptic equations – Solution of Laplace's equation by Iteration – Poisson's equation. **Chapter 12: Sections: 5, 6, 7.**	12

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Venkataraman M. K	Numerical Methods in Science and Engineering	The National Publishing Company	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Kandasamy P, Thilagavathy K and Gunavathi K	*Numerical Methods*	S. Chand company Ltd	2012

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
S. Earnest Rajadurai Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Course Objective

To introduce the concepts of Procedure Oriented Programming and the various programming constructs of C

Course Outcome

On the successful completion of the course, students will be able to

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA103			**Title**	**Batch:**	2024 - 2027
				Core Course: Lab I Programming Lab in C	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	2

CO Number	CO Statement	Knowledge Level
CO1	Apply the various basic programming constructs like decision making statements. Looping statements, functions, structures, pointers and files	K3
CO2	Design programs using the concept of files in C and be able to simulate operations	K4
CO3	Determine the efficient techniques in programming to solve various scientific problems	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	L	H	H	H	M	L	M	L	M	M	H	H
CO2	H	M	M	H	H	L	M	L	M	L	H	H
CO3	M	H	M	H	M	M	H	M	M	L	H	H

Content

SET A

1. Write a C program to calculate the average of N numbers
2. Write a C program to check the greatest among three numbers.
3. Write a C program for finding sum of individual digits.
4. Write a C program to check whether the given number is Armstrong number or not.
5. Write a C program to generate the prime numbers between a given range.
6. Write a C program to generate the Fibonacci series for the given number.
7. Write a C program to print the Floyd's triangle.
8. Write a C program to calculate the factorial value for the given number using recursion.
9. Write a C program to find the reverse of a given number.
10. Write a C program to find if the given string is a palindrome or not.

11. Write a C program to count the number of vowels in a given string. 12. Write a C program to convert upper case to lower case and lower case to upper case. 13. Write a C program to insert or delete an element in an array. 14. Write a C program to sort the numbers in ascending /descending order using arrays. 15. Write a C program to find the addition of matrix. 16. Write a C program to find the matrix multiplication 17. Write a C program to display transpose matrix of a given number. 18. Write a C program to sort the strings in alphabetical order. 19. Write a C program to perform linear search in a given array. 20. Write a C program to create a student file with reg no, name, mark1, mark2.. 21. Write a C program to merge two files. (Using Files) 22. Write a C program to read and write to the file Using fread() and fwrite() functions. **23.** Write a program to implement command line arguments
Total Hours 60

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E Balagurusamy	Programming in ANSI C	Tata McGraw-Hill, Eighth Edition	2019

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ashok N Kamthane	Programming with ANSI and Turbo C	Pearson	2002.
2	Henry Mullish & Hubert L. Cooper	The Spirit of C	Jaico,	1996

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

SEMESTER II

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with Data Analytics)	
Course Code:	24UDA204			**Title**	**Batch:**	2024 - 2027
				Core III: Java Programming	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objective

To introduce the concepts of Object-Oriented Programming Paradigm and the programming constructs of JAVA

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recite the history of JAVA and its evolution	K1
CO2	Explain the various programming language constructs, object oriented concepts like overloading, inheritance, polymorphism, Interfaces , threads, exception handling and packages.	K2
CO3	Illustrate the concepts of Applets, files and the concept of stream classes.	K3
CO4	Outline the benefits and applications of objects oriented programming concepts and defend how JAVA differs from other programming languages	K4
CO5	Judge the pros and cons of other object oriented language with the concepts of JAVA	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	L	H	H	H	L	M	L	M	L	H	H
CO3	M	H	M	H	M	L	M	M	M	M	H	H
CO4	M	L	M	H	H	L	H	L	M	L	H	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Fundamentals of Object-Oriented Programming**: Object-Oriented Paradigm – Basic Concepts of Object-Oriented Programming – Benefits of Object-Oriented Programming – Application of Object- Oriented Programming. **Java Evolution:** History – Features - Web Browsers **–** Java Environment **Overview of Java:** Simple Java program- Java program Structure – Java Tokens – Statements – Java Virtual Machine – Command Line Arguments	12
Unit II	**Constants, Variables, Data Types - Operators and Expressions** – **Decision Making and Branching - Decision Making and Looping**–**Classes, Objects and Methods.**	11
Unit III	**Arrays and Strings:** Introduction – One dimensional array – Creating an array – Two-dimensional array – String **– Interfaces: Multiple Inheritance – Packages: Putting Classes together – Multithreaded Programming.**	12
Unit IV	**Managing Errors and Exceptions:** Introduction-Types of Errors-Exceptions-Syntax of Exception Handling-Multiple catch statements-Finally statement-throwing our own exception **Applet Programming:** Introduction-How Applets differ application- Preparing to Write Applets-Building applet code- Applet lifecycle-Creating an Executable Applet - Designing Web page-Applet tag-Adding Applet to HTML file - Running the Applet-Passing Parameters to Applets **Graphics Programming**: Introduction-Graphics Class – Lines and Rectangles-Circles and Ellipses – Drawing Arcs-Drawing Polygons-Line Graph-using control loop in Applets-Drawing Bar Chart	12
Unit V	**Managing Input / Output Files in Java:** Concepts of Streams- Stream Classes – Byte Stream classes – Character stream classes – Using streams – I/O Classes – File Class – I/O exceptions – Creation of files – Reading / Writing characters, Byte-Handling Primitive Data Types – Random Access Files. **Event Handling:** Introduction to Event Handling, Delegation Event Model, Sources of events, Event Listeners **AWT Controls - Introduction to JDBC**: Load the driver; establish connection; create statement; execute query; iterate result set, transactions	13
	Total Hours	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E Balagurusamy	Programming with Java – A Primer	Tata McGraw-Hill, Eighth Edition	2019

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Patrick Naughton and Hebert Schildt	The Complete Reference Java 2	Tata McGraw-Hill, 3rd Edition	
2	John R. Hubbard	Programming with Java	Tata McGraw-Hill, 2nd Edition	

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Course Objective

- To introduce the concept of data structures and the types of data structures

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA205			**Title**	**Batch:**	2024 - 2027
				Core Course IV: Data Structures	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

- To demonstrate how various data structures can be implemented and used in various application

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Define the concept of Data structure and list the various classifications of data Structures like array, stack and Queue	K1
CO2	Demonstrate how linked lists, Linked Staak and Linked Queue works	K2
CO3	Defines Trees and Binary Trees and its Working	K3
CO4	Illustrate the various file organizations like Sequential, Random and the concept of Hash Table	K4
CO5	Design algorithms for various sorting and searching techniques	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	L	H	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	Introduction – Analysis of Algorithms – **Arrays**: Introduction – Array Operations – Number of Elements in an Array – Representation of arrays in Memory – Applications	12

	Stacks: Introduction – Stack Operations – Applications **– Queues:** Introduction – Operations on Queue – Circular Queues – Other types of Queues - Applications	
Unit II	**Linked List:** Introduction - Singly Linked List –Circularly Linked Lists – Doubly Linked List – Multiply Linked List – Applications **Linked Stacks and Linked Queues**: Introduction – Operations on Linked Stacks and Linked Queues – Dynamic Memory Management and Linked Stacks – Implementation of Linked Representation - Applications	11
Unit III	**Trees and Binary Trees:** Introduction – Trees: Definition and Basic Terminologies – Representation of Tress – Binary Trees: Basic Terminologies and Types – Representation of Binary Tress – Binay Tree Traversal – Threaded Binary Trees **Graphs:** Introduction – Definition and Basic Terminologies – Representation of Grpahs – Graph Traversals - Applications	12
Unit IV	**Hash Table:** Introduction – Hash Table Structure – Hash Functions – Linear Open Addressing – Chaining – Applications **File Organization:** Introduction – Files - Keys – Basic File Operation – Heap or Pile Organization – Sequential File Organization – Indexed Sequential File Organization - Direct File Organization	12
Unit V	**Searching:** Introduction – Linear Search – Transpose Sequential Search – Interpolation Search – Binary Search – Fibonacci Search – Other Search Techniques **Internal Sorting**: Introduction – Bubble Sort - Insertion Sort – Selection Sort – Merge Sort – Shell Sort - Quick Sort - Heap Sort- Radix Sort.	13
	Total Contact Hrs	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	G. A. Vijayalakshmi Pai	Data Structures and Algorithms – Concepts, Techniques and Applications	Tata McGraw-Hill Publishing Company Limited NEW DELHI	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ellis Horowitz, Sartaj Shani, Sanguthevar Rajasekaran	Computer Algorithms	Galgotia Publication	2007
2	Ellis Horowitz, Sartaj Shani	Data Structures	Galgotia Publication.	2008

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA2A1			**Title**	**Batch:**	2024 - 2027
				Generic Elective - Allied II: Statistics and Probability	**Semester :**	II
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objective

To introduce the concepts of statistics and Probability in the field of Data Science

Course Outcome

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.	K1
CO2	Understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.	K2
CO3	Apply the concept of testing of hypothesis for small and large samples in real life problems	K3
CO4	Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.	K4
CO5	Have the notion of sampling distributions and statistical techniques used in engineering and Management problems.	K5

Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	L	H	M	L	L	L	M	M	H	H
CO2	H	L	H	H	H	L	M	L	M	L	H	M
CO3	M	H	M	H	H	L	M	M	M	H	H	H
CO4	L	L	M	H	H	L	H	L	H	L	H	L
CO5	H	M	H	H	M	H	L	L	H	H	H	H

Units	Content	Hrs
Unit I	**Probability:** Introduction – Definition - Addition and multiplicative theorem – The axioms of probability – Conditional probability – multiplicative law of probability – Baye's theorem –Simple problems (1-10). **Random variables:** Definition - Discrete and continuous random variables – Cumulative distributive function – properties of distribution function – simple problems.	12
Unit II	**Moments and Moment generating functions:** Definition – central moments in terms of moments about the origin – Examples - Moment generating function – Definition – properties of MGF – simple problems. **Large samples:** Population – sample – sampling distribution – sampling distribution of mean – characteristics of a sampling distribution – central limit theorem – test of hypothesis – procedure – Test for a specified mean – Test for equality of two means – simple problems.	11
Unit III	**Small samples: t-test**: Definition – uses – properties of the sampling distributions of t – Test for a specified mean – simple problems. **Chi square-test:** Definition – uses – procedure for testing the significance difference between the observed and expected frequencies – test of independence of attributes – test procedure - Test for a specified population variance – simple problems.	12
Unit IV	**Small samples: F-test**: Definition – procedure for the test of two population variances-simple problems. **Analysis of variance**: Introduction - One way and Two-way classifications – simple problems.	12
Unit V	**Regression:** Introduction – deviation of regression lines – properties of regression coefficients – simple problems.	13
	Total Hours	**60**

(Note: Theorems statements only)

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	P.R.VITTAL	Mathematical statistics	Margham publications	2004

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Devore. J.L.	Probability and Statistics for Engineering and the Sciences‖,	Cengage Learning, New Delhi, 8th Edition	2014
2	Papoulis, A. and Unni krishnapillai, S.	Probability, Random Variables and Stochastic Processes	McGraw Hill Education India, 4th Edition, New Delhi.	2010
3	Ross, S.M.,	Introduction to Probability and Statistics for Engineers and Scientists	Elsevier, 3rd Edition.	2004
4	Spiegel. M.R., Schiller. J. and Srinivasan, R.A.,	Schaum‘s Outline of Theory and Problems of Probability and Statistics	Tata McGraw Hill Edition	2004
5	Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K.	Probability and Statistics for Engineers and Scientists	Pearson Education, Asia, 8th Edition	2007

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Mr. Earnest Rajadurai Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc,			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA2A2			**Title**	**Batch:**	2024 - 2027
				Generic Specific Elective: Allied II: Optimization Techniques	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objectives

The course aims to

- Understand how to translate a real-world problem into a mathematical formulation.
- Understand the basic assumptions and properties of LPP by using graphical and simplex methods.
- Structure special type of LP Problems using transportation and assignment models.
- Solve some specific problems of scheduling jobs on two or three machines.
- Realize the need to study replacement and maintenance analysis techniques.
- Learn the variety of performance measures of a queuing system.
- Construct network diagrams with the single and three time estimates of activitiesinvolved in a project.

Course Outcomes:

On completion of the course, students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Formulate OR models to solve real life problems by using graphical and simplex methods.	K1
CO2	Analyze the advanced methods for large scale transportation and assignment problems.	K2
CO3	Evaluate sequencing problems of scheduling jobs on two or three machines.	K3
CO4	Appreciate the use of replacement analysis in handling problems like "Staffing problem and equipment renewal problem" etc.	K4
CO5	Apply various methods to select optimum strategies to win the game.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	**H**	**H**	**H**	**H**	**M**	**L**	**M**	**L**	**M**	**M**	**H**	**H**
CO2	**H**	**M**	**M**	**H**	**H**	**L**	**M**	**L**	**M**	**L**	**H**	**H**
CO3	**M**	**H**	**M**	**H**	**M**	**M**	**H**	**M**	**M**	**L**	**H**	**H**
CO4	**M**	**H**	**M**	**H**	**M**	**L**	**H**	**L**	**M**	**L**	**H**	**M**
CO5	**H**	**M**	**H**	**H**	**L**	**L**	**M**	**L**	**M**	**H**	**H**	**H**

SYLLABUS

UNIT	CONTENT	No. of Hours
I	Introduction to Optimization Techniques - Linear programming problem(LPP): Definition -Canonical form, Standard form and Formulation of a LPP- Solving LPP by Graphical and Simplex methods - Simple problems.	13
II	Transportation problem - Finding Initial Basic Feasible Solution – North West Corner Method, Least Cost Method, Vogel‟s Approximation Methodand Optimal solution – MoDi method - Assignment Problem – Maximization, Minimization and Restricted assignment problem – Simple Problems.	13
III	Sequencing problem – Johnson‟s rule for n jobs – 2 machines, n job 3 machines problems – Replacement problems – Elementary replacement models - items whose efficiency deteriorates with time and value of money remains constant during a period.	10
IV	Game theory – concept of pure and mixed strategies – value of games – solving 2 person zero sum games with saddle point – solving 2X2 games without saddle point – simple problem – dominance principle – simple problem. Queuing theory – introduction – queuing system – description of Poisson queues – problem on {(M/M/1): (∞/ FIFO)} only.	12
V	Network analysis: PERT & CPM network components and precedence Relationship – critical path analysis – project scheduling with uncertainactivity times – simple problem.	12

Note: 80% Problems and 20% Theory.

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Hamady, A. Taha	Operations Research An Introduction	Dorling Kindersley	2013
2	Ronald L. Rardin	Optimization in Operations Research	Perason Education Pvt Ltd	2003
3	Dr. S.P.Gupta, Dr. P.K. Gupta & Dr.ManMohan,	Business Statistics and Operation Research	Sultan Chand & Sons publishers, 5th edition	2011

Reference books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	J K Sharma	Operations Research	Macmillan Publishers India Ltd	2017
2	S. Kalavathy	Operations Research	Vikas Publishing house, , 4th Edition	2003
3	Anderson, Sweeney Williams	Quantitative Methods for Business	Thomson Learning,	2004
4	Rathindra P. Sen	Operations Research	PHI Learning	2012

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S. Earnest Rajadurai Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B. Sc Computer Science with Data Analytics	
Course Code:	24UDA206			**Title**	**Batch:**	2024 - 2027
				Core Lab II Programming Lab in Java	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	2

Course Objective

To introduce the concepts of Object-Oriented Programming Paradigm and the programming constructs of JAVA

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply the various basic programming constructs of JAVA like decision making statements. Looping statements, overloading, inheritance, polymorphism, constructors and destructors	K3
CO2	Illustrate the concepts of threading and multi-threading	K4
CO3	Design programs using various file stream classes; file types, and frames	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	L	H	H	H	M	L	M	L	M	M	H	H
CO2	H	M	M	H	H	L	M	L	M	L	H	H
CO3	M	H	M	H	M	M	H	M	M	L	H	H

Content
1. Write a Java Program to check whether a number is odd or even
2. Write a Java program to check for positive and negative number
3. Write a Java Program to find largest of three numbers
4. Write a Java program to swap two variables using third temporary variable
5. Write a Java program to swap two variables without using temporary variables
6. Write a Java Program to check a character is vowel or consonant
7. Write a Java program to calculate the average of N numbers
8. Write a Java program to find total, average and percentage marks all subjects
9. Write a Java program to calculate area and perimeter of a rectangle
10. Write a Java program to generate fibonacci series
11. Write a Java program to check for palindrome numbers
12. Write a Java Program to sum all odd numbers between 0 to N

13. Write a Java program to print all armstrong numbers between 0 to Numbers
14. Write a Java program to find factorial of a number using recursion
15. Write a Java program to find transpose matrix
16. Write a Java program to find max and min number in an array
17. Write a Java Program to Sort an Array in Ascending Order
18. Write a Java program to search an element in an array
19. Write a Java program to implement command line arguments
20. Write a Java program to implement class, objects and methods
21. Write a Java program to implement constructors
22. Write a Java program to implement default and parameterized constructor
23. Write a Java program to implement method overloading
24. Write a Java program to implement nesting of methods
25. Write a Java program to find area of rectangle using single inheritance
26. Write a Java program to implement String operations
27. Write a Java program to implement StringBuffer operations
28. Write a Java program to implement packages
29. Write a Java program to implement multiple inheritance using interface
30. Write a Java Program to implement thread and its methods
31. Write a Java Program to implement multiple catch statement in Exception Handling
32. Write a Java program to copy one file to another file using FileInputStream and FileOutputStream
33. Write a Java program to implement mouse handling
34. Write a Java program to implement Key handling
35. Write a Java Program to add two numbers using Applet
36. Write a Java Program to Draw a Human Face using Applet
37. Write a Java Program to Create and Fill Shapes using Applet
38. Write a Java Program to demonstrate the parameter passing to Applet
39. Write a Java Program to create a Simple Registration form using awt controls
40. Write a Java program to implement JDBC

Total Hours 75

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E Balagurusamy	Programming with Java – A Primer	Tata McGraw-Hill, Eighth Edition	2019

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Patrick Naughton and Hebert Schildt	The Complete Reference Java 2	Tata McGraw-Hill, 3rd Edition	2008
2	John R. Hubbard	Programming with Java	Tata McGraw-Hill, 2nd Edition	2011

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA2S1			**Title**	**Batch:**	2024 - 2027
				SEC 1: Data Analysis using Excel	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem.**	30		**Credits:**	2

Course Objective

This course was designed to make the student aware of various formatting function, understand the use of mathematical functions, pivot table and charts for visualization and summarization of data.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	List and explain various function used in Microsoft excel.	K3
CO2	Associate various formulas and functions and relate it to implement on available data sets.	K4
CO3	Illustrate data in form of charts and pivot table based on organized data available in excel	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Contents	Hrs
1. Create a worksheet to demonstrate formatting in Excel 2. Create a student worksheet to implement formula and functions 3. Create an employee table to implement auto functions 4. Create an invoice and analyse the data using statistical functions 5. Analyse the excel data using advanced the statistical functions 6. Create an excel sheet to implement Sort, Filter and Freeze 7. Create an excel sheet to implement different kinds of chart: Column Chart, Bar chart, Line Chart, Pie Chart, Area Chart, Surface Chart 8. Create an excel sheet to convert text to column 9. Analyze data by: a. Creating a pivot table b. Filtering data using Slicers c. Analyzing data using Pivot Charts 10. Create an excel sheet to implement Vlookup	30 Hrs

Reference:

https://www.w3schools.com/EXCEL/index.php

https://www.tutorialspoint.com/excel/index.htm

https://www.geeksforgeeks.org/introduction-to-ms-excel/

https://www.javatpoint.com/excel-tutorial

https://www.simplilearn.com/learn-ms-excel-free-training-course-skillup

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	BSc Computer Science with Data Analytics	
Course Code:	24UDA2S2			**Title**	**Batch:**	2024 - 2027
				SEC 1: Microsoft Office Automation Tools	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem**	30		**Credits:**	2

Course Objective

Getting an insight knowledge on MS-word, MS-excel, and Power point.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To gain knowledge of various text formats and creating customers list using mail merge for sending letters to the respondents at a time.	K3
CO2	Aware and apply various statistical tools available in Ms-excel for all applications	K4
CO3	To gain knowledge making effective presentation using power point presentation.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Content
1. Create a document and apply different formatting options 2. Design a Greeting card using Word Art for different festivals 3. Create your Bio data and use page borders and shadings 4. Create a document and insert header and footer, page title etc. 5. To create a document, set the margins, orientation, size, Column water mark, page color and page borders 6. Insert a table into the document 7. Write a program to implement mail merge 7. Prepare a mark sheet of your class subjects 8. Apply the creating, editing, saving, printing, securing & protecting operations to an excel spreadsheets 9. Prepare a bar chart and pie chart for analysis of five year results of your institute 10. Prepare an Attendance sheet of 10 students for any subjects of your Syllabus. Calculate their total attendance, total percentage of attendance of each student and average of attendance 11. Apply themes and layouts to power point slides and insert pictures, graphics, shapes and tables into presentation 12. Create a company advertisement using power point presentation
Total Hours 30 Hrs

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. S. Srivastava	MS Office	Lakshmi Publications	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dave Jaworski	**Microsoft Secrets**	Morgan James Publishing	2017

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

SEMESTER III

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA307			**Title**	**Batch:**	2024 - 2027
				Core Course V: Problem Solving using Python	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	4

Course Objective

- To know and understand the basics of Python programming.
- To able to understand the concepts of decision and control statements.
- To learn the concepts of functions and strings.
- To use Python data structures – lists, tuples and dictionaries.
- To learn the concept of object-oriented programming in Python

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Develop solutions to simple computational problems.	K1
CO2	Decompose a Python program into functions.	K2
CO3	Represent compound data using Python lists and tuples	K3
CO4	Representation of data using tuples, set and dictionaries	K4
CO5	Apply OOPs concepts in real-time Python applications.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	m	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	m	H	H
CO4	M	H	M	H	M	m	H	L	M	L	H	H
CO5	H	M	H	H	m	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Introduction:** History of Python – Executing Python Programs – Commenting in Python – Internal Working of Python - Python Character Set – Token – Python Core Data Type – print() Function – Assigning Values to Variables – Multiple Assignments – input() Function – eval() Function – Formatting Numbers and Strings – Python Inbuilt Functions - Decision and Loop Control Statements	14
Unit II	**Functions:** Introduction – Syntax and Basics of Function – Use of a Function – Parameters and Arguments in a Function – Local and Global Scope of a variable – return Statement – Recursive Functions – Lambda function. **Strings:** Introduction – str class – Basic Inbuilt Python Functions for String – Traversing String with for and while Loop – Immutable Strings – Various String Operations.	14
Unit III	**Lists**: Introduction – Creating Lists – Accessing the Elements of a List – Negative List Indices – List Slicing - List Slicing with Step Size – Python Inbuilt Functions for Lists – List Operator – List Comprehensions – List methods – List and Strings – Splitting a String in List – Passing and Returning List from a Function. **Tuples :** Creating Tuples - tuple() Function - Inbuilt Functions for Tuples - Indexing and Slicing - Operations on Tuples - Passing Variable Length Arguments to Tuples - Lists and Tuples - Sort Tuples - Traverse Tuples from a List - zip() Function - Inverse zip(*) Function	15
Unit IV	**Sets:** Creating Sets - Set in and not in Operator - Python Set Class - Set Operations. **Dictionaries**: Need of Dictionaries - Basics of Dictionaries - Creating a Dictionary - Adding and Replacing Values - Retrieving Values - Formatting Dictionaries - Deleting Items - Comparing Two Dictionaries - Methods of Dictionary Class - Traversing Dictionaries - Nested Dictionaries - Traversing Nested Dictionaries. **File Handling:** Introduction – Need of File Handling – Text Input and Output – seek( ) Function – Binary Files.	16
Unit V	**Object-Oriented Programming: Class, Objects and Inheritance:** Defining Classes – Self-parameter and Adding Methods to a Class – Display Class Attributes and Methods – Special Class Attributes – Accessibility – Constructor and Destructor Methods – Passing an Object as Parameter to a Method – Method Overloading – Operator Overloading – Inheritance – Types of Inheritance – Using super() – Method Overriding.	16
	Total Contact Hrs	**75**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ashok Namdev Kamthane, Amit Ashok Kamthane,	Programming and Problem Solving with PYTHON	McGraw Hill Education (India) Private Limited,	First Edition, 2018.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Allen Downey, Jeffrey Elkner, Chrish Meyers	How to Think like a Computer Scientist- Learning with Python	Dreamtech Press	Reprint Edition 2016.
2	Timothy A, Budd	Exploring Python	McGraw Hill Education India Private Limited	Tenth Reprint, 2017
3	Peter Norton et al.,	Beginning Python	Wiley &Dreamtech Press	2006
4	Al Sweigart,	Automate the Boring Stuff with Python: Practical Programming for Total Beginners	No Starch Press,	2nd Edition, 2019
5	Liang Y. Daniel	Introduction to Programming Using Python	Pearson Education	2017

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA308			**Title**	**Batch:**	2024 – 2027
				Core Course VI : RDBMS	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objective

- Gain a good understanding of the architecture and functioning of Database Management Systems
- Understand the use of Structured Query Language (SQL) and its syntax.
- Apply Normalization techniques to normalize a database.
- Understand the need of transaction processing and learn techniques for controlling the consequences of concurrent data access.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Describe basic concepts of database system	K1
CO2	Design a Data model and Schemas in RDBMS	K2
CO3	Competent in use of SQL	K3
CO4	Analyze functional dependencies for designing robust Database	K4
CO5	Applications using PL/SQL	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	L	H	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	Introduction to DBMS– Data and Information - Database – Database Management System – Objectives - Advantages – Components - Architecture. ER Model: Building blocks of ER Diagram – Relationship Degree – Classification – ER diagram to Tables – ISA relationship – Constraints – Aggregation and Composition – Advantages	10
Unit II	Relational Model: CODD's Rule- Relational Data Model - Key - Integrity – Relational Algebra Operations – Advantages and limitations – Relational Calculus – Domain Relational Calculus - QBE.	12
Unit III	Structure of Relational Database. Introduction to Relational Database Design - Objectives – Tools – Redundancy and Data Anomaly – Functional Dependency - Normalization – 1NF – 2NF – 3NF – BCNF. Transaction Processing – Database Security	12
Unit IV	SQL: Commands – Data types – DDL - Selection, Projection, Join and Set Operations – Aggregate Functions – DML – Modification - Truncation - Constraints – Subquery	13
Unit V	PL/SQL: Structure - Elements – Operators Precedence – Control Structure – Iterative Control - Cursors - Procedure - Function - Packages – Exceptional Handling - Triggers.	13
	Total Contact Hrs	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. Sumathi, S. Esakkirajan,	Fundamentals of Relational Database Management System	Springer International Edition	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Abraham Silberchatz, Henry F. Korth, S. Sudarshan,	Database System Concepts	McGrawHill 7th Edition	2019
2	Alexis Leon & Mathews Leon	Fundamentals of DBMS	Vijay Nicole Publications 2nd Edition	2014
3	Ramez Elmasri and Shamkant B. Navathe,	Fundamentals of Database Systems	Pearson Education, Fifth Edition,	2008.

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
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Programme Code:	B.Sc			**Programme Title:**	B. Sc Computer Science with Data Analytics	
Course Code:	24UDA3A1			**Title**	**Batch:**	2024 – 2027
				Generic Elective Allied III: Introduction to Linear Algebra	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objective

To introduce the computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, and vector spaces

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Explain the concept/theory in linear algebra, to develop dynamic and graphical views to the related issues of the chosen topics as outlined in "course content," and to formally prove theorems	K1
CO2	Recognize the basic applications of the chosen topics and their importance in the modern science	K2
CO3	Develop simple mathematical models, and apply basic linear algebra techniques learned from the chosen topics to solve simple problems	K3
CO4	Report and communicate effectively with others and present mathematical results in a logical and coherent fashion	K4
CO5	Appraise the power and beauty of mathematics, and solve problems independently and collaboratively as part of a team	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Linear Equations:** Introduction – system of homogeneous linear equations – augmented matrix – row echelon form - finding the solution of homogeneous system (AX=0) - System of non-homogeneous linear equations-working rule for finding the solutions for AX=B - linear independent and dependent - Simple problems.	12
Unit II	**Matrices and their algebra:** Introduction – matrix – types of matrices – matrix addition and multiplication – partitioning matrices – simple problems. **Operation on matrices:** Transpose of a matrix – symmetric and skew - symmetric – conjugate – conjugate transpose – Hermitian and skew-Hermitian – orthogonal – unitary matrices – simple problems.	11
Unit III	**System of simultaneous linear equations:** Introduction – determinants – determinant of a square matrix – singular and non-singular matrices – minors and co-factors – ad-joint of a matrix – invertible matrices – inverse of a matrix – Cramer's rule – theorems (statements only) – rank of a matrix – simple problems.	13
Unit IV	**The characteristic equation of a matrix:** Introduction – polynomial of a square matrix - characteristic equation of a matrix - characteristic vector of a matrix – Cayley's Hamilton theorem – some results on characteristic roots and vectors – simple problems.	11
Unit V	**Vector spaces:** Introduction – vector spaces – subspaces – subspace spanned by a set of vectors – basis and dimension of a vector space – standard basis – some results in basis and dimension of a vector space – linear transformation – non-singular linear transformation – inner product – orthogonal – orthonormal - simple problems.	13
	Total Contact Hrs	**60**

(Note: Theorems Statement Only)

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	R.S Aggarval and Matharu	Linear Algebra,	S. Chand and Company Ltd	1999

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Gilbert Strang	Introduction to Linear Algebra,	Wellesley – Cambridge Press, 5th Edition.	2016
2	Gilbert Strang	Linear Algebra and Its Apllications.	Cengage Learning Fourth Edition.	2006
3	David C. Lay, Steven R. Lay, and Judi J. McDonald	Linear Algebra and Its Applications.	Pearson – 5th Edition.	2014

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Mr. Earnest Rajadurai Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc,			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA3A2			**Title**	**Batch:**	2024 - 2027
				Generic Elective Allied III: Applied Statistics	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objective

The course aims to

- Solve the past data related to a variable and to fit a suitable model.
- Highlight the important logic and methodology for calculation of various index numbers.
- Develop an understanding of Statistical Quality Control.
- Learn the various methods of sampling techniques.
- Develop the basic statistics using excel functions and data analysis tools.

Course Outcome

On completion of the course, students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of time series data and methods used to forecast the future.	K1
CO2	Understand the various statistical functions used to identify the processing product with inthe control or not.	K2
CO3	Know the examined lots of products are free of defectives.	K3
CO4	Apply various sampling techniques in real life business problems.	K4
CO5	Execute the statistical functions and data analysis tools in excel.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	**M**	**H**	**H**	**H**	**M**	**L**	**M**	**L**	**M**	**M**	**H**	**H**
CO2	**H**	**M**	**M**	**H**	**H**	**L**	**M**	**L**	**M**	**L**	**H**	**H**
CO3	**M**	**H**	**M**	**H**	**M**	**M**	**H**	**M**	**M**	**L**	**H**	**H**
CO4	**M**	**H**	**M**	**H**	**M**	**L**	**H**	**L**	**M**	**L**	**H**	**M**
CO5	**H**	**M**	**H**	**H**	**L**	**L**	**M**	**L**	**M**	**H**	**H**	**H**

SYLLABUS

UNIT	CONTENT	No. of Hours
I	Sampling Techniques: Definition – Methods of sampling – Probability sampling: Simple random sampling (SRS) with and without replacement – Selection of SRS using lottery method and random number table method – Stratified random sampling – Systematic sampling and Clustering sampling. Non-probability sampling: Convenience sampling, Judgment sampling and Quota sampling – Sampling errors (Concepts only).	12
II	Time series - meaning uses and its components –Trend: Estimation of Trend – Moving average method and method of least square – Simple problems - Seasonal variations: Measuring seasonal variations - Simple average method only.	12
III	Index Numbers - Definition – Uses – Construction of Unweighted and weighted Index – Laspeyre"s, Paasche"s, Fisher"s index numbers – Time reversal and factor reversal tests - Cost of living Index number - Simple problems.	10
IV	Theory of Statistical Quality Control (SQC) - Concept, uses, construction and interpretation of Mean, Range, p, np and C charts- Simple problems.	13
V	Statistics using Excel: Statistical functions – Measure of Central tendency: AVERAGE, AVERAGEA, MEDIAN, MODE. Measure of Dispersion: MIN, MAX, QUARTILE, VAR, VARP, STDEV, STDEVP, SKEW, Distributions: BINOMDIST, POISSON.DIST, NORMDIST, NORMINV. Time series: FORECAST TREND, SLOPE and INTERCEPT. Data Analysis using Excel: Descriptive Statistics – t-Test: Two-sample (equal and unequal variance) for mean, Paired two samples for mean, Z-test: Two-sample for means – ANOVA – Correlation – Regression – Moving average.	13

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S.C. Gupta and V. K. Kapoor	Fundamental of Applied Statistics	Sultan Chand & Sons Publishers, New Delhi	2012

2	S.P. Gupta and M.P. Gupta	Business Statistics	Sultan Chand & Sons Publishers, New Delhi	2015
3	R.S.N. Pillai and Bhagavathi	Statistics Theory and Practice	Sultan Chand & Sons Publishers, New Delhi, 7th Edition	2008
4	S.P. Gupta	Statistical Methods	Sultan Chand & Sons Publishers, New Delhi, 28th Edition	2017
5	Ananthi Sheshasayee and Sheshayee	Computer Applications in Business and Management	Margam Publication	2014

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Prem . S. Mann	Introductory Statistics	John Wiley & Sons	2007
2	Allan Bluman	Introductory Statistics. A step by step approach	McGraw-Hill Publication	2009

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
S. Earnest Rajadurai Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA309			**Title**	**Batch:**	2024 - 2027
				Core Course Lab III Programming Lab in Python	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	2

Course Objective

- To know and understand the basics of Python programming.
- To able to understand the concepts of decision and control statements.
- To learn the concepts of functions and strings..
- To use Python data structures – lists, tuples and dictionaries.
- To learn the concept of object oriented programming in Python

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Knowledge of various python tools and python program execution	K3
CO2	Solve Problems using control structures, functions, list, tuples, dictionaries and file handling	K4
CO3	Solve problems using OOPs concept	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	m	H	L	M	H	H	L	H	H
CO3	M	M	M	H	M	H	M	M	M	m	H	H

Content
1. Write a Python program that displays the following information: Name, Address, Mobile number, College Name and Course 2. Write a Python program to find the largest of three numbers using if else and conditional operator 3. Write a Python program to print the Employee pay slip using eval() function. 4. Write a Python program to find the difference between the ASCII code of the any lower case letter and its corresponding uppercase letter. 5. Write a Python program to demonstrate the uses of various python built-in functions. 6. Write a Python program to print the number of days in a month. 7. Write a python program to display prime number between intervals 8. Write a python program to perform matrix multiplication using nested for loop 8 b. Write a python program to perform matrix multiplication using list comprehension 9. Read a distance in meter and a time in seconds through keyboard. Write a Python program to calculate the speed of a car in meter/second. 10. Write recursive functions for the factorial of positive integer 11. Implement the string operations using string slicing functions. 12. Write a Python program to strip unwanted character from a string. 13. Consider the list with mixed type of elements, such as L1=[1,"x",4,6,90, "apple", „a", o,4]. Create another list using comprehension which consists of only the integer element present within the list L1. 14. Write a function reverse(Lst) to reverse the elements of a list. 15. Write the python program to count the number of times an element is present in the tuple 16. Write a python program to reverse a tuple 17. Write a program to assign grades to students and display all the grades using keys() and get() method of a dictionary. 18. Write a program to pass a list to a function. Calculate the total number of positive and negative numbers from the list and then display the count in terms of dictionary 19. Write a python program to implement set operations 20. Write a program to add the content of a file numbers.txt and display the sum of all numbers present in a file. **21.** Write a python program that generate 50 random numbers within a range 500 to 1000 and write them to file. **22.** Write a program to read the contents of a file Grades.txt and calculate the total marks and percentage obtained by a student. **23.** Write a program to calculate the area of a rectangle by passing an object as parameter to method. **24.** Write a simple program to demonstrate the concept of multilevel inheritance **25.** Write a python program to search an element in a list (Linear Search) **26.** Programs on Numpy **27.** Programs on Panda **28.** Programs on MatplotLib
Total Hours 60

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ashok Namdev Kamthane, Amit Ashok Kamthane,	Programming and Problem Solving with PYTHON	McGraw Hill Education (India) Private Limited,	First Edition, 2018.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Allen Downey, Jeffrey Elkner, Chrish Meyers	How to Think like a Computer Scientist- Learning with Python	Dreamtech Press	Reprint Edition 2016.
2	Timothy A, Budd	Exploring Python	McGraw Hill Education India Private Limited	Tenth Reprint, 2017
3	Peter Norton et al.,	Beginning Python	Wiley &Dreamtech Press	2006
4	Al Sweigart,	Automate the Boring Stuff with Python: Practical Programming for Total Beginners	, No Starch Press,	2nd Edition, 2019
5	Liang Y. Daniel	Introduction to Programming Using Python	Pearson Education	2017

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA310			**Title**	**Batch:**	2024 - 2027
				Core Course lab IV: RDBMS Lab	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits: 4**	4

Course Objective

- To understand the fundamentals of relational and object-oriented database systems
- To understand the techniques in developing databases for real time applications.
- To be familiar with PL/SQL commands.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Implement programs using object oriented database systems.	K3
CO2	Construct programs in PL/SQL with real time applications.	K4
CO3	Gain knowledge about PL/SQL commands.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Content

1. Create a database and perform DDL commands create, alter, drop, rename and truncate.
2. Create a database. Write a query to create primary constraints with column level with naming convention.
3. Create a database. Write a query to create default and check constraints.
4. Use SQL commands to implement the concept of built in functions
5. Execute the date and string functions in SQL.
6. Create two tables named sales and orders. Combine the records in two tables using joins.
7. Write a query to update multiple records from students' table.
8. Implement PL/SQL program for EB calculation.
9. Implement the concept of recursive function

10. Use SQL Queries to manage views, Sequence and Synonyms 11. Implement the concept of packages using procedure and function 12. Design a PL/SQL to handle User Defined Exception 13. Create a cursor to select the five highest paid employees from the employee table. 14. Prepare an employee payroll of a company using Stored Functions. **15.** Implement Trigger for student data.
Total Hours 60

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. Sumathi, S. Esakkirajan,	Fundamentals of Relational Database Management System	Springer International Edition	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Abraham Silberchatz, Henry F. Korth, S. Sudarshan,	Database System Concepts	McGrawHill 7th Edition	2019
2	Alexis Leon & Mathews Leon	Fundamentals of DBMS	Vijay Nicole Publications 2nd Edition	2014
3	Ramez Elmasri and Shamkant B. Navathe,	Fundamentals of Database Systems	Pearson Education, Fifth Edition,	2008.

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA3N1			**Title**	**Batch:**	2024 - 2027
				NME I: **Web Designing using HTML and CSS**	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem.**	30		**Credits:**	2

Course Objective

The objective of this course is to make the students to gain the practical knowledge of HTML and CSS. This will help the students to develop effective Web pages of their own.

Course Outcome

On completion of the course, students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the heading levels, ordered and unordered levels within a web page	K1
CO2	Understand the concept of inserting a graphics and creation of link in a web page	K2
CO3	Creating a table in a web page	K3
CO4	Understanding the concept of Frames and Forms	K4
CO5	Creation of a web page using Cascading Style Sheet	K5

Content
1. Program to describe various text formatting commands. 2. Program to create an Unordered list. 3. Program to create an Ordered list. 4. Program to create a Table. 5. Program to create a Hyper link. 6. Program to insert an image to Web page and to implement Marquee tag. 7. Program to implement Audio and Video Element. 8. Program to divide a web page into Frames. 9. Program to divide a web page into Multiple Frames. 10. Program to create a form in HTML 11. Program to create a form in HTML and display the data in the same window 12. Program to implement External Style Sheet 13. Program to implement Internal Style Sheet 14. Program to implement Inline Style Sheet 15. Create a web page to display the information of a renowned personality **Total Hours 30 Hrs**

References

1. https://www.w3schools.com/html/
2. https://www.programiz.com/html/form
3. https://www.geeksforgeeks.org/
4. https://www.javatpoint.com/html-form
5. https://www.tutorialspoint.com/html/
6. https://www.makeitsimple.co.in/

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics
Course Code:	24UDA3N2			**Title**	**Batch:** 2024 - 2027
				NME I: Adobe Photoshop	**Semester:** III
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem.**	30		**Credits:** 2

Course Objective

The objective of this course is to make the students to gain a working knowledge of Photoshop and develop their skills in editing and altering photographs for through a basic understanding of the tool bar, layers, and the adjustments panel.

Course Outcome

On completion of the course, students should be able to

Course Outcomes (CO)

CO1	To apply the different type of tools available in Photoshop to create simple applications.	K3
CO2	To interpret programs using various filters in Photoshop	K4
CO3	To access the new tools for designing multi-layered applications.	K1
CO4	To Create simple shapes by applying shape tweens and motion tweens.	K2
CO5	To Identify the basic tools and components of multimedia components.	K5

Content

1. Understanding of Image Menu using Photoshop
2. Reduce Picture Size and Replace color using Photoshop
3. Make a simple book cover by using basic functionalities using Photoshop
4. Transfer an object from one image to another and erase background using Photoshop
5. Add a pattern as background using Photoshop
6. Create India Map using Photoshop
7. Retouching photos using Photoshop
8. Take a logo and modify it using Photoshop
9. Alter an image using filters using Photoshop
10. Special Effects-Color in black and white image using Photoshop
11. Special Effects-Feathered Portraits (Soft fade) using Photoshop
12. Poster Designing for an event

Total Hours 30 Hrs

References

1. https://www.w3schools.com/html/
2. https://www.programiz.com/html/form
3. https://www.geeksforgeeks.org/
4. https://www.javatpoint.com/html-form
5. https://www.tutorialspoint.com/html/
6. https://www.makeitsimple.co.in/

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Ms. Sivakamisundareswari Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

SEMESTER IV

Programme Code:	B.Sc			**Programme Title:**	B. Sc Computer Science with Data Analytics	
Course Code:	24UDA411			**Title**	**Batch:**	2024 - 2027
				Core Course VII: R Programming	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	3

Course Objective

To enable the students to gain basic knowledge about R.

- To understand getting data in R.
- To enable the students to understand about objects and date and time functions.
- To facilitate the students to have knowledge on control structures and functions.
- To smooth the progress of learning debugging and simulation.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply the knowledge of R concepts.	K1
CO2	To understand how to read the larger datasets in R.	K2
CO3	To get knowledge on managing data frames.	K3
CO4	Analyze and understand the control structures and functions.	K4
CO5	Investigate debugging and loop functions in R.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Overview of R:** R Introduction - S Introduction – S Philosophy – Back to R - Basic Features of R – Free software - Design of the R system - Limitations of R - R Resources. **R Nuts and Bolts:** Entering Input-Evaluation - R Objects – Numbers – Attributes - Creating vectors – Lists - Mixing objects - Explicit coercion - Matrices - Lists - Factors - Missing Values - Data frames - Names.	12
Unit II	**Getting Data in and out of R**: Reading and Writing Data – Reading Data Files with read.table() - Reading in Larger Datasets with read.table - Calculating Memory Requirements for R Objects - Using the readr package. **Using Textual and Binary Formats for Storing Data:** Using dput() and dump() - Binary Formats. **Interfaces to the Outside World:** File Connections - Reading Lines of a Text File - Reading From a URL Connection.	11
Unit III	**Subsetting R Objects:** Subsetting a Vector - Subsetting a Matrix - Subsetting Lists - Subsetting Nested Elements of a List – Extracting Multiple Elements of a List - Partial Matching - Removing NA Values. **Vectorized Operations:** Vectorized Matrix Operations. **Dates and Times :** Dates in R - Times in R - Operations on Dates and Times. **Managing Data Frames with the dplyr package:** Data Frames – The dplyr Package - dplyr Grammar - Installing the dplyr package -select, filter(), arrange(), rename(), mutate() – CONTENTS - group_by() ,%>% .	13
Unit IV	**Control Structures:** if-else - for Loops - Nested for loops – while Loops - Repeat Loops - next, break. **Functions:** Functions in R - Your First Function - Argument Matching - Lazy Evaluation - The ... Argument - Arguments Coming After the Argument. **Scoping Rules of R:** A Diversion on Binding Values to Symbol - Scoping Rules - Lexical Scoping: Why Does It Matter? - Lexical vs. Dynamic Scoping - Application: Optimization - Plotting the Likelihood.	11
Unit V	**Loop Functions:** Looping on the Command Line - lapply() - sapply() - split() - Splitting a Data Frame - tapply - apply() - Col/Row Sums and Means - Other Ways to Apply - mapply() – CONTENTS – Vectorizing a Function. **Debugging:** Something‟s Wrong! - Figuring Out What‟s Wrong - Debugging Tools in R - Using traceback() - Using debug() – Using recover(). **Profiling R Code:** Using system.time() - Timing Longer Expressions - The R Profiler - Using summaryRprof(). **Simulation**-Generating Random Numbers - Setting the random number seed - Simulating a Linear Model -Random Sampling.	13
	Total Contact 60 Hrs	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Roger D. Peng	R Programming for Data Science	Lean pub publishers	2015.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jared P.Lander ,	R for Everyone – Advanced Analytics and Graphics	Addison Wesley Data & Analytics Series	Reprint 2016.

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA412			**Title**	**Batch:**	2024 - 2027
				Core Course VIII: Data Mining and Warehousing	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	3

Course Objective

To enable the students to gain the knowledge about Data Mining

- To understand the Basics of Data mining.
- To learn how to use association rule in data mining.
- To learn efficient clustering techniques.
- To understand the concepts of decision trees.
- To know the scope of temporal and spatial data mining..

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply the knowledge data mining to mine the data.	K1
CO2	Analyze the complexity and correctness of the association rule.	K2
CO3	Choose the appropriate clustering algorithm for a specified application.	K3
CO4	Apply and implement decision tree design techniques.	K4
CO5	Apply temporal and spatial data mining.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	Data Mining – Kinds of Data – Kinds of pattern – Technologies – Kinds of Applications – Issues in Data Mining	10
Unit II	Data Objects and Attribute Types – Basic Statistical Description of Data – Data Visualization – Measuring Data Similarity and Dissimilarity **Data Preprocessing**: Data Quality – Major Tasks in Data Preprocessing – Data Cleaning: Missing values – Noisy Data – Data Cleaning as a process	12
Unit III	**Data Warehouse** – Difference between operational database system and Datawarehouse – Need of separate Datawarehouse – Data warehouse architecture – Datawarehouse models – Extraction, Transformation and Loading – Meta Repository Data Cube – Schema for Multidimensional Data Model – OLAP Operations	12
Unit IV	**Mining Frequent Patterns**, Associations and Correlations: Basic Concepts – Frequent ItemSet Mining Methods: Apriori Algorithm – Association Rule from Frequent Itemset – Improving the efficiency of Apriori **Classification:** Basic Concepts – Decision Tree Induction – Bayes Classification Methods – Rule Based Classification	13
Unit V	**Cluster Analysis** – Partitioning Methods: K Means – K Mediod - Hierarchical Methods: Agglomerative versus Divisive – Distance Measures in Algorithmic Methods. **Data Mining Applications:** Financial Data Analysis – Retail and Telecommunication Industry - Science and Engineering – Intrusion Detection and Prevention – Data Mining and Recommender System	13
	Total Contact Hrs	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	J. Han, M. Kamber	Data Mining: Concepts and Techniques	Morgan Kauffman	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Arun K, Pujari	Data mining Techniques	Universities Press, Second Edition,	2010.
2	Margaret H. Dunham	Data Mining - Introductory and Advanced Topics	Prentice Hall	2012

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with Data Analytics)	
Course Code:	24UDA4A1			**Title**	**Batch:**	2024- 2027
				Generic Elective Allied IV: Introduction to Data Science	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	3

Course Objective

To introduce the concepts, techniques and tools with respect to the various facets of data science practice, including data collection and integration, exploratory data analysis, predictive modeling, descriptive modeling and effective communication.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To describe the concept of Data Science	K1
CO2	To understand the concepts of data science process modelling	K2
CO3	To apply the machine learning algorithm	K3
CO4	Implementation of Hadoop and Spark	K4
CO5	Case Study : Implementing the concepts for real world problems	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	L	H	H	H	L	M	L	M	L	H	M
CO3	M	H	M	H	H	L	M	M	M	H	H	H
CO4	L	L	M	H	H	L	H	L	M	L	H	M
CO5	H	M	H	H	M	L	L	L	M	H	H	H

Units	Content	Hrs
Unit I	Introduction to Data Science – Benefits and uses – Facets of data – Data science process – Big data ecosystem and data science	12
Unit II	The Data science process – Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building	11
Unit III	Algorithms - Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised - Semi-supervised	12
Unit IV	Introduction to Hadoop – framework – Spark – replacing MapReduce– NoSQL – ACID – CAP – BASE – types	12
Unit V	Case Study – Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation	13
	Total Hours	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Davy Cielen, Arno D. B. Meysman, Mohamed Ali	Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools	Manning Publications	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Roger Peng	The Art of Data Science	lulu.com	2016
2	MurtazaHaider	Getting Started with Data Science – Making Sense of Data with Analytics	IBM press, E-book.	2016
3	Davy Cielen, Arno D.B. Meysman, Mohamed Ali	Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools	Dreamtech Press	2016.
4	Annalyn Ng, Kenneth Soo	Numsense! Data Science for the Layman: No Math Added	Kindle Edition	2017

5	Cathy O'Neil, Rachel Schutt	Doing Data Science Straight Talk from the Frontline	O'Reilly Media	2013
6	Lillian Pierson 2017, 2 nd Edition.	Data Science for Dummies	O'Reilly Media	2017

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	**B. Sc Computer Science with Data Analytics**	
Course Code:	24UDA4A2			**Title**	**Batch:**	**2024 – 2027**
				Generic Elective – Allied IV: Business Intelligence	**Semester:**	**IV**
Lecture Hrs./Week or Practical Hrs./Week	**4**	**Tutorial Hrs./Sem.**	**60**		**Credits:**	**3**

Course Objective

The main objectives of this course are to

- To become familiar with the role of mathematical models, Business intelligence architectures, representation of the decision-making process, evolution of information systems
- Define development of a model, representation of input data ,data mining process, analysis methodologies, data validation, data transformation, data reduction
- Evaluate classification models, Bayesian methods, Clustering methods, Partition methods, Hierarchical methods

Course Outcome

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To become familiar with the ethics and basics of Business Intelligence and Decision Support Systems.	K1
CO2	To define mathematical models, data mining and data preparation	K2
CO3	To describe classification problems and clustering methods	K3
CO4	To study marketing models, Logistic and production models and Data envelopment analysis	K4
CO5	To be able to grasp the objectives of knowledge management and artificial intelligence and expert systems.	K5

Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	H	H	M	H	M	L	M	M	H	H
CO2	H	H	H	M	H	H	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	M	H	H
CO4	M	H	M	H	M	M	H	L	M	L	M	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Syllabus

Units	Content	Hrs
Unit I	**Business intelligence:** Effective and timely decisions-Data- information and knowledge- The role of mathematical models- Business intelligence architectures- **Ethics and business intelligence Decision support systems**: Definition of system-Representation of the decision-making process- Evolution of information systems- Definition of decision support system- Development of a decision support system	14
Unit II	**Mathematical models for decision making:** Structure of mathematical models- Development of a model. **Classes of models Data mining:** Definition of data mining-Representation of input data - Data mining process- Analysis methodologies Data preparation: Data validation- Data transformation- Data reduction	14
Unit III	**Classification:** Classification problems- Evaluation of classification models-Bayesian methods, Logistic regression-Neural networks- Support vector machines Clustering: Clustering methods- Partition methods- Hierarchical methods, Evaluation of clustering models	15
Unit IV	**Business intelligence applications**: Relational marketing- Sales force management. **Logistic and production models:** Supply chain optimization- Optimization models for logistics planning-Revenue management systems. **Data envelopment analysis**: Efficiency measures- Efficient frontier-The CCR model-Identification of good operating practices	16
Unit V	**Artificial Intelligence and Expert Systems**: Concepts and Definitions of Artificial Intelligence- Artificial Intelligence Versus Natural Intelligence- Basic Concepts of Expert Systems-Applications of Expert Systems- Structure of Expert Systems- Knowledge Engineering- Development of Expert Systems	16
	Total Contact Hrs	**75**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Carlo Vercellis	Business Intelligence: Data Mining and Optimization for Decision Making	Carlo Vercellis/ First	2009
2	Efraim Turban, Ramesh Sharda, Dursun Delen	Decision support and Business Intelligence Systems	Pearson Education/ Ninth	2011
3	Grossmann W, Rinderle-Ma	Fundamental of Business Intelligence	Springer /First	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Carlo Vercellis	Business Intelligence: Data Mining and Optimization for Decision Making	Carlo Vercellis/ First	2009
2	Efraim Turban, Ramesh Sharda, Dursun Delen	Decision support and Business Intelligence Systems	Pearson Education/ Ninth	2011
3	Grossmann W, Rinderle-Ma	Fundamental of Business Intelligence	Springer /First	2015

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Ms. M. Sivakami Sunderswari Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B. Sc Computer Science with Data Analytics	
Course Code:	24UDA413			**Title**	**Batch:**	2024 - 2027
				Core course Lab V: Programming Lab in R	**Semester**	IV
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	2

Course Objective

- Gain knowledge in basics of R
- To understand and trace the execution in R
- Understand and customize graphs
- To make students to develop applications using R

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics in R programming in terms of constructs, control statements, string functions	K3
CO2	Implement data frames and lists.	K4
CO3	Design applications in R using File concept.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Content
1. Implement R Expressions and Data Structures 2. Implement any 10 built in functions in R. 3. Create and manipulate vector in R 4. Create and manipulate Matrix in R. 5. Create Factors and Implement Operations on Factors. 6. Implement operations on Data Frames. 7. Implement operations on Lists.

8. Working with looping statements. 9. Implement Plot function in R to customize Graphs. 10. Implement 3D Plot in R to customize Graphs. 11. (a) Read data from a text file saved on hard disk (b) Read data from a comma separated file (c) Read data from the Excel file (d) Read data right from internet 12. Working on sample data set
Total Hours 60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Roger D. Peng	R Programming for Data Science	Lean pub publishers	2015.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jared P.Lander ,	R for Everyone – Advanced Analytics and Graphics	Addison Wesley Data & Analytics Series	Reprint 2016.

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	BSc Computer Science with Data Analytics	
Course Code:	24UDA414			**Title**	**Batch:**	2024 - 2027
				Core Course Lab VI Data Mining Lab	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	3	**Tutorial Hrs./Sem.**	45		**Credits:**	2

Course Objective

- To learn fundamental of data mining.
- Designed to exercise the data mining techniques such as
- classification, clustering.
- Demonstrate various mining algorithms on real world data.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn to execute data mining tasks using a data mining toolkit (such as WEKA) and visualize the results.	K3
CO2	Demonstrate the working of algorithms for data mining tasks such association classification.	K4
CO3	Apply various clustering algorithms on the given data set.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Content
1. Demonstrate categorical attributes and real valued attributes 2. Perform the basic statistical analysis and visualizations in R using the sample data provided. 3. Perform data exploration for the iris dataset 4. Perform data visualization for the iris dataset 5. Perform K Means clustering for Iris Dataset to create 3 clusters

6. Demonstrate hierarchical clustering using R 7. Write a R program to demonstrate decision tree 8. Write the R program to implement Regression Analysis 9. Write the R program to implement **Apriori Algorithm** 10. Write the R program to implement **Outliers** 11. Implement Regression Analysis using R. 12. Implement Outlier detection using R.
Total Hours 60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	J. Han, M. Kamber	Data Mining: Concepts and Techniques	Morgan Kauffman	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Arun K, Pujari	Data mining Techniques	Universities Press, Second Edition,	2010.
2	Margaret H. Dunham	Data Mining - Introductory and Advanced Topics	Prentice Hall	2012

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	BSc Computer Science with Data Analytics	
Course Code:	24UDA4S1			**Title**	**Batch:**	2024 - 2027
				SEC II: Naan Mudhalvan UI Web Development	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem.**	30		**Credits:**	2

Course Objective

- Provide Fundamentals of HTML tags, links, images, frames, lists, tables, form elements and input types
- Introduced to various CSS selectors and applying colors, and also the background and inserting borders, CSS attribute selectors, Gradient and shadows
- Learn the basics of JavaScript and how to manipulate DOM elements.
- Applying JavaScript functionalities to create web pages
- Learn how to include Bootstrap in the project and use different Bootstrap features like fixed drop down menu, carousel, text and image grids

Course Outcomes:

CO1	Analyze a web page and identify its elements and attributes	K3
CO2	Create web pages using HTML and Cascading Style Sheets	K4
CO3	Build dynamic web pages using JavaScript (Client side programming)	K1
CO4	Capable of construction less demanding web application on their own	K2
CO5	Building a complete webpage using bootstrap	K5

Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	L	H	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**HTML:** What is web publishing, web browsers, Introduction to HTML, Writing HTML Code, HTML Basic Tags, Text Tags, Semantic Elements in HTML5, Link tags, Image Tags, Hyperlinks, Frames and Iframes in HTML, Lists and Tables, Forms in HTML, Form Elements, HTML Input Types: Text, Radio, Checkbox, Button, Date, Time, Email and Password? Programs on HTML	6
Unit II	**Cascading Style Sheets**: Introduction, CSS Selectors, Element Selector, ID selector, class selector, universal selector, CSS Colors, Background, Border, Attribute Selectors, CSS Text and Fonts, Gradient and shadows. Programs on CSS	6
Unit III	**JavaScript I:** Evolution of JavaScript, Java vs. JavaScript, JavaScript Syntax, and JavaScript Popup boxes, Datatypes and Variables, Type Conversions, Operators. Programs on JavaScript	6
Unit IV	**JavaScript II:** Conditional Statements and Looping Statements. Functions: Definition, Parameters, Invocation, function call and apply (), Arrays and strings	6
Unit V	**Bootstrap:** Introduction, Containers, Grid Basic, Typography, Colors, Tables, Images, Alerts, Buttons, Progress Bars, Spinners, Pagination, Cards, Navbar, Carousel and Models Programs on Bootstrap	6
	Total Contact Hrs	**30**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Laura Lemay, Rafe Coburn, Jennifer Kyrnin	Mastering HTML, CSS & JavaScript Web Publishing	7th Edition	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Terry Felke- Morris	Web Development and Design Foundation with HTML5	Pearson, Ninth edition	2017
2	Paul Deitel, Harvey and Abbey Deitel, Deital	Internet & World Wide Web How to Program	Pearson Education	2019
3	Uttam K Roy	Web Technologies	Oxford University Press	2017

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			Programme Title:	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA4S2			Title	Batch:	2024 - 2027
				SEC II: Naan Mudhalvan Exploratory Data Analysis	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30		Credits:	2

Course Objective

The Course aims

- To learn how to manage data frames.
- To explore the basic graphs.
- To expand the knowledge on Plotting system.
- To gain knowledge about plotting and color in R.
- To learn about ggplot2 plotting system.

Course Outcome

On completion of the course, students should be able to

Course Outcomes (CO)

CO1	Understand dpylr package.	K3
CO2	Understand analytic graphics and exploratory graphs.	K4
CO3	Apply plotting system.	K1
CO4	Recognize plotting and colors	K2
CO5	Learn how to use, customize plotting system	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	L	H	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Pedagogy

Units	Content	Hrs
Unit I	**Managing Data Frames with the dplyr package:** Data Frames - The dplyr Package – dplyr Grammar – dplyr package - select() - filter() - arrange() - rename() - mutate() - group_by(). **Exploratory Data Analysis:** Formulate your question - Read in your data - Check the packaging - Run str() - Top and the bottom of your data - Check "n"s - Validate with at least one external data source.	6
Unit II	**Principles of Analytic Graphics:** Show comparisons - Show causality, mechanism, explanation, systematic structure - Show multivariate dataIntegrate evidence - Describe and document the evidence. **Exploratory Graphs:** Characteristics of exploratory graphs-Air pollution in the United states-Getting the data-Simple summaries: One Dimension-Five number summary-Box plot-Histogram-Overlaying features-Bar plot-Simple summaries: Two dimensions and beyond-Multiple Box plots-Multiple Histograms- Scatter plots-Scatter plot-using color-Multiple scatter plots.	6
Unit III	**Plotting systems:** The Base Plotting system-The Lattice system-The ggplot2 system. **Graphics Devices:** The Process of Making a Plot - Plot creation - Graphics File Devices - Multiple Open Graphics Devices – Copying plots. The **Base Plotting System:** Base Graphics - Simple Base Graphics - Base Graphics Parameters - Base Plotting Functions - Base Plot with Regression Line - Multiple Base Plots.	6
Unit IV	**Plotting and Color in R:** Colors 1, 2, and 3 - Connecting colors with data - Color Utilities in R - colorRamp() - colorRampPalette() - RColorBrewer Package - Using the RColorBrewer palettes - The smoothScatter() function - Adding transparency. **The ggplot2 Plotting System Part I**: The Basics: qplot() – Label your dataModifying aesthetics -Adding a geom – Histograms - Facets - Case Study: MAACS Cohort -Summary of qplot()	6
Unit V	**The ggplot2 Plotting System Part II:** Basic Components of a ggplot2 Plot - Building Up in Layers - First Plot with Point Layer - Adding More Layers: Smooth, Facets - Modifying Geom Properties - Modifying Labels - Customizing the Smooth -Changing the Theme. **Data Analysis Case study**: Synopsis – Loading and processing the Raw Data – Results.	6
	Total Contact Hrs	**30**

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Roger D. Peng	Exploratory Data Analysis with R	Lean Publishing	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	John Maindonald and W. John Braun	Analysis and Graphics Using R – an Example Based Approach	Cambridge University Press, Third Edition	2010
2	Maria L. Rizzo	Statistical Computing with R	Second Edition	2019

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA4N1			**Title**	**Batch:**	2024 - 2027
				NME II: **Data Analysis using Excel**	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem.**	30		**Credits:**	2

Course Objective

This course was designed to make the student aware of various formatting function, understand the use of mathematical functions, pivot table and charts for visualization and summarization of data.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	List and explain various function used in Microsoft excel.	K3
CO2	Associate various formulas and functions and relate it to implement on available data sets.	K4
CO3	Illustrate data in form of charts and pivot table based on organized data available in excel	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Contents	Hrs
1. Create a worksheet to demonstrate formatting in Excel 2. Create a student worksheet to implement formula and functions 3. Create an employee table to implement auto functions 4. Create an invoice and analyse the data using statistical functions 5. Analyse the excel data using advanced the statistical functions 6. Create an excel sheet to implement Sort, Filter and Freeze 7. Create an excel sheet to implement different kinds of chart: Column Chart, Bar chart, Line Chart, Pie Chart, Area Chart, Surface Chart 8. Create an excel sheet to convert text to column 9. Analyze data by: a. Creating a pivot table b. Filtering data using Slicers c. Analyzing data using Pivot Charts 10. Create an excel sheet to implement Vlookup	30 Hrs

Reference:

https://www.w3schools.com/EXCEL/index.php

https://www.tutorialspoint.com/excel/index.htm

https://www.geeksforgeeks.org/introduction-to-ms-excel/

https://www.javatpoint.com/excel-tutorial

https://www.simplilearn.com/learn-ms-excel-free-training-course-skillup

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	BSc Computer Science with Data Analytics	
Course Code:	24UDA4N2			**Title**	**Batch:**	2024 - 2027
				NME II: Office Automation Tools	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem**	30		**Credits:**	2

Course Objective

Getting an insight knowledge on Ms-word, Ms-excel, and Power point.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To gain knowledge of various text formats and creating customers list using mail merge for sending letters to the respondents at a time.	K3
CO2	Aware and apply various statistical tools available in Ms-excel for all applications	K4
CO3	To gain knowledge making effective presentation using power point presentation.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Content
1. Create a document and apply different formatting options 2. Design a Greeting card using Word Art for different festivals 3. Create your Bio data and use page borders and shadings 4. Create a document and insert header and footer, page title etc. 5. To create a document, set the margins, orientation, size, Column water mark, page color and page borders 6. Insert a table into the document 7. Write a program to implement mail merge 7. Prepare a mark sheet of your class subjects 8. Apply the creating, editing, saving, printing, securing & protecting operations to an excel spreadsheets 9. Prepare a bar chart and pie chart for analysis of five year results of your institute

	10. Prepare an Attendance sheet of 10 students for any subjects of your Syllabus. Calculate their total attendance, total percentage of attendance of each student and average of attendance 11. Apply themes and layouts to power point slides and insert pictures, graphics, shapes and tables into presentation 12. Create a company advertisement using power point presentation
Total Hours 30 Hrs	

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. S. Srivastava	MS Office	Lakshmi Publications	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dave Jaworski	**Microsoft Secrets**	Morgan James Publishing	2017

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

SEMESTER V

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA515			**Title**	**Batch:**	2024 - 2027
					Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	6	**Tutorial Hrs./Sem.**	90	**Core Course IX:** Big Data Analytics	**Credits:**	4

Course Objective

- To introduce big data tools & Information Standard formats.
- To understand the basic concepts of big data.
- To learn Hadoop, HDFS and Map Reduce concepts.
- To teach the importance of NoSQL.
- To explore the big data tools such as Hive, HBase and Pig.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To understand, illustrate and evaluate the concepts and techniques of Data Science, Big Data Analytics and its tools.	K1
CO2	To collaborate, apply and review the computing for big data in Hadoop, and NoSQL environment	K2
CO3	To comprehend, implement and review the concepts of data science and big data analytics projects using MapReduce, and MongoDB.	K3
CO4	To understand, use and analyze the concepts of big data analytics projects using HIVE database.	K4
CO5	To illustrate, develop and review the concepts of PIG database in Hadoop environment.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	M	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	M	H	H
CO4	M	H	M	H	M	H	H	L	M	L	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Big Data and Analytics:** Classification of Digital Data: Structured Data- Semi Structured Data and Unstructured Data. **Introduction to Big Data:** Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data - Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop Environment **Big Data Analytics:** Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments – Basically Available Soft State Eventual Consistency - Top Analytics Tools	18
Unit II	**Technology Landscape:** NoSQL, Comparison of SQL and NoSQL, Hadoop - RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem	18
Unit III	**Mongodb and Mapreduce Programming:** MongoDB: Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language. **MapReduce:** Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression	18
Unit IV	**Hive:** Introduction – Architecture - Data Types - File Formats - Hive Query Language Statements – Partitions – Bucketing – Views - Sub- Query – Joins – Aggregations - Group by and Having – RCFile - Implementation - Hive User Defined Function - Serialization and Deserialization.	18
Unit V	**Pig:** Introduction - Anatomy – Features – Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Types - Piggy Bank – User Defined Functions - Parameter Substitution – Diagnostic Operator - Word Count Example using Pig - Pig at Yahoo! - Pig Versus Hive .	18
	Total Contact Hrs	**90**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Seema Acharya, Subhashini Chellappan	Big Data and Analytics	Wiley Publications	First Edition,2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Judith Huruwitz, Alan Nugent, Fern Halper, Marcia Kaufman	Big data for dummies	John Wiley & Sons	2013
2	Tom White	Hadoop The Definitive Guide	O'Reilly Publications	Fourth Edition, 2015
3	Dirk Deroos, Paul C.Zikopoulos, Roman B.Melnky, Bruce Brown, Rafael Coss	Hadoop For Dummies	Wiley Publications	2014
4	Robert D.Schneider	Hadoop For Dummies	John Wiley & Sons, Inc.	2012
5	Paul Zikopoulos	Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data	McGraw Hill	2012
6	Chuck Lam	Hadoop In Action	Dreamtech Publications	2010

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA516			**Title**	**Batch:**	2024 – 2027
				Core Course X : Data Visualization	**Semester:**	V
Lecture Hrs./Week or Practical Hrs./Week	6	**Tutorial Hrs./Sem.**	90		**Credits:**	4

Course Objective

- To make the student understand Data Visualization.
- To analyze the Various Visualization Techniques for Geospatial Data and Multivariate Data.
- To understand the Visualization Techniques for Multivariate Data.
- Basic understanding of Tableau.
- To get basic understanding in Power BI

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Know the foundations of data visualization	K1
CO2	Identify spatial and geospatial data	K2
CO3	Identify visualization techniques for Trees, Graphs and Networks	K3
CO4	Learn visual analytic techniques using Tableau	K4
CO5	Know the basics of PowerBI.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	L	H	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Introduction:** History of Visualization - Relationship between Visualization and Other Fields - The Visualization Process - Pseudo code Conventions- The Scatter plot - The Role of the User.	18
Unit II	**Data Foundations**- Types of Data - Structure within and between Records **Visualization Techniques for Spatial Data:** One-Dimensional Data - Two-Dimensional Data - Three-Dimensional Data - Dynamic Data - Combining Techniques.	18
Unit III	**Visualization Techniques for Geospatial Data:** Visualizing Spatial Data - Visualization of Point Data - Visualization of Line Data - Visualization of Area Data - Other Issues in Geospatial Data Visualization.	18
Unit IV	**Tableau:** Creating Visual Analytics with Tableau Desktop - Connecting to Your Data - Building Your First Visualization - Creating Calculations to Enhance Your Data.	18
Unit V	**Power BI**: Introducing Power BI - Sharing the dashboard - Understanding data refresh - Using Power BI Desktop- Getting data from services and content packs. .	18
	Total Contact Hrs	**90**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Matthew Ward, Georges Grinstein, Daniel Keim	Interactive Data Visualization-Foundations, Techniques, and Applications	A K Peters, Ltd. Natick, Massachusetts	2010

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Noah Iliinsky and Julie Steele	Designing Data Visualizations	O‟Reilly Media, Inc	2011
2	Kieran Healy	Data Visualization – A Practical Introduction	Princeton University Press	2019

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			Programme Title:	B. Sc Computer Science with Data Analytics	
Course Code:	24UDA5E1			Title	Batch:	2024 – 2027
				Discipline Specific Elective I: Computer Networks	Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75		Credits:	4

Course Objective

The Course aims

- To build an understanding of the fundamental concepts of computer networking.
- To introduce the basic taxonomy and terminology of computer networking.
- To introduce advanced networking concepts.
- Describe how signals are used to transfer data between nodes.
- Describe how routing protocols work.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Visualize the different aspects of networks, protocols and network design models	K1
CO2	Identify the hacking methods and threats to National security	K2
CO3	Analyze and compare different LAN protocols	K3
CO4	Compare and select appropriate routing algorithms for a network	K4
CO5	Examine the important aspects and functions of network layer, transport layer and application layer in internetworking.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Introduction:** Uses – Network Hardware: LAN –MAN – WAN, Internetworks – Network Software: Protocol hierarchies – Design issues for the layers – Connection-Oriented and Connectionless Services– Service Primitives-Reference models: OSI – TCP/IP.	14
Unit II	**Physical Layer:** Guided Transmission Media -Wireless Transmission - Communication Satellites – Digital Modulation and Multiplexing - Mobile Telephone System.	14
Unit III	**Data Link Layer**: Data Link layer Design Issues - Error Detection And Correction - Elementary Data Link Protocols - Sliding Window Protocols	15
Unit IV	**Network Layer**: Network Layer Design Issues: Store and Forward Packet Switching - Services Provided to the Transport Layer - Routing Algorithms: Shortest Path Routing – Flooding - Distance Vector Routing-Broadcast Routing-Multicast Routing – Network Lay	16
Unit V	**Transport Layer & Application Layer:** Transport Services - Elements of Transport Protocols – Congestion Control – Domain Name System - Electronic Mail – World Wide Web.	16
	Total Contact Hrs	**75**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Andrew S Tanenbaum	Computer Networks	Pearson Education	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Behrouz A. Forouzan	Data Communications and Networking	Fourth Edition TMH	2018
1	P.C .Gupta	Data communications and Computer Networks	Fourth Edition TMH	2006
2	W.A. Shay	Understanding communications and Networks	3rd Edition	2014

3	William Stallings	Data and Computer Communication	Sixth Edition, Pearson Education	2000

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	BSc Computer Science with Data Analytics	
Course Code:	24UDA5E2			**Title**	**Batch:**	2024 - 2027
				Discipline Specific Elective I: Internet of Things	**Semester:**	V
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	4

Course Objective

To enable the students to gain the knowledge about Internet of Things

- To learn about various IOT-related protocols.
- To build simple IoT Systems using Arduino and Raspberry Pi.
- To understand data analytics and cloud in the context of IoT.
- To develop IoT infrastructure for popular applications.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Understanding the concept of IoT.	K1
CO2	Analyze various protocols for IoT..	K2
CO3	Design a PoC of an IoT system using Raspberry Pi/Arduino.	K3
CO4	Apply data analytics and use cloud offerings related to IoT.	K4
CO5	Analyze applications of IoT in real time scenario.	K5

Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Fundamentals of IOT:** Genesis of IOT – IOT and Digitization – IOT Impact. **Comparing IOT Architectures:** The oneM2M IoT Standardized Architecture – The IoT World Forum (IoTWF) Standardized Architecture - A Simplified IoT Architecture - The Core IoT Functional Stack - IoT Data Management and Compute Stack - Sensors, Actuators, and Smart Objects.	15
Unit II	**IoT Access Technologies:** Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e and LORA WAN. **IP as the IoT Network Layer:** The Need for Optimization - Optimizing IP for IoT. **Application Protocols for IoT:** The Transport Layer - IoT Application Transport Methods and Protocols.	15
Unit III	**Data and Analytics for IOT:** An Introduction to Data Analytics for IoT - Machine Learning - Big Data Analytics Tools and Technology - Edge Streaming Analytics - Network Analytics.	15
Unit IV	**Securing IoT:** A Brief History of IoT Security - Common Challenges in IoT Security - IoT Security Practices and Systems - Formal Risk Analysis Structures: OCTAVE and FAIR.	15
Unit V	**Case Studies/ Industrial Applications:** **Manufacturing:** An Introduction to Connected Manufacturing - Architecture for the Connected Factory. **Utilities:** An Introduction to the Power Utility Industry – The GridBlocks Reference Model. **Smart and Connected Cities:** Smart City Use-Case Examples: Street Lighting Architecture - Smart Parking - Smart Parking Architecture - Smart Traffic Control Architecture.	15
	Total Contact Hrs	**75**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry	IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things	Cisco Press	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Arshdeep Bahga, Vijay Madisetti	Internet of Things – A hands-on approach	Universities Press	2015
2	Olivier Hersent, David Boswarthick, Omar Elloumi	The Internet of Things – Key applications and Protocols	Wiley Publications	2012.

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			Programme Title:	B. Sc Computer Science with Data Analytics	
Course Code:	24UDA5E3			Title	Batch:	2024 – 2027
				Discipline Specific Elective I: Cybersecurity	Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75		Credits:	4

Course Objective

The main objectives of this course are to

1. To understand Information Security, Cyber threats, attacks, web security.
2. To know about different modes of hacking tools and phases of penetration tests and Methodologies.

Course Outcome

On completion of the course, students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics of information security, threats and its attacks	K1
CO2	Understand the fundamentals of ethical hacking with the hacking methodologies	K2
CO3	Analyze the phases of the penetration test with the methods	K3
CO4	Understand the vulnerabilities and use the frameworks to identify vulnerabilities by service scan	K4
CO5	Understand the web security issues with the fundamentals of OWASP	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	**M**	**H**	**H**	**H**	**M**	**L**	**M**	**L**	**M**	**M**	**H**	**H**
CO2	**H**	**M**	**M**	**H**	**H**	**L**	**M**	**L**	**M**	**L**	**H**	**H**
CO3	**M**	**H**	**M**	**H**	**M**	**M**	**H**	**M**	**M**	**L**	**H**	**H**
CO4	**M**	**H**	**M**	**H**	**M**	**L**	**H**	**L**	**M**	**L**	**H**	**M**
CO5	**H**	**M**	**H**	**H**	**L**	**L**	**M**	**L**	**M**	**H**	**H**	**H**

SYLLABUS

Units	Content	Hrs
Unit I	Fundamentals of Ethical Hacking: Overview of Cyber threats – Data and Network Security Attacks – Threats: MAC spoofing – Access control Network protocol and services–Hacking terms - Ethical Hacking overview –Modes of Ethical Hacking – Ethics and Legality	14
Unit II	Hacking Methodology Reconnaissance: Foot printing: Reconnaissance - Footprinting theory – Penetration test – Phases of Penetration test - Methods of Footprinting – Network Information gathering process – Terminologies of Foot printing – Footprinting through search engine directives – Whois tool –NetCraft – Extract Information from DNS - Foot printing from Email servers – Shodan – Dig – MetaGooFil – Social Engineering.	14
Unit III	Scanning and Enumeration : Scanning: Concept of Nmap - - Port scanning with Nmap – Subnet - Scanning IPs with Nmap Pings and Ping sweeps – Port - Three way handshake – NmapSyn scanning – Nmap TCP Scan – Nmap UDP Scan - Bypass of IPS and IDS – Nmap Script Engine Enumeration: Service Fingerprinting – Vulnerability Scanners – Basic Banner Grabbing – Common Network services – SMTP – DNS – RPCBIND Enumeration – SMB – NetBIOS	15
Unit IV	System and Network Vulnerability**:** Metasploit – Penetration testing with framework Metasploit – Scan services to identify vulnerabilities – Scan FTP services – Scan HTTP services – Exploitation – Post exploitation techniques – Meterpreter – Rootkit – Backdoor – Password hashes – Privilege Escalation - Scanning vulnerable services with Nessus	16
Unit V	Software Vulnerability (OWASP 10) : Fundamentals of OWASP Zed Attack Proxy (ZAP) – Web app vulnerability scan - Code Injection Attacks – Broken Authentication – Sensitive Data Exposure – XML External Entities – Broken Access Control – Security misconfiguration – Website pen testing - Cross Site Scripting (XSS) – Insecure Deserialization – Using Components with known vulnerabilities – Insufficient logging and monitoring.	16
	Total Contact Hrs	**75**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	McClure, S., Scambray, J. and Kurtz	Hacking Exposed 7Network Security Secrets and Solutions	Fourth Edition	2012
2	Engebretson, P.	The Basics Of Hacking And Penetration Testing	Pearson Education	2013

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Zaid Sabih	Learn Ethical Hacking from Scratch	PACKT publishing,	2018
2	Harsh Bothra	Hacking be a hacker with ethics	Khanna Publishing	2016

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA517			**Title**	**Batch:**	2024 - 2027
				Core Course lab VII: Big Data Lab	**Semester:**	V
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**			**Credit**	3

Course Objective

The objectives of this course are

- To implement HDFS and Hadoop
- To realize storage of big data using MongoDB.
- To implement MapReduce programs for processing big data.

Course Outcome

On the successful completion of the course, students will be able to

CO1	To implement HDFS and Hadoop	K3
CO2	To realize storage of big data using MongoDB.	K4
CO3	To implement MapReduce programs for processing big data.	K5

Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Content

1. Install, configure and run python, numPy and Pandas.
2. Install, configure and run Hadoop and HDFS.
3. Visualize data using basic plotting techniques in Python.
4. Implement NoSQL Database Operations: CRUD operations, Arrays using MongoDB.
5. Implement Functions: Count – Sort – Limit – Skip – Aggregate using MongoDB.
6. Implement word count / frequency programs using MapReduce.
7. Implement a MapReduce program that processes a dataset.
8. Implement clustering techniques using SPARK.

9. Implement an application that stores big data in MongoDB / Pig using Hadoop / R
Total Hours 75

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Seema Acharya, Subhashini Chellappan	Big Data and Analytics	Wiley Publications	First Edition,2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Judith Huruwitz, Alan Nugent, Fern Halper, Marcia Kaufman	Big data for dummies	John Wiley & Sons	2013
2	Tom White	Hadoop The Definitive Guide	O'Reilly Publications	Fourth Edition, 2015
3	Dirk Deroos, Paul C.Zikopoulos, Roman B.Melnky, Bruce Brown, Rafael Coss	Hadoop For Dummies	Wiley Publications	2014
4	Robert D.Schneider	Hadoop For Dummies	John Wiley & Sons, Inc.	2012
5	Paul Zikopoulos	Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data	McGraw Hill	2012
6	Chuck Lam	Hadoop In Action	Dreamtech Publications	2010

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA518			**Title**	**Batch:**	2024 - 2027
				Core Course Lab VIII: Data Visualization Lab	**Semester:**	V
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**			**Credit**	3

Course Objective

- To understand the concept of Tableau
- To become familiar with the Work Sheets and Time Series
- To provide hands on experience with Tableau.
- To familiarize students with Various BI Dashboards.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Connect data source using Tableau	K3
CO2	Apply appropriate data sets for visualization	K4
CO3	Identify and apply Power BI Concept	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Content
1. Connecting to a data source and joining related data sources in Tableau 2. Visualization concept using Show Me. 3. Adding, duplicating, and renaming, reordering, clearing, and deleting on worksheets. 4. Time series, Aggregation and Filters for Unemployment Data Statistics. 5. Maps and Scatter plots for a sample DataSet. 6. Table calculations, Dashboard and Storytelling using Customer Data Set. 7. Import the legacy data from different sources such as (Excel, SqlServer, Oracle etc.) and load in the target system. 8. Reporting/Dash boarding using powerBI. 9. Publishing Power BI Dashboards. 10. Data relationships and queries in PowerBI.
Total Hours 75 Hrs

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Matthew Ward, Georges Grinstein, Daniel Keim	Interactive Data Visualization-Foundations, Techniques, and Applications	A K Peters, Ltd. Natick, Massachusetts	2010

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Noah Iliinsky and Julie Steele	Designing Data Visualizations	O‟Reilly Media, Inc	2011
2	Kieran Healy	Data Visualization – A Practical Introduction	Princeton University Press	2019

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B. Sc,			**Programme Title:**	Bachelor of Science (Computer Science with Data Analytics)	
Course Code:	24UDA5S1			**Title**	**Batch:**	2024 - 2027
				SEC III: Quantitative Aptitude	**Semester:**	V
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs/Sem**			**Credits:**	2

Course Objective

The objective of this course is to provide learners with a deeper understanding of aptitude concepts and enhance problem-solving skills through the application of Vedic Mathematics techniques.

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall and explain the basic Vedic mathematics sutras and techniques.	K1
CO2	Apply Vedic mathematical methods to solve basic arithmetic and aptitude problems.	K2
CO3	Analyze and break down complex aptitude problems using Vedic techniques to simplify calculations.	K3
CO4	Evaluate and compare different Vedic methods to identify the fastest and most efficient approach for a given problem.	K4
CO5	Create and apply new strategies for solving aptitude problems using advanced Vedic techniques.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	L	H	H	H	M	L	M	L	M	M	H	H
CO2	H	M	M	H	H	L	M	L	M	L	H	M
CO3	M	H	M	H	M	M	H	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	L	H	M
CO5	H	M	H	H	L	L	M	L	M	H	H	H

SYLLABUS

Units	Content	Hrs
Unit I	**Quantitative Aptitude:** Algebra Equations **Basic Arithmetic:** Percentage - Basic Arithmetic - Ratio & Proportions Number System – Progression.	6
Unit II	**Time, Work, Speed & Distance:** Speed & Distance - Time & Work **Profit, Loss and Interest:** Profit & Loss - SI & CI **Odd one Out, Analogy:** Odd One Out – Analogy.	6
Unit III	**Geometry & Mensuration:** Geometry – Mensuration –Trigonometry.	6
Unit IV	**Statistics:** Probability - P & C -Mean, Median, Mode -Venn Diagram. **Series, Coding – Decoding:** Series - Coding – Decoding **Flowchart & Visual Reasoning:** Flowchart - Visual Reasoning.	6
Unit V	**Reasoning:** Data Sufficiency - Attention to Details - Missing Term in Box - Logical Sequence of Words - Case Puzzles **Relationships:** Blood Relationships **Critical Reasoning:** Assumptions & Arguments - Statement & Conclusions and Directions.	6
	Total Contact Hrs	**30**

Note: Theorems Statement Only)

Pedagogy:

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dr. R. S. AGGARWAL	Quantitative Aptitude for competitive Examinations	S. Chand company private Ltd	2023

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION

1	HRITHIK AGGARWAL	Quantitative Aptitude for competitive Examinations	S. Chand company private Ltd	2025

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Mr S.Earnest Rajadurai Signature	Name: Dr. E. Ramadevi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA5S2			**Title**	**Batch:**	2024 - 2027
				SEC III: AI and Chatbot Development using Python	**Semester:**	V
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem.**			**Credits:**	2

Course Objective

To enable the students to gain the knowledge about AI and Chatbot Development

- To introduce students to **AI and Natural Language Processing (NLP)**.
- To develop **rule-based and AI-powered chatbots**.
- To deploy chatbots on **various platforms**.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Able to Understand the Basics of AI	K1
CO2	Able to Understand the Basics of NLP	K2
CO3	Implementing rule based chatbot	K3
CO4	Implementing AI powered chatbot	K4
CO5	To deploy chatbots on **various platforms**	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Introduction to AI and Chatbots:** Basics of Artificial Intelligence (AI) and Machine Learning (ML) - Understanding Natural Language Processing (NLP) - Chatbots: Types, Applications, and Use Cases - Overview of chatbot development frameworks (Dialogflow, Rasa, ChatterBot). **Practical** • **Set up Python environment** for chatbot development (install NLTK, SpaCy, ChatterBot). • **Create a simple chatbot** using Python with if-else conditions. • **Explore chatbot frameworks** (Dialogflow, Rasa, ChatterBot) and compare features.	6
Unit II	**NLP Techniques for Chatbots:** Tokenization, Stemming, Lemmatization - Named Entity Recognition (NER) - Sentiment Analysis using NLTK and SpaCy - Intent recognition and text classification. **Practical** • T**okenization and Lemmatization:** Process text input using NLTK and SpaCy. • **Named Entity Recognition (NER):** Identify people, places, and dates in a given text. • **Sentiment Analysis:** Implement a sentiment analysis model using VADER or TextBlob.	6
Unit III	**Rule-Based Chatbots:** Building a basic chatbot using Python - Using ChatterBot for conversational AI - Implementing pattern matching and decision trees for responses - Enhancing chatbot responses using predefined templates. **Practical** • Build a chatbot using ChatterBot and train it with custom responses. • Pattern Matching Chatbot: Implement a chatbot using regular expressions. • Decision Tree-based Chatbot: Create a chatbot that answers FAQs based on user input.	6
Unit IV	**AI-Powered Chatbots:** Introduction to machine learning-based chatbots - Implementing a chatbot using TF-IDF and cosine similarity - Using transformer models (GPT, BERT) for chatbot conversations - Fine-tuning pre-trained AI models for chatbots. **Practical** • Build a chatbot using TF-IDF and cosine similarity for retrieving answers. • Train a machine learning model (Naïve Bayes) to classify user intents. • Implement a chatbot using a transformer model (Hugging Face GPT-2/DialoGPT).	6

Unit V	**Chatbot Deployment and Real-World Applications:** Integrating chatbots with Telegram, WhatsApp, or Web Applications - Deploying chatbots using Flask and FastAPI - Connecting chatbots with databases for dynamic responses - Future trends in AI-powered chatbots. **Practical** • Integrate a chatbot with Telegram API to respond to user messages. • Deploy a chatbot using Flask/FastAPI and test on a web browser. • Store chatbot conversations in a database (SQLite/MySQL) for analysis.	6
	Total Contact Hrs	**30**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Sumit Raj	Building Chatbots with Python	Apress	2018
2	Aurélien Géron	Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow	O'Reilly Media, Inc.	2019
3	Steven Bird, Ewan Klein, and Edward Loper	Natural Language Processing with Python	O'Reilly Media, Inc. 1st Edition	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Duygu Altinok	Mastering spaCy	Packt Publishing	2021
2	Andrew Freed	Conversational AI	Manning Publications	2021
3	Anirudh Koul, Siddha Ganju, Meher Kasam	Practical Deep Learning for Cloud, Mobile, and Edge	O'Reilly Media, Inc.	2019

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

SEMESTER VI

Programme Code:	**B.Sc**			**Programme Title:**	**B.Sc Computer Science with Data Analytics**	
Course Code:	**24UDA619**			**Title**	**Batch:**	**2024 - 2027**
				Core Course XI: Full Stack Development	**Semester:**	**VI**
Lecture Hrs./Week or Practical Hrs./Week	**5**	**Tutorial Hrs./Sem.**			**Credits:**	**4**

Course Objective

- To understand the basics of JavaScript and importance of MERN stack
- To understand the role of React in designing front-end components
- To understand the design issues in the development of backend components using Node.js and Express
- To understand the significance of using MongoDB as a database system
- To understand the advanced features of full stack development

Course Outcome

On completion of the course, students should be able to

Course Outcomes (CO)

CO1	To understand the basics of JavaScript and importance of MERN stack	K3
CO2	To understand the role of React in designing front-end components	K4
CO3	To understand the design issues in the development of backend components using Node.js and Express	K1
CO4	To understand the significance of using MongoDB as a database system	K2
CO5	To understand the advanced features of full stack development	K5

Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

CO4	M	H	M	H	M	L	H	L	M	L	H	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Introduction to Full Stack Development Frameworks**: Full Stack Development, Need of Full Stack Development, Introduction to Front end Environment Tools, Introduction to Backend Environment Tools, Introduction to Databases, Client/Server architecture structure. **Stack Frameworks:** MEAN, MERN, MEVN, LAMP, Rails or Ruby on Rails, Django Stack	14
Unit II	**Basics Of MERN Stack**: MERN Components - React - Node.js - Express - MongoDB – Tools and Libraries – Versions - Why MERN - Server-Less Hello World - Project Setup - nvm - Node.js - npm.	14
Unit III	**React Components:** Issue Tracker – React Classes - Composing Components - Passing Data using Properties and Children - Dynamic Composition **React state** - Initial State - Async State Initialization - Event Handling - Stateless Components - Designing components.	15
Unit IV	**NODE.JS:** Introduction – Nodejs Process Model – Install Node.js - Node.js basics - Local and Export Modules - Node Package Manager - Node.js web server - Node.js File system - Node Inspector - Node.js EventEmitter - Frameworks for Node.js - Express.js Web App - Serving static Resource - Node.js Data Access **Express:** Routing – Request Matching – Route Parameters – Route Lookup - Handler Function – Request Object – Response Object - Middleware **REST API:** Resource Based – HTTP Methods as Actions	16
Unit V	**MONGODB:** MongoDB Basics - Documents - Collections - Query Language - Installation - The mongo Shell - MongoDB CRUD operations - - MongoDB Node.js Driver - Schema Initialization - Reading from MongoDB - Writing to MongoDB.	16
	Total Contact Hrs	**75**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Vasan Subramanian	Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node	A Press Publisher,	2019

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Reference Books

- http://tutorialsteacher.com
- https://reactjs.org/
- https://nodejs.org
- www.Expressjs.com
- www.mongodb.com

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with Data Analytics)	
Course Code:	24UDA6E4			**Title**	**Batch:**	2024 - 2027
				Discipline Specific Elective II: Machine Learning Algorithms	**Semester:**	VI
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	4

Course Objective

To enable the students to gain the knowledge about Machine Learning

- Make the Student understand the Basics of Machine learning
- Recognize the Linear and Logistic Regression
- Implementing Naïve bayes and SVM
- Implementing clustering and decision tree
  Knowledge of recommendation system and NLP

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Able to Understand the Basics of Machine learning	K1
CO2	Recognize the Linear and Logistic Regression	K2
CO3	Implementing Naïve bayes and SVM	K3
CO4	Implementing clustering and decision tree	K4
CO5	Knowledge of recommendation system and NLP	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Introductio**n – classic and adaptive machine – Categories of machine learning algorithm **Important Elements in Machine Learning:** Data Formats – Learnability **Feature Selection and Feature Engineering**: scikit learn toy datasets – creating training and test set – managing categorical data – managing missing features – Data scaling and normalization – Feature selection and filtering – Principal component analysis	15
Unit II	**Linear Regression**: Linear models – A bidimensional example – Linear Regression with scikit-learn and and higher dimensionality – Ridge, Lasso and Elastic Net – Evaluation Metrics for Regression Model **Logistic Regression:** Linear classification – Logistic regression – Implementation and optimizations – Stochastic gradient descent algorithms – Finding the optimal hyperparameters – Classification metrics – ROC curve	15
Unit III	**Naïve Bayes:** Bayes Theorem – Naïve Bayes Classifiers – Naïve Bayes in scikit-learn **Support Vector Machine:** Linear support vector machine – scikit-learn implementation – controlled support vector machine – support vector regression	15
Unit IV	**Binary Decision Tree and Ensemble Learning:** Binary decision tree – decision tree classification – Ensemble learning **Clustering Fundamentals:** Clustering Basics – K Means – Hierarchical clustering	15
Unit V	**Introduction to Recommendation System:** Naïve User based system – content-based system – Model free collaborative filtering – Model based collaborative filtering **Introduction to Natural Language Processing:** NLTK and built-in corpora – bag of words strategy – A sample text classifier – Introduction to Artificial Neural network - Machine Learning Architecture	15
	Total Contact Hrs	**75**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Giuseppe Bonaccorso	Machine Learning algorithms	Packt Publishing Ltd. UK	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jason Bell	Machine Learning for Big Data- Hands on for Developers and Technical Professionals	Jhon Wiley & sons ,	Reprint 2017
2	Henrik Brink , Joseph W.Richards , Mark Fetherolf	Real World Machine Learning	Dreamtech Press (India) Pvt Ltd.,	2017

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	BSc Computer Science with Data Analytics	
Course Code:	24UDA6E5			**Title**	**Batch:**	2024 - 2027
				Discipline Specific Elective II: Predictive Analysis	**Semester:**	VI
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	4

Course Objective

The Course aims

- To understand the basics of Predictive analysis and its challenges
- To identify and visualize data in different dimensions.
- To understand the basic concepts data preparation and feature creation.
- To understand the concepts of Association rules
- To know how to assess predictive models.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Analyze the difference between predictive modeling with other models	K1
CO2	Represent data in various statistical formats.	K2
CO3	Identify the methods for data cleaning	K3
CO4	Analyze different Association rules and Item sets.	K4
CO5	Assess the predictive modeling and Linear Regression.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	M	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	M	H	H
CO4	M	H	M	H	M	M	H	L	M	L	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Introduction to Predictive Analysis:** Analytics – Predictive Analytics– Business Intelligence – Predictive Analytics vs. Business Intelligence - Predictive Analytics vs. Statistics – Predictive Analytics vs. Data Mining- Challenges in using predictive analytics. Predictive Analytics Processing steps – Business understanding – Defining data for predictive modelling – Defining the target variable – Defining measures of success for predictive models.	14
Unit II	**Understanding Data**: Single Variable Summaries- Data Visualisation in one dimension – Histograms – Multiple Variable summaries - Data Visualisation, two or higher dimensions – Value of statistical significance	14
Unit III	**Data Preparation- Variable cleaning:** Incorrect values – consistency in Data Formats – Outliers – Multidimensional Outliers – Missing values – Fixing Missed Data **Feature creation:** Simple Variable Transformations – Fixing Skew – Binning Continuous Variables-Numeric Variable Scaling – Nominal variable transformation – Ordinal variable transformation – Data and time variable features – ZIP Code features – Multidimensional Features- Variable selection Prior to modeling - Sampling	15
Unit IV	**Item sets**: Terminology - Parameter Settings – Frequent Item set. **Predictive Modeling:** Logistic Regression– K-Nearest Neighbor	16
Unit V	**Predictive Modeling:** Naive Bayes - Regression models -Linear Regression. **Assessing Predictive Models:** Batch approach to model assessment – Assessing Regression models	16
	Total Contact Hrs	**75**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dean Abbott	Applied Predictive Analytics - Principles and Techniques for the Professional Data Analyst	Wiley India Pvt Ltd.,	2015.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Daniel T.Larose, Chantal D.Larose	Data Mining and Predictive Analysis	Wiley India Pvt Ltd 2nd Edition	2017
2	Max Kuhn, Kjell Johnson	Applied Predictive Modeling	Springer	2016.

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	BSc Computer Science with Data Analytics	
Course Code:	24UDA6E6			**Title**	**Batch:**	2024 - 2027
				Discipline Specific Elective II: Social Media Analysis	**Semester:**	VI
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	4

Course Objective

- To understand foundations of Social Media Analytics.
- To Visualize and understand the data mining aspects in social networks.
- To solve mining problems by different algorithms.
- To understand network measures for social data.
- To understand behavioural part of web applications for Analysis. 6. To analyze the data available on any social media applications.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics of Social Media Analytics Explain Behavior Analytics techniques used for social media data.	K1
CO2	Explain the significance of Data mining in Social media.	K2
CO3	Demonstrate the algorithms used for text mining.	K3
CO4	Apply network measures for social media data.	K4
CO5	Apply social media analytics for Face book and Twitter kind of applications.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	m	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	m	H	H
CO4	M	H	M	H	M	m	H	L	M	L	H	H
CO5	H	M	H	H	m	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**ANALYTICS IN SOCIAL MEDIA AND TYPES OF ANALYTICS TOOLS :**The foundation for analytics- Social media data sources- Defining social media data- data sources in social media channels- Estimated Data sources and Factual Data Sources- Public and Private data-data gathering in social media analytics.	14
Unit II	**VISUALIZING SOCIAL NETWORKS :** Introduction, A Taxonomy of Visualization- The convergence of Visualization- Interaction and Analytics. Data mining in Social Media: Introduction- Motivations for Data mining in Social Media-Data mining methods for Social Media- Related Efforts.	14
Unit III	**TEXT MINING IN SOCIAL NETWORKS :** Introduction- Keyword search-Classification Algorithms- Clustering Algorithms-Greedy Clustering-Hierarchical clustering-k-means clustering- Transfer Learning in heterogeneous Networks-Sampling of online social networks- Comparison of different algorithms used for mining- tools for text mining	15
Unit IV	**NETWORK MEASURES CENTRALITY:** Degree Centrality -Eigenvector Centrality-Katz Centrality - PageRank- Betweenness Centrality- Closeness Centrality -Group Centrality -Transitivity and Reciprocity- Balance and Status-Similarity: Structural Equivalence- Regular Equivalence	16
Unit V	**BEHAVIOR ANALYTICS:** Individual Behavior-Individual Behavior Analysis, Individual Behavior Modeling-Individual Behavior Prediction **Collective Behavior:** Collective Behavior Analysis- Collective Behavior Modeling, Collective Behavior Prediction	16
	Total Contact Hrs	**75**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Reza Zafarani Mohammad Ali Abbasi Huan Liu	Social Media Mining	Cambridge University Press Fourth Edition	2012
2	Charu C. Aggarwal .	Social Network Data Analytics, Springer	Pearson Education	2013

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bing Liu	Social Media Analytics: Effective Tools for Building, Interpreting, and Using Metrics	2 nd Edition	2013
2	Matthew A. Russell	Web Data Mining : Exploring Hyperlinks, Contents and Usage Data, Springer	2nd Edition	2016

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	BSc Computer Science with Data Analytics	
Course Code:	24UDA6E7			**Title**	**Batch:**	2024 - 2027
				Discipline Specific Elective III: Cloud Computing	**Semester:**	VI
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	4

Course Objective

To enable the students to gain the knowledge of Cloud Computing

- Understand the cloud computing architectures, applications and challenges.
- Know how the data is stored in the cloud and the various services offered by the cloud.
- Develop the skills in Web Application Development using cloud technologies

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To understand the concepts in Cloud Computing and its Security	K1
CO2	Understand the concept of cloud computing services and its business value	K2
CO3	Analyze various web-based applications for collaborating everyone in cloud computing	K3
CO4	To explain and apply levels of services of Cloud	K4
CO5	To describe the security aspects in cloud.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	Cloud Computing Foundation: Introduction to Cloud Computing – Move to Cloud Computing – Types of Cloud – Working of Cloud Computing	15
Unit II	Cloud Computing Architecture : Cloud Computing Technology – Cloud Architecture – Cloud Modeling and Design - Virtualization : Foundation – Grid, Cloud and Virtualization – Virtualization and Cloud Computing	15
Unit III	Data Storage and Cloud Computing : Data Storage – Cloud Storage – Cloud Storage from LANs to WANs – Cloud Computing Services : Cloud Services – Cloud Computing at Work.	15
Unit IV	Cloud Computing and Security : Risks in Cloud Computing – Data Security in Cloud – Cloud Security Services – Cloud Computing Tools : Tools and Technologies for Cloud – Cloud Mashaps – Apache Hadoop – Cloud Tools	15
Unit V	Cloud Applications – Moving Applications to the Cloud – Microsoft Cloud Services – Google Cloud Applications – Amazon Cloud Services – Cloud Applications	15
	Total Contact Hrs	**75**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	A.Srinivasan and J.Suresh	Cloud Computing – A Practical Approach for Learning and Implementation	Pearson India Publications	2014

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dr. Kumar Saurabh	Cloud Computing-Unleashing Next Gen Infrastructure to Application	Wiley India Pvt Ltd, 3rd Edition	2014

2	Rajkumar Buyya, James Broberg, Andrzej Goscinski	Cloud computing principles and paradigms	Wiley India	2014.
3	Michael Miller	Cloud computing web-based application that change the way you work & collaborate online	Pearson Education	2013
4	Kris Jamsa	Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business	Jones & Bartlett Publishers	2013
5	Arshdeep Bahga and Vijay Madisetti	Cloud Computing – A Hands on Approach	Universities Press (India) Pvt Ltd.	2014.

WEB REFERENCES:

- NPTEL & MOOC courses titled Cloud computing
- https://nptel.ac.in/courses/106105167/

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B. Sc Computer Science with Data Analytics	
Course Code:	24UDA6E8			**Title**	**Batch:**	2024 - 2027
					Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75	**Discipline Specific Elective III:** Next Generation Database	**Credits**	4

Course Objective

To enable the students to gain basic knowledge about Next Generation Databases

- Concepts of No-SQL Databases
- The types No-SQL databases
- The features of MongoDB

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Describe the features of No-SQL Databases	K1
CO2	Develop programs using Document and Graph databases	K2
CO3	Experiment the features of column and key value databases	K3
CO4	Construct simple queries using MongoDB.	K4
CO5	Apply advanced MongoDB features	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Introduction:** Early Database Management Systems - Database revolutions: First, second and third generation - Big Data Revolution - Introduction to Sharding - Motivation for No-SQL Databases - CAP Theorem - Types of No-SQL Databases : Document Oriented - Columnar - Graph - Key-Value Pair	15
Unit II	**Document and Graph Databases:** Introduction- Basic operation of document databases- XML and XML Databases: XML Tools and Standards- XML Databases - XML Support in Relational Systems - JSON Document Databases : Introduction - Data Models in Document Databases - MemBase and CouchBase - Graph Databases	15
Unit III	**Column and Key-Value Databases** - Introduction – Data Warehousing Schemas- The Columnar Alternative- Column Database Architectures- In-Memory Databases- Distributed Database Patterns: Distributed Relational Databases- Non-Relational Distributed Databases- Sharding and Replication	15
Unit IV	**MongoDB:** Introduction to MongoDB: Need for MongoDB - MongoDBVs Relational Database Management Systems – Data Types – MongoDB Query Language - Getting Data into MongoDB – Database Operations: Create – Update – Read – Delete - Querying	15
Unit V	**Advanced MongoDB:** Indexing - Aggregation – Introduction to Map-Reduce Programming: Mapper - Reducer- Combiner – Partitioner - Searching – Sorting – Compression – ShardingComparison of Relational databases to new No-SQL stores - MongoDB - Cassandra - HBASE - Neo4J	15
	Total Contact 60 Hrs	**75**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Guy Harrison	Next Generation Databases	1st Edition, Apress	2015.
2	Shakuntala Gupta Edward, Navin Sabharwal	Practical Mongo DB	1st 2 Edition,Apress	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Adam Fowler ,	NoSQL for Dummies	1st Edition, John Wiley & Sons	2015
2	Ramez Elmasri and Shamkant Navathe	Fundamentals of Database Systems	6th Edition, Pearson	2011

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA6E9			**Title**	**Batch:**	2024 - 2027
				Domain Specific Elective III: Blockchain Technology	**Semester:**	VI
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	4

Course Objective

To enable the students to gain the knowledge about Block chain technology

- To study the basic concept of cryptocurrencies and blockchain
- To explain the details of bitcoin and its different components
- To study the basic Hyperledger and web3
- To analyse the position of web3 and Hyperledger with different aspects of blockchain technologies
- To differentiate between alternate blockchain and their advantages in application areas
- To understand Ethereum development environment and their application development process

Course Outcome

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Explain cryptocurrencies and their relationship with blockchain technologies	K1
CO2	Explain the different steps ion the use of bitcoins	K2
CO3	Relate web3 and Hyperledger to concepts in blockchain technologies	K3
CO4	Apply blockchain to different real-life problems	K4
CO5	Implement simple application using Ethereum	K5

Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Introduction:** Cryptographic hash functions – hash pointers – digital signatures – public keys as identities – an example cryptocurrency. Bitcoin, history of blockchain and Bitcoin – Types of Blockchain – Consensus – Decentralization.	12
Unit II	**Bitcoin** – Digital Keys and Addresses – Transactions, life cycle, data structure, types – Structure of the blockchain – Mining – Bitcoin Networks and Payments – Wallets – Alternative coins – Smart Contracts – Definition – Recardian contracts.	11
Unit III	**Web3 and Hyperledger:** Web 3 Contract development – POST requests – Frontend – Development framework – Hyperledger Projects – Protocol – Reference architecture – Hyperledger Fabric – Corda.	13
Unit IV	**Alternative Blockchains and Application**: Alternative blockchains – Applications, Internet of Things, Government, Health, Finance – Scaleability – Privacy.	11
Unit V	**ETHEREUM**: Setting up Ethereum development tools – Solidity language. – Ethereum accounts, key pairs, working with Externally Owned Accounts (EOA), contract accounts – Smart contracts, structure, setting up and interaction, examples – Decentralised applications, implementation, case studies – Whisper protocol – Swarm architecture and concepts.	13
	Total Contact Hrs	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Imran Bashir	Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained	Packt Publishing, Second Edition	2018
2	A. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder,	Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction	Princeton University Press	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Arshdeep Bahga and Vijay Madisetti	Blockchain Applications : A Hands-On Approach	Pearson Education	2017
2	Andreas Antonopoulos, Satoshi Nakamoto	Mastering Bitcoin	O'Reilly Publishing	2014

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
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Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA620			**Title**	**Batch:**	2024 - 2027
				Core Course Lab IX: Full Stack Development Lab	**Semester:**	V
Lecture Hrs./Week or Practical Hrs./Week	6	**Tutorial Hrs./Sem.**			**Credit**	2

Course Objective

- To understand the basics of JavaScript and importance of MERN stack
- To understand the role of React in designing front-end components
- To understand the design issues in the development of backend components using Node.js and Express
- To understand the significance of using MongoDB as a database system
- To understand the advanced features of full stack development

Course Outcome

On completion of the course, students should be able to

Course Outcomes (CO)

CO1	To understand the basics of JavaScript and importance of MERN stack	K3
CO2	To understand the role of React in designing front-end components	K4
CO3	To understand the design issues in the development of backend components using Node.js and Express	K5

Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

S.No	Unit / List of Programs
1	Write a program to create a simple webpage using HTML
2	Write a program to create a website using HTML CSS and JavaScript?
3	Write a program to build a Chat module using HTML CSS and JavaScript?
4	Write a program to create a simple calculator Application using React JS
5	Write a program to create a voting application using React JS
6	Write a program to create and Build a Password Strength Check using Jquery.
7	Write a program to create and Build a star rating system using Jquery.
8	Create a Simple Login form using React JS
9	**Create a blog using React JS Using the CMS** Users must be able to design a web page using the drag and drop method. Users should be able to add textual or media content into placeholders that are attached to locations on the web page using drag and drop method.
10	**Create a project on Grocery delivery application** Assume this project is for a huge online departmental store. Assume that they have a myriad of grocery items at their godown. All items must be listed on the website, along with their quantities and prices. Users must be able to sign up and purchase groceries.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Vasan Subramanian	Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node	A Press Publisher,	2019

,.

Reference Books

- http://tutorialsteacher.com
- https://reactjs.org/
- https://nodejs.org
- www.Expressjs.com
- www.mongodb.com

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
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Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA621			**Title**	**Batch:**	2024 - 2027
				Core Course Lab X: Machine Learning Lab	**Semester:**	VI
Lecture Hrs./Week or Practical Hrs./Week	6	**Tutorial Hrs./Sem.**	90		**Credit**	2

Course Objective

To enable the students to gain the knowledge about Data Mining

- Make the Student understand the Basics of Machine learning
- Know about Regression Algorithm
- Understand Classification Algorithm
- Evaluate the Bayesian Estimation Models and Neural Network
- Analyze of Machine Learning Experiments. With NLP

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Able to Understand the Basics of Machine learning	K3
CO2	Evaluate the Bayesian Estimation Models and Neural network	K4
CO3	Able to Analyze Machine learning experiments. With NLP	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Content
1) Write a program to load dataset and find the following a) Find no of rows and columns b) List the column names c) Find no of null values in each column d) Select the data from 3rd row, 4thcolumn to 10throw, 6thcolumn. e) No of unique values in particular column. 2) Write a program to manage missing values a) Delete the row with missing values

b) Fill the missing value with mean value
c) Fill the missing value with median value
d) Replace the null value with previous row value.
e) Replace the null value with next row value.

3) Write a program to reduce the features to five using Principal component Analysis algorithm in the dataset.

4) Write a program to reduce the features to two using Linear Discriminant Analysis algorithm in the dataset.

5 Wrie a program to do the following Regression task
a) Load the dataset.
b) Separate the features and target label into x and y variable.
b) Split the dataset into 75% training and 35% testing.
c) Use the Linear Regression algorithm to train the data.
d) Find MSE, RMSE and R2 Score to evaluate the model.

6) Wrie a program to do the following Classification task
a) Load the dataset.
b) Separate the features and target label into x and y variable.
b) Split the dataset into 70% training and 30% testing.
c) Use the naïve Bayesian Classifier algorithm to train the data.
d) Finally compute the accuracy of the classifier.

7) Wrie a program to do the following Classification task
a) Load the dataset.
b) Separate the features and target label into x and y variable.
b) Split the dataset into 80% training and 20% testing.
c) Use the Decision tree Classifier algorithm to train the data.
d) Provide the Confusion matrix and compute the accuracy of the classifier.

8) Wrie a program to do the following Classification task
a) Load the dataset.
b) Separate the features and target label into x and y variable.
b) Split the dataset into 75% training and 35% testing.
c) Use the naïve Support vector Machine algorithm to train the data.
d) Use evaluation techniques to find the classification report, confusion matrix and the accuracy of the classifier.

9) Wrie a program to do the following clustering task
a) Load the dataset.
b) Create a scatter plot with Age as X and Spending Score as Y axis.
c) Find optimum number of clusters for age and spending score columns.
d) Cluster the age and spending score into optimum number of clusters using Kmeans.
e) Draw a scatter plot displaying data points colored on the basis of clusters.

10) Wrie a program to do the following Classification task using neural network
a) Load the dataset.
b) Separate the features and target label into x and y variable.
b) Split the dataset into 70% training and 30% testing.
c) Use the MLP algorithm to train the data, set the two hidden layers as 50,20 and max iteration as 500.
d) Use evaluation techniques to find the classification report, confusion matrix and the accuracy of the classifier.

Total Hours 90 Hrs

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Giuseppe Bonaccorso	Machine Learning algorithms	Packt Publishing Ltd. UK	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jason Bell	Machine Learning for Big Data- Hands on for Developers and Technical Professionals	Jhon Wiley & sons ,	Reprint 2017
2	Henrik Brink , Joseph W.Richards , Mark Fetherolf	Real World Machine Learning	Dreamtech Press (India) Pvt Ltd.,	2017

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	B.Sc Computer Science with Data Analytics
Course Code:	24UDA622			**Title**	**Batch:** 2024 - 2027
				Core Course XII: Major Project	**Semester:** VI
Lecture Hrs./Week or Practical Hrs./Week		**Tutorial Hrs./Sem.**			**Credit** 4

COMPUTER SCIENCE PROJECT and VIVA VOCE

Guidelines

Introduction

The title of the project work and the organization will be finalized at the end of the fifth Semester. Each student will be assigned with a Faculty for guidance. The Project work and coding will be carried by using the facility of the computer science lab as well as in the organization. The periodical review will be conducted to monitor the progress of the project work. The project report will be prepared and submitted at the end of the semester. An external examiner appointed by the Controller of Examination will conduct the viva voce examination along with a respective guide.

Area of Work

- Web Based Development
- Mobile app development
- Website development
- IoT Projects
- Big Data and Data Mining Projects
- Cloud Computing Projects
- Networking Projects
- Artificial Intelligence and Machine learning Projects
- Data Analytics Projects using Python, R, Tableau etc.
- System Software
- Web Security Projects
- Image Processing

Methodology

Arrangement of Contents:

The sequence in which the project report material should be arranged and bound is as follows:

10. Cover Page & Title Page
11. Bonafide Certificates
12. Declaration
13. Acknowledgement
14. Synopsis
15. Table of Contents
16. Chapters
17. Appendix
18. References

Format of Table of Contents

TABLE OF CONTENTS

	3.2 Modules of the Project
	3.3 Input Design Format
	3.4 Output Design
	3.5 Table Design
	3.6 Supporting Diagrams (ER/DFD/Use Case)
4	**Implementation and Testing**
	4.1 Coding Methods
	4.2 Testing Approach
	4.3 Implementation and Maintenance
5	**Project Evaluation**
	5.1 Project Outcome
	5.2 Limitations of the Project
	5.3 Further Scope of the Project
6	**Conclusion**
7	**Appendix**
	7.1 Source Code
	7.2 Screenshots and Reports
8	**References**

Size of the Project

The Project Report contents should be a maximum of not exceeding 70 pages.

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
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Programme Code:	B.Sc			Programme Title:	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA6S1			Title	Batch:	2024 - 2027
				SEC IV: Naan Mudhalvan Gen AI and Prompt Engineering	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30		Credits:	2

Course Objective

The objective of this course is get the knowledge of Gen AI and Prompt Engineering

Course Outcome

On completion of the course, students should be able to

Course Outcomes (CO)

CO1	Understand the prompts and its types	K3
CO2	Understand Gen AI with NLP	K4
CO3	ChatGPT Prompt Examples	K1
CO4	Understand ChatGPT in Workplace	K2
CO5	Learn advanced prompts	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	L	H	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Introduction** Introduction - Role of Prompts in AI Models - What is Generative AI? - NLP and ML Foundations - Common NLP Tasks - Optimizing Prompt-based Models - Tuning and Optimization Techniques - Pre-training and Transfer Learning - Designing Effective Prompts - Prompt Generation Strategies - Monitoring Prompt Effectiveness - Prompts for Specific Domains.	6

Unit II	**ChatGPT Prompts Examples** Act Like Prompt - Include Prompt - Column Prompt - Find Prompt - Translate Prompt - Define Prompt - Convert Prompt - Calculate Prompt - Generating Ideas Prompt - Create A List Prompt - Determine Cause Prompt	6
Unit III	**ChatGPT Prompts Examples** Assess Impact Prompt -Recommend Solutions Prompt - Explain Concept Prompt - Outline Steps Prompt - Describe Benefits Prompt - Explain Drawbacks Prompt - Shorten Prompt - Design Script Prompt - Creative Survey Prompt - Analyze Workflow Prompt - Design Onboarding Process Prompt .	6
Unit IV	**ChatGPT in work place** Prompts for Programmers - HR Based Prompts - Finance Based Prompts - Marketing Based Prompts - Customer Care Based Prompts - Chain of Thought Prompts - Ask Before Answer Prompts – Fill In The Blank Prompts	6
Unit V	**Advanced Prompt Engineering** Perspective Prompts - Constructive Critic Prompts - Comparative Prompts- Reverse Prompts - Social Media Prompts - Advanced Prompts - New Ideas and Copy Generation - Ethical Considerations - Do's and Don'ts - Useful Libraries and Frameworks - Case Studies and Examples - Emerging Trend	6
	Total Contact Hrs	**30**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Web Reference

https://www.tutorialspoint.com/prompt_engineering/prompt_engineering_tutorial.pdf

https://developer.nbg.gr/sites/default/files/PromptEngineeringF.pdf

https://platform.openai.com/docs/guides/prompt-engineering

https://www.developer.tech.gov.sg/products/collections/data-science-and-artificial-intelligence/playbooks/prompt-engineering-playbook-beta-v3.pdf

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
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Programme Code:	B.Sc			Programme Title:	B.Sc Computer Science with Data Analytics	
Course Code:	24UDA6S2			Title	Batch:	2024 - 2027
				SEC IV: Naan Mudhalvan Industry 4.0	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30		Credits:	2

Course Objective

The main objectives of this course are to:

1. Align the theory and concepts with Industrial application of computers
2. Introduce the basic concepts of Industry 4.0, Artificial Intelligence, Big Data and Internet of Things.
3. Learn the applications and tools of Industry 4.0

Course Outcome

On completion of the course, students should be able to

Course Outcomes (CO)

CO1	Understand the basic concepts of Industry 4.0	K3
CO2	Outline the features of Artificial Intelligence	K4
CO3	Summarize the Big data domain stack and Internet of Things	K1
CO4	Identify the applications and Tools of Industry 4.0	K2
CO5	Analyze the skills required for future	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	L	H	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Introduction** Need – Reason for Adopting Industry 4.0 - Definition – Goals and Design Principles - Technologies of Industry 4.0 – Big Data – Artificial Intelligence (AI) – Industrial Internet of Things - Cyber Security – Cloud – Augmented Reality	6
Unit II	Artificial Intelligence: Artificial Intelligence (AI) – What & Why? - History of AI - Foundations of AI The AI - Environment - Societal Influences of AI - Application Domains and Tools - Associated Technologies of AI - Future Prospects of AI - Challenges of AI.	6
Unit III	Essential of Big Data in Industry 4.0 - Big Data Merits and Advantages - Big Data Components : Big Data Characteristics - Big Data Processing Frameworks - Big Data Applications - Big Data Tools - Big Data Domain Stack : Big Data in Data Science - Big Data in IoT - Big Data in Machine Learning	6
Unit IV	Applications of IoT – Manufacturing – Healthcare – Education – Aerospace and Defence – Agriculture - – Transportation and Logistics – Impact of Industry 4.0 on Society: Impact on Business, Government, People. Tools for Artificial Intelligence, Big Data and Data Analytics, Virtual Reality, Augmented Reality, IoT, Robotics	6
Unit V	Industry 4.0 – Education 4.0 – Curriculum 4.0 – Faculty 4.0 – Skills required for Future - Tools for Education – Artificial Intelligence Jobs in 2030 – Jobs 2030 - Framework for aligning Education with Industry 4.0.	6
	Total Contact Hrs	**30**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	P. Kaliraj, T. Devi	Higher Education for Industry 4.0 and Transformation to Education 5.0	Contents [MOOC, SWAYAM, NPTEL, Websites etc.] 1 https://nptel.ac.in/courses/106/105/106105195/	2020

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Manoel Carlos Ramon	API Features and Arduino Projects for Linux Programmers‖	Intel® Galileo and Intel® Galileo Gen 2:, Apress	2014
2	Marco Schwartz Yun‖	Internet of Things with the Arduino	Packt Publishing,	2014

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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