DEPARTMENT OF COMPUTER SCIENCE WITH ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

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

SYLLABUS

B.Sc. COMPUTER SCIENCE WITH ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

BATCH 2025-2028

Department of Computer Science with Artificial Intelligence & Machine learning

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 ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Vision

To be a leading school of emerging trends in Artificial Intelligence and Machine Learning that affords quality education to equip students with the technical know-how, ascertain their hidden talents, provide ambient environment to show case their highest potential and to transform the students to be creative and innovative leaders and entrepreneurs as anticipated by the Industry

Mission

- To offer a broad and balanced academic plans that strengthens and emphasizes high quality and creative instruction
- To strive for quality education that will prepare young minds for imbibing knowledge, skills and sensitivity.
- To create a platform for students for exploring their creative potential and nurturing the spirit of entrepreneurship and critical thinking to adapt better to the changing global scenario and gain access to multiple career opportunities.
- To motivate the budding professionals in exploiting the potential of start-ups and innovations in Artificial Intelligence & Machine Learning and the related Domains and to maintain level of excellence and standards that offers them statewide, national and international significance.

Program Educational Objectives:

PEO1	Expertise with the principles of Artificial Intelligence and problem solving, inference, perception, knowledge representation, and learning
PEO2	Exhibit high standards with regard to application of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning and deep learning models
PEO3	Investigate with a machine learning model for simulation and analysis and explore the scope, potential, limitations, and implications of intelligent systems.
PEO4	Establish the ability to Listen, read, proficiently communicate and articulate complex ideas with respect to the needs and abilities of diverse audiences.
PEO5	Instillkey technologies in Artificial Intelligence, Machine Learning and deep learning, visualization techniques, Natural language processing and Robotics.

Program Outcomes:

PO1	**Domain Knowledge:** Demonstrate a sound understanding of all the main areas of Machine Learning & AI and also demonstrate the ability to exercise critical judgment in the evaluation of Machine Learning and AI applications.
PO2	**Problem Analysis:** Understand how to distill a real-world challenge as an artificial intelligence problem, involving explicit representation and learning of symbolic and numeric models; reasoning about such models; and using such models for decision making, action selection, and interaction with humans.
PO3	**Design/development of solutions:** Design and develop research-based solutions for complex problems in artificial intelligence and machine learning industry through appropriate consideration for the public health, safety, cultural, societal, and environmental concerns.
PO4	**Communicative & oratorical Skills:** Establish the ability to Listen, read, proficiently communicate and articulate complex ideas with respect to the needs and abilities of diverse audiences.
PO5	**Exhibit Entrepreneurial Skills:** Deliver innovative ideas to instigate new business ventures and possess the qualities of a good entrepreneur
PO6	**Ethics:** Recognize the social impact of artificial intelligence and the underlying responsibility to consider the ethical, privacy, moral, and legal implications of artificial intelligence technologies**.**
PO7	**Individual and teamwork:** Graduates will be able to undertake any responsibility as an individual/member of multidisciplinary teams and have an understanding of team leadership
PO8	**Use of State-of-the-Art AI and machine learning tools & techniques:** Design, analyze, implement, and use state-of-the-art AI and machine learning tools & techniques for dealing with real-world data, including data involving vision, language, perception, and uncertainty.

PO9	**Dynamism and Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO10	**Research instinct**: Apply AI and ML specific research techniques, tools,methods, design of experiments, analysis and synthesis of the information for conducting investigations of complex problems.

Program Specific Outcomes (PSOs)	
After the successful completion of **B.Sc. Computer Science with Artificial Intelligence and Machine Learning** programme, the students are expected to	
PSO1	**Professional Proficiency:**Exhibit good domain knowledge and completes the assigned responsibilities effectively and efficiently on par with the expected quality standards for Artificial Intelligence and Machine Learning professional.
PSO2	**Societal and Environmental Sustainability:**Apply the technical and critical thinking skills in the discipline of artificial intelligence and machine learning to find solutions for complex problems.Design and develop research-based solutions for complex problems in artificial intelligence and machine learning industry through appropriate consideration for the public health, safety, cultural, societal, and environmental concerns.

Mapping of PEOs with POs & PSOs

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

DEPARTMENT OF COMPUTER SCIENCE WITH ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

(FOR THE CANDIDATES ADMITTED FROM THE ACADEMIC YEAR 2025 - 2026)

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	25UTL1C1/ 25UTL1C2/	Tamil Paper-I: / Tamil paper-I:	5	-	-	3	25	75	100	3
	25UHN1C1/ 25UHN1C2	Hindi Paper-I : / Hindi Paper-I								
	25UFR1C1 / 25UFR1C2	French Paper-I / French Paper-I								
II	25UEN1C1/ 25UEN1C2	English Paper-I/ English Paper-I	5	-	-	3	25	75	100	3
III	25UAI101	**CC I**: Problem solving and Programming in C	4	-	-	3	25	75	100	4
	25UAI102	**CC II**: Data Structures and Applications	4	-	-	3	25	75	100	4
	25UAI1A1/ 25UAI1A2	**GE I – Allied I:** Introduction to Linear Algebra / Discrete Mathematics	4	-	-	3	25	75	100	4
	25UAI103	**CC Lab I**: Data structures Using C Lab	-	5	-	3	20	30	50	2
IV	25EVS101	**AECC I**: Environmental Studies	2	-	-	-	-	50	50	2
	25HEC101	Human Excellence: Personal Values & SKY Yoga Practice – I	1	-	-	2	20	30	50	1
V		Extension Activities (NSS, NCC,S ports& Games, etc.,)	-	-	-	-	-	-	-	-
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	25UTL2C2	Tamil Paper-II	5	-	-	3	25	75	100	3
	25UHN2C2	Hindi Paper-II								
	25UFR2C2	French Paper-II								
II	25UEN202 / 25UEN203	Communication Skills – II (Level I) /Communication Skills – II (Level II)	5	-	-	3	25	75	100	3
III	25UAI204	**CCIII**: Java Programming	4	-	-	3	25	75	100	4
	25UAI205	**CC IV**: Operating Systems	4	-	-	3	25	75	100	4
	25UAI2A1/2 5UAI2A2	**GE II – Allied II**: Probability& Statistics / Optimization Techniques	5	-	-	3	25	75	100	4
	25UAI206	**CC Lab II**: Java Programming Lab	-	4	-	3	20	30	50	2
IV	25UAI2S1 /25UAI2S2	**SEC I**: Naan Mudhalvan: Front end UI/UX Development/ Industry 4.0	2	-	-	2	-	50	50	2
	25HEC202	Human Excellence : Family Values & SKY Yoga Practice - II	1	-	-	2	20	30	50	1
V		Extension Activities (NSS,NCC,Sports& Games, etc.,)	-	-	-	-	-	-	-	-
EC	25CMM201	IKS:Manaiyiyal Mahathuvam-I			15 Hrs.	2	-	50	50	Grade
	25CUB201	IKS:Uzhavu Bharatham– I			15 Hrs.	2	-	50	50	Grade
	25UAI2VA	**VAC-I**Python for Data Science -Perspective of Cutting Edge Technology			30 hrs					2*
		Online Course(Optional)(MOOC/NPTEL/SWAYAM)								
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; IKS – Indian Knowledge System;

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	25UTL3C3	Tamil Paper-III	3	-	-	3	25	75	100	3
	25UHN3C3	Hindi Paper-III								
	25UFR3C3	French Paper-III								
II	25UEN3C3	Communication Skills – III (Level I) /Communication Skills – III (Level II)	3	-	-	3	25	75	100	3
III	25UAI307	**CC V**: Python Programming	4	-	-	3	25	75	100	4
	25UAI308	**CC VI**: Artificial Intelligence	4	-	-	3	25	75	100	4
	25UAI3A1/25UAI3A2	**GE III – Allied III**: Discrete Structures and its Applications	4	-	-	3	25	75	100	4
	25UAI309	**CC Lab III**: Python Programming Lab	-	4	-	3	20	30	50	2
	25UAI310	**CC Lab IV**: AI Lab	-	3	-	3	20	30	50	2
IV	25UAI3N1 / 25UAI3N2	**Non Major Elective - I :** Web Development Essentials / Advanced Excel Lab(SEC)	-	1	-	2	-	50	50	2
	25HEC303	Human Excellence - Professional Values & Ethics - SKY Yoga Practice – III	1	-	-	2	20	30	50	1
V	25UHW301	Health and Wellness	2#	-	-	-	-	-	100 Reduce To 25	1
EC	25CMM302	**IKS:**Manaiyiyal Mahathuvam-II			15 Hrs.	2	-	50	50	Grade
	25CUB302	**IKS:**Uzhavu Bharatham– II			15 Hrs.	2	-	50	50	Grade
	25UXX3VA	Online Course(Optional)(MOOC/NPTEL/SWAYAM)								
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; IKS – Indian Knowledge System;

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	25UTL4C4	Tamil Paper-IV	3	-	-	3	25	75	100	3
	25UHN4C4	Hindi Paper-IV								
	25UFR4C4	French Paper-IV								
II	25UEN4C4	Communication Skills – IV (Level I) / (Level II)	3	-	-	3	25	75	100	3
III	25UAI411	**CC VII**: Machine Learning	4	-	-	3	25	75	100	3
	25UAI412	**CC VIII**: DataBase System Concepts	4	-	-	3	25	75	100	3
	25UAI4A1/ 25UAI4A2	**GE IV – Allied IV**: Computer Networks / Microprocessor and Microcontroller	4	-	-	3	25	75	100	3
	25UAI413	**CC Lab V**: ML Lab	-	4	-	3	20	30	50	2
	25UAI414	**CC Lab VI**: DBMS Lab	-	3	-	3	20	30	50	2
	25UAI4S1/ 25UAI4S2	**SEC II**: Naan Mudhalvan **:**Advanced Java script Front end Framework with Angular / Aptitude for Placements	-	2	-	2	-	50	50	2
IV	25UAI4N1 / 25UAI4N2	**Non Major Elective - II** : Web Application Development/ Transforming Data with Excel and Power BI	-	2	-	2	-	50	50	2
	25HEC404	Human Excellence – Social Values & SKY Yoga Practice IV	1	-	-	2	20	30	50	1
V		Extension Activities (NSS,NCC,Sports& Games, tc.,)	-	-	-	-	-	-	50	1
EC	25CMM403	**IKS:**Manaiyiyal Mahathuvam-III			15 Hrs.	2	-	50	50	Grade
	25CUB403	**IKS:**Uzhavu Bharatham– III			15 Hrs.	2	-	50	50	Grade
	25UAI4VA	**VAC-II:** Practical approach for Statistical problems using AI and Machine Learning			30 hrs					2*
		OnlineCourse(Optional)(MOOC/NPTEL/SWAYAM)								
Total			**30**						**800**	**25**

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; SEC – Skill Enhancement Course; VAC-Department Specific Value Added Course; IKS – Indian Knowledge System;*Extra Credits;

	SEMESTER V									
Part	**Course Code**	**Course Title**	**Hrs/ Week**		Hrs/Sem	Exam Hrs	**MAX.MARKS**			**Credits**
			L	**P**	**T**		**Int**	**Ext**	**Total**	
III	25UAI517	**CC IX**: Natural Language Processing	5	-	-	3	25	75	100	4
	25UAI518	**CC X:**Big data technologies	5	-	-	3	25	75	100	4
	25UAI5E1/ 25UAI5E2/ 25UAI5E3	**DSE-I**: IoT/ Soft Computing/ Mobile Application Development	5	-	-	3	25	75	100	5
	25UAI519	**CC Lab VI**: Programming Lab in NLP	-	5	-	3	20	30	50	2
	25UAI520	**CC Lab VII:** Big Data Technologies Lab	-	5		3	20	30	50	2
IV	25UAI5S1/ 25UAI5S2 / 25UAI5S3	**SEC-III :**AI for Cyber Security /Advanced Java script back end Framework(Node JS,Express JS)/ Human Computer Interaction	-	4	-	3	-	50	50	2
	25HEC505	Human Excellence Paper: National Values& SKY Yoga Practice-5	1	-	-	2	20	30	50	1
EC	25UAI5AL	**ALC I :** Business Intelligence	SS		-	-	-	100	100	2**
	25AID501	Soft Skills Development – I	-		-	-	-	-	-	Grade
	25GKL501	General Knowledge	SS		-	2	-	50	50	Grade
Total			**30**						**500**	**20**

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

1.

	SEMESTERVI									
Part	**Course code**	**Course Title**	**Hrs/Week**		**Hrs/ Sem**	**ExamHrs**	**MAX.MARKS**			**Credits**
			T	P			**Int**	**Ext**	**Total**	
III	25UAI621	**CCXI** :Deep Learning	5	-	-	3	25	75	100	3
	25UAI6E4 25UAI6E5 25UAI6E6	**DSE–II:**UI/UX Design/ Gen AI/Text analytics	4	-	-	3	25	75	100	5
	25UAI6E7 25UAI6E8 25UAI6E9	**DSE–III :**AR/VR / Open Source Software/ Robotics& its Applications	5	-	-	3	25	75	100	5
	25UAI622	**CC Lab IX**: Deep Learning Lab	-	6	-	3	20	30	50	2
	25UAI623	**CC Lab X**: Power BI &Data Visualization Lab	-	5	-	3	20	30	50	2
	25UAI624	Project	-	-	-	-	25	75	100	2
IV	25UAI6S4/ 25UAI6S5/ 25UAI6S6	**SEC IV**: Social & Ethical Issues in AI/ Computer Vision/Recommender Systems	3	-	-	2	12	38	50	2
	25HEC606	Human Excellence Paper:Global Values&SKYYogaPractice-6	1	-	-	2	20	30	50	1
EC	25AID602	Soft Skills Development–II	-		-	-	-	-	-	Grade
	25UAI6AL	**ALC-II :Quantum Computing**	SS		-	-	-	100	100	2*
Total			**30**						**600**	22
	GrandTotal								**3900**	140

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 Commerce, Management & Social Work Programme

The Final year Commerce, Management & Social Work students should undergo a project work during (V/VI) semester

- The period of study is for 4 weeks.
- Project / Internship work has to be done in an industrial organization (or) work on any industrial problem outside the organization is allowed.
- Students are divided into groups and each group is guided by a Mentor.
- The group should not exceed four students, also interested student can undergo individually.
- A problem is chosen, objectives are framed, and data is collected, analyzed and documented in the form of a report / Project.
- Viva – Voce is conducted at the end of this semester, by an External Examiner and concerned

  Mentor (Internal Examiner).
- Project work constitutes 100 marks, out of which 25 is CIA and 75 is CEE Marks.

Mark Split UP

CIA	CEE	Total
25	75	100

S. No	Components for CIA	Marks
1	Review – I *	5
2	Review – II *	5
3	Review – III *	5
4	Rough Draft Submission	10
Total		**25**

* Review includes Objectives and Scope, Research Methodology, Literature Review, Data Analysis and Results, Discussion and Interpretation, Recommendations and Implications, Presentation and Format, Creativity and Originality, and Overall Impact and Contribution.

S. No	Components for CEE	Marks
1	Evaluation*	50
2	Viva-Voce	25
Total		**75**

* Evaluation includes Originality of Idea, Relevance to Current Trend, Candidate Involvement, Thesis Style / Language, and Presentation of Report.

Continuous Internal Assessment for Project

For Science Stream

The Final year Science students should undergo a project work during (V/VI) semester

- The period of study is for 4 weeks.
- Project / Internship work has to be done in an industrial organization (or) work on any industrial problem outside the organization is allowed.
- Students are divided into groups and each group is guided by a Mentor.
- The group should not exceed four students, also interested student can undergo individually.
- A problem is chosen, objectives are framed, and data is collected, analyzed and documented in the form of a report / Project.
- Viva – Voce is conducted at the end of this semester, by an External Examiner and concerned Mentor (Internal Examiner).
- Project work constitutes 200 marks, out of which 50 is CIA and 150 is CEE Marks.

Mark Split UP

CIA	CEE	Total
50	150	200

S. No	Components for CIA	Marks
1	Review – I *	10
2	Review – II *	10
3	Review – III *	10
4	Rough Draft Submission / Report Submission	20
Total		**50**

*** Review I: -** Problem Analysis

*** Review II: -** Data collection & Design

*** Review III: -** Data Analysis

S. No	Components for CEE	Marks
1	Evaluation *	100

2	Viva-Voce	50
Total		**150**

* Evaluation includes Problem and Hypothesis, Experimental Design / Materials / Procedure, Variables / Controls / Sample Size, and Data Collection / Analysis.

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	

ComponentsforCEE: 75 Marks

ComponentsforCEE	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 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

Chapter No. **Title** **Page No.**

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.

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	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

		time		

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

Programme Code:	B.Sc			**Programme Title:**	**Bachelor of Science (Computer Science with AI & ML)**	
Course Code:	25UAI101			**Title**	**Batch:**	2025 - 2028
				Core I: Problem solving and Programming in C	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	4

Course Objective

The course provides insight knowledge about C programming language.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals of C Language.	K2
CO2	Apply the control statements in programs	K2
CO3	Understand the representation and usage of arrays.	K2
CO4	Develop programs using functions and storage classes.	K3
CO5	Execute programs with pointers and files	K3

Mapping

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

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

Units	Content	Hrs
Unit I	INTRODUCTION TO PROBLEM SOLVING TECHNIQUES Fundamentals - Computer Hardware – Computer Software - Algorithms - Building blocks of algorithms (statements, state, control flow, functions) - Notation (pseudo code, flow chart, and programming language) -Problem formulation - Algorithmic problem solving - Simple strategies for developing algorithms (iteration, recursion). Illustrative problems.	15
Unit II	Introduction - Character set - C tokens - keyword & Identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining Symbolic Constants - 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 &Associatively - Mathematical functions - Reading & Writing a character - Formatted input and output.	15
Unit III	Decision Making and Branching: Introduction – 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. Arrays and Strings : Arrays-One Dimensional Array-Two Dimensional Arrays-Initializing Two Dimensional Arrays-Multi Dimensional Arrays-Handling of Character Strings-Declaring and Initializing String Variables-Reading Strings from terminal-Writing Strings to Screen-Arithmetic Operations on Characters-Putting Strings Together-Comparison of Two strings-String Handling Functions	15
Unit IV	User-Defined Functions: Introduction – Need and Elements of User-Defined Functions- Definition- Return Values and their types - Function Calls – Declarations – Category of Functions- Nesting of Functions - Recursion – Passing Arrays and Strings to Functions - The Scope, Visibility and Lifetime of Variables- Multi file Programs- Structures and Unions-Structures-Definition-Giving Values to members Structure Initialization- Comparison of Structure Variables-Arrays of Structures-Arrays with Structures - Structures and Functions-Unions-Size of Structures	15
Unit V	Pointers and Files: Pointers - Declarations - Advantages of pointers - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Structures and Pointers - Pointer arithmetic. File Management in C-Defining and Opening a File-Closing a File-I/O Operation on Files-Error Handling during I/O Operations-Random Access Files-File Inclusion-Compiler Control Directives.	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	E.Balagurusamy	"Programming in ANSI C	(7th Edn.), TMH	2017
2	Karl Beecher	"Computational Thinking: A Beginner's Guide to Problem Solving and Programming"	1st Edition, BCS Learning & Development Limited	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	ReemaThareja	Programming in C	(2nd Edn), Oxford University Press	2015
2	H. Schildt	"C: The Complete Reference"	(4th Edn), TMH	2000

Web References

https://www.geeksforgeeks.org/generations-of-computers-computer-fundamentals/

https://opentextbc.ca/computerstudies/chapter/classification-of-generations-of-computers/

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

https://www.javatpoint.com/c-programming-language-tutorial

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. S. Niraimathi Signature	Dr. S. Niraimathi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	**Bachelor of Science (Computer Science with AI & ML)**	
Course Code:	25UAI102			**Title**	**Batch:**	2025 - 2028
				Core II: Data Structures and Applications	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objective

- To introduce the concept of data structures and the types of data structures
- To demonstrate how various data structures can be implemented and used in various applications

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 structures and list the various classifications of data structures.	K1
CO2	Demonstrate how arrays, stacks, queues, linked lists, trees, heaps, Graphs and Hash Tables are represented in the main memory and various operations are performed on those data structures.	K2
CO3	Illustrate the various file organizations like Sequential, Random and Linked organizations.	K3
CO4	Discover the real time applications of the various data structures	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	M
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 :** Algorithms, Array, Stack and Queue 12 h Introduction to algorithms - Definition - Properties - Development of Algorithms - Data Structures - Definition - Classification- Analysis of Algorithms - Asymptotic Notations. Arrays: Representation of Arrays - Operations - Applications - Stack - Stack operations - Applications - Queue - Queue Operations - Applications.	12
Unit II	**Linked List** : Introduction - Logical representation of linked list - Linked list operations - Types of linked lists -Singly linked list - Doubly linked lists - Circular linked lists - Linked stacks and queues - polynomial addition - Dynamic Storage Management - Garbage collection and compaction.	13
Unit III	**Non Linear Data Structures:** Trees - Definition and Basic Terminologies -Representation of Trees - Binary Trees: Basic Terminologies and Types - Representation of Binary Trees - Binary Tree Traversals - Threaded Binary Trees – Application**.** **Graphs**: Introduction - Definitions and Basic Terminologies - Representations of Graphs - Graph Traversals - Applications.	12
Unit IV	**Sorting**: Introduction- Bubble Sort – insertion sort-Selection Sort – Merge Sort – shell Sort – Quick Sort – Heap Sort –Radix Sort.	11
Unit V	**Searching**: Introduction -Linear Search – Transpose sequential search—Interpolation search-Binary Search – Fibonacci search-other search techniques.	12
	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	G AVijayalakshmiPai	Data structures and Algorithms	McGraw Hill, 1st Edition, ISBN: 9780070667266	2008
2	Horowitz, S. Sahni, and S.	Computer Algorithms	Galgotia Pub. Pvt. Ltd.,	2012

	Rajasekaran			

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	T. H. Cormen, C. E. Leiserson, R. L. Rivest	Introduction to Algorithms	Prentice hall, 3rd Edition	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**
Name: Dr.B.Azhagusundari Signature	Name: Dr.S.Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	**B. Sc,**			**Programme Title:**	**Bachelor of Science (Computer Science with AI & ML)**	
Course Code:	25UAI1A1			**Title**	**Batch:**	**2025 - 2028**
				Allied I : Introduction to Linear Algebra	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	**4**	**Tutorial Hrs./Sem.**	**60**		**Credits:**	4

Course Objective

To introduce the concepts of Numbers, Quantification, sets, logical reasoning, probability and calculus

Course Outcome

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

CO Number	**CO Statement**	**Knowledge Level**
CO1	Define basic terms and concepts of matrices.	K1
CO2	Comprehend the use of various matrix operations	K2
CO3	Understand the concept of Vector spaces and Basis	K3
CO4	Determine Eigen values and Eigen Vectors	K4
CO5	Determine orthogonal set concept	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

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**

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**
Name: MrS.Earnest Rajadurai Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI2A2			**Title**	**Batch:**	2025 - 2028
				General Elective II: Discrete Mathematics	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course objectives

- This course has been designed for students to learn and understand
- the logic and Proof
- basic concept of counting and graph
- apply the concept of counting Techniques

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand discrete mathematical preliminaries and apply discrete mathematics in formal representation of various computing constructs	K2
CO2	Demonstrate an understanding of relations ,functions, Combinations and lattices	K3
CO3	Apply the techniques of discrete structures and logical reasoning to solve a variety of problems and write an argument using logical notation	K4
CO4	Analyze and construct mathematical arguments that relate to the study of discrete structures	K5
CO5	Analyze and construct mathematical arguments that relate to the study of discrete structures	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

Units	Content	Hrs
Unit I	Relations: Cartesian product of two sets – Relations – Representation of Relation – Operations on Relations – Equivalence of Relation – Closures and Warshall's Algorithm – Partitions and equivalence classes	12
Unit II	Coding Theory: Introduction – Hamming distance – Encoding a Message – Group codes –Procedure for Generating Group Codes – Decoding and error correction – An example of Simple Error Correcting Code.	12
Unit III	Mathematical Logic: Introduction – True / False - Statements – Connectives – Atomic and Compound Statements – Well Formed (Statement) Formulae – The truth table of a formula – Tautology – Tautological implications and equivalence of a formula – Normal forms – Principal Normal Forms.	12
Unit IV	Graph Theory :Graphs and sub graphs - Operations on Graphs - Isomorphism of Graphs - Walks, paths and cycles - Trees - spanning trees of graph - Algorithm for finding a spanning tree of a connected graph - Krushkal's algorithm to find an optimal tree of a weighted graph.	12
Unit V	Number Theory: Divisibility: Divisibility of integer – Division algorithm – Common divisor – Greatest common divisor– The Euclidean algorithm – Primes and Composite Number: Definition of Prime, Composite, Twin prime – Euclid's theorem – Unique factorization theorem – To find GCD & LCM of two integers – Positional representation of on integers – Worked examples	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	Dr. M. K. Venkataraman, Dr. N. Sridharan, N. Chandarasekaran	Discrete Mathematics	The National Publishing Company Chennai	2006
2	S. Kumaravelu & Susheela Kumaravelu	Graph Theory	JankiCalender Corporation, Sivakasi,	1999
3	Kumaravelu and SuseelaKumaravelu	Elements of Number Theory	Raja Sankar offset Printers.	2002

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	J.P.Tremblay, R Manohar	Discrete Mathematical Structures with Applications to Computer Science	McGraw Hill International Edition	2007
2	Dr. A. Singaravelu, Dr.V.Ravichandran, Dr. T.N. Shanmugam	Discrete Mathematics	Meenakshi agency 5th edition	2008
3	NarsinghDeo	Graph Theory with applications to engineering and computer science	, Prentice hall of India, New Delhi, 2	2003

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.EarnestRajadurai Signature	Name:Dr.S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI103			**Title**	**Batch:**	2025 – 2028
				Core Lab I : Data structures Using C Lab	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	2

Course Objective

- To practice the fundamental programming methodologies in the C programming language via laboratory experiences.
- To code, document, test, and implement a well-structured, robust computer program using the C programming language.
- To prepare students to face the challenges and opportunities in the IT industry by building strong foundations in C programming language..

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.	K3
CO2	Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions	K4
CO3	Role of Functions involving the idea of modularity.	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 C program to Implement a program to insert and delete elements in an array. 2. Write a C Program to Implement linear search and binary search algorithms on an array. 3. Write a C program to Implement a singly linked list with operations like insertion and deletion at the beginning. 4. Write a C program to Implement a stack using an array (push, pop, peek). 5. Write a C program to Implement a queue using an array (enqueue, dequeue). 6. Write a C program to Implement Bubble Sort to sort an array. 7. Write a C program to Implement Selection Sort to sort an array. 8. Write a C program to Implement Binary Search for an element in a sorted array. 9. Write a C programto ImplementQuick Sort algorithm. 10.Write a C program to Implement Merge Sort algorithm.
Total Hours 60

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: Dr. S.Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

SEMESTER II

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI204			**Title**	**Batch:**	2025 - 2028
				Core III: Java Programming	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objective

The course provides insight knowledge about object oriented programming concepts and programming language in Java

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Develop an in-depth understanding of object-oriented programming concepts	K2
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	M
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	**Object Oriented Programming concepts**: Evolution of java – Java Architecture – Data Types – Variables and Operations – Environment setup – Command Line Arguments - Comments. Programs: 1. Write a program to solve problems using data types, variable and operators. 2. Write a program and Use Command line arguments to display messages like CSE SNSCT Coimbatore & adding numbers etc.	12
Unit II	**Control structures – Arrays - Objects and classes**: Classes – Access Specifiers – methods and attributes - constructors: Default Constructor – Parameterized Constructor – Copy Constructor- Garbage collection. Programs: 1. Write a program to Solve problems using Control structures with array concept. 2. Write programs using class and constructors.	13
Unit III	**Inheritance:** Super class - Sub class – Types of inheritance – Method Overloading - Method Overriding – Abstract class - this keyword – Final Keyword - Packages - Interfaces. Programs: 1. Write a Programs that engaging inheritance. 2. Write a Programs using method overloading and packages.	12
Unit IV	**Exception handling:** Exception types – try catch and finally block, throws –Runtime exception – Introduction to Multithreading - Thread Creation – Thread control and priorities - Thread synchronization, Inter-thread communication.	11
Unit V	**Managing Input/ Output in files in Java**: Introduction-Concept of Streams-Stream Classes-Byte Stream classes-Character Stream Classes-Using Streams-other useful I/O Classes- using the File Class-I/O Exceptions-Creation of Files-Reading/Writing Characters - Reading/Writing Bytes.	12
	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	R.NageswaraRao	Core Java : An Integrated Approach	John Wiley, ISBN 9789351199250	2016
2	Cay S.Horstmann, Gary Cornell.	Core Java 2 Volume I – Fundamentals	Oracle Press Java,12th Edition.	2022
3	H. Schildt	Java2 The Complete Reference	MCGraw Hill, 11th Edition	2020

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Deital&Deital	Java How to Program	Third Edition, Pearson Education Asia	2012
2	K. Arnold and J. Gosling	TheJava Programming Language	Addison Wesley,4th Edition	2005

Web references

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

https://www.geeksforgeeks.org/java/

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

https://www.programiz.com/java-programming

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: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI205			**Title**	**Batch:**	2025 - 2028
				Operating Systems	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objectives

- Thi s course has been designed for students to learn and understand The main components and their functions of Operating Systems
- Th e concept of process management, scheduling, IPC and Deadlocks.
- Th e need for special purpose operating systems

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recognize the components of an OS and their functions.	K2
CO2	Understand the CPU process management policies.	K2
CO3	Apply the scheduling algorithms for CPU scheduling	K3
CO4	Analyze the various memory management policies	K4
CO5	Articulate the various Input and Output management policies	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	M
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

Unit	contents	Hours
I	**OPERATING SYSTEMS OVERVIEW:** Introduction, operating system operations, process management, memory management, storage management, protection and security, distributed systems. OPERATING SYSTEMS STRUCTURES: Operating system services and systems calls, system programs, operating system structure, operating systems generations.	12
II	**PROCESS MANAGEMENT:** Process concepts, process state, process control block, scheduling queues, process scheduling, multithreaded programming, threads in UNIX, comparison of UNIX and windows. CONCURRENCY AND SYNCHRONIZATION: Process synchronization, critical section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of synchronization, readers and writers problem, dining philosophers problem, monitors, synchronization examples(Solaris), atomic transactions. Comparison of UNIX and windows.	12
III	**DEADLOCKS**: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock banker's algorithm. MEMORY MANAGEMENT: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement algorithms, allocation of frames, thrashing, case study - UNIX.	12
IV	**FILE SYSTEM: C**oncept of a file, access methods, directory structure, file system mounting, file sharing, protection. File system implementation: file system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance, comparison of UNIX and windows.	12
V	I/O Systems: File concept – Access methods – Directory structure – File-system mounting – Protection – Directory implementation – Allocation methods – Free-space management – Disk scheduling– Disk management – Swap-space management – Protection. Case Study: The Linux System – History – Design Principles – Kernel Modules – Process Management – Scheduling – Memory management – File systems.	12
Total		**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	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne	Operating System Principles	7th edition, Wiley India Private Limited, New Delhi.	2006

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	William Stallings	"Operating Systems - Internals & Design Principles"	(9th Edition, PHI private Ltd, New Delhi	2018
2	Abraham Silberschatz, Greg Gagne, Peter B. Galvin	Operating Systems Concepts	10th Edition, John Wiley	2018

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: Dr. B.Azhagusundari Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI2A1			**Title**	**Batch:**	2025 - 2028
				General Elective I: Probability and Statistics	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	4

Course Objective

- This course has been designed for students to learn and understand
- Basic concepts of Probability theory
- Apply the concepts to solve the probability problems
- Concepts of Regression and Correlation

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the concept of probability theory	K2
CO2	Identify the problem-solving random variable and probability function	K2
CO3	Apply the knowledge of Probability distribution	K3
CO4	Identify the sampling distributions	K3
CO5	Interpret the concept of correlation and regression	K3

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). **Chapter 1: sections: 1.1 to 1.11.**	15
Unit II	**Measures of averages:**Introduction – Arithmetic mean (AM) – weighted AM – formula for calculating AM in a frequency distribution – properties of AM-combined mean (CM) – geometric mean (GM) – harmonic mean (HM) – merits and demerits of AM, GM, HM – median – quartiles and deciles – mode – merits and demerits – mean, median and mode – simple problems. **Chapter 5 (Part II – Statistical methods): sections: 5.1 to 5.23.**	15
Unit III	**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. **Chapter 24: sections: 24.1 to 24.14.** **Small samples:t-test**: Definition – uses – properties of the sampling distributions of t – Test for a specified mean – simple problems. **Chapter 25: sections: 25.1 to 25.13.**	16
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. **Chapter 26: sections: 26.1 to 26.28.**	14
Unit V	**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. **Chapter 27: sections: 27.1 to 27.35.** **Regression:** Introduction – deviation of regression lines – properties of regression coefficients – simple problems. **Chapter 9: sections: 9.1 to 9.25.**	15
	Total Hours	**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	John E. Freund's	"Mathematical Statistics with Applications "	8th Edition, Prentice Hall of India, New Delhi	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Robert. V. Hogg and Allen T.G. Craig	"Introduction to Mathematical Statistics",	5th edition, Pearson Education	2006
2	SuddhebduBiswas and G.L. Sriwastav.	"Mathematical Statistics",	1st Edition, Narosa Publishing House Pvt. India.	2009
3	Nabebdu Pal and SahadebSarkar	"Statistics	2nd Edition, Prentice Hall of India, New Delhi	2009
4	Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying E. Ye,	"Probability and Statistics for Engineers and Scientists	9th edition, Pearson Education	2006

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.EarnestRajadurai Signature	Name: Dr.S.Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI2A2			**Title**	**Batch:**	2025 - 2028
				General Elective II: Optimization Techniques	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	4

Course Objectives

- Mathematical Foundation course Solves
- Modeling linear programs and solving with a computer
- Simplex algorithms to solve linear programs
- Other algorithms for linear programming
- Integer Programming, Network problems, Non-linear programming

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	To remember the basic principles and practices of computing grounded in mathematics and science	K2
CO2	To understand the Problems using various linear Algorithms	K3
CO3	To apply algorithms to the decision making problems	K4
CO4	To Analyze the programming algorithms with exercises	K5
CO5	To Summarize the inventory and queuing models	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

Units	Content	Hrs
Unit I	I**ntroduction**: Simplex method – Graphical method – Standard form – IBFS- Artificial Variable technique – big M	15
Unit II	**Transportation** : Mathematical formulation – Initial feasible solution – North – West Corner Method – Matrix minima method – Vogel's approximation method – Optimized basic feasible solution- Solution by UV method Assignment Problem : Introduction – Definition – Assignment algorithm – Balanced Assignment Problem – Unbalanced Assignment problem – Hungarian Method	16
Unit III	**Networks** : Networks and basic components – rules – time calculation in networks – CPM – PERT – PERT Calculations- Resource analysis in network scheduling project cost – time cost optimization algorithm	14
Unit IV	**Inventory :** Introduction – Reasons for carrying Inventory – Type of Inventories – The Inventory decision – EOQ with no Shortages – Production problem with no shortages – EOQ with Shortages – Production problem with shortages- EOQ with Price Breaks – EOQ with no price breaks – EOQ with two price breaks Queuing Theory : Queuing System characteristics – Poisson process and exponential distribution (M/M/1) : (α/FIFO) , (M/M/1) : (N/FIFO) , (M/M/C) : (α / FIFO) , (M/M/C) : (N/FIFO)	16
Unit V	**Sequencing** : Introduction- problems of sequencing – problems with n jobs and two machines – Problems with n jobs and three machines – problems with n jobs and m machines **Replacement Theory** : Introduction – replacement of equipment or asset the deteriorates gradually – replacement of equipment that fails suddenly	14
	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	KantiSwarup, P.K. Gupta and Man Mohan,	Operations Research	Sultan Chand & Sons Educational Publishers, New Delhi	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	. P.K. Gupta, D.S. Hira	Problem in Operations Research	S.Chand& Company Ltd	2007
2	J.K. Sharma	Operations Research Theory and Applications	Third Edition, Macmillan India Ltd	2006
3	Hamdy A. Taha	Operations Research : An Introduction	Eight Edition PHI, New Delhi,	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**
Name: Mr.EarnestRajadurai Signature	Name:Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI206			**Title**	**Batch:**	2025–2028
				Core Lab II Java Programming Lab	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	2

Course Objective

- To make the student learn an object oriented way of solving problems using java.
- To make the students to write programs using multithreading concepts and handle exceptions.
- To make the students to write programs that connects to a database and be able to perform various front-end operations.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	To remember and recollect the object oriented concepts	K3
CO2	To get the idea of packages, interfaces and exceptions and AWT	K4
CO3	To validate the projects using front-end and back-end programming	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 EvenPosition .java 2.NCR 3.write a java program to calculate Permutation 4.write a java program Fahrenheit to celsius

5.write a java program celsius to fahrenheit 6.write a java program ReverseNum 7.write a java program CountWords 8.write a java program CountWordFile 9.write a java program Multiple classes 10.write a java program Static method 11.write a java program Multiple inheritance 12.write a java program Interface extends another interface 13.write a java program Package without class 14.import multiple package 15.import single package 16.write a java program ThreadEx1.java(using extending thread class) 17.write a java program ThreadEx2.java(using implements runnable) 18.write a java program ThreadTest.java(Three threading) 19.write a java program JavaException.java 20.write a java program TestFinallyBlock.java 21.write a java program Read file 22.write a java program Write file 23.write a java program Copy one file into another file 24.write a java program List of files in a specific directory 25.write a java program file creationProgram to generate Fibonacci series
Total Hours 60

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	R.NageswaraRao	Core Java : An Integrated Approach	John Wiley, ISBN 9789351199250	2016
2	Cay S.Horstmann, Gary Cornell.	Core Java 2 Volume I - Fundamentals	Oracle Press Java,12th Edition.	2022
3	H. Schildt	Java2 The Complete Reference	MCGraw Hill, 11th Edition	2020

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Deital&Deital	Java How to Program	Third Edition, Pearson Education Asia	2012
2	K. Arnold and J. Gosling	The Java Programming Language	Addison Wesley,4th Edition	2005

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: Dr.S.Niraimathi Signature	Name: Dr.S.Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Dr. R .ManicaChezian Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI2S1			**Title**	**Batch:**	2025 - 2028
				SEC-I: Naan Mudhalvan: Front end UI/UX Development	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem.**	30		**Credits:**	2

Course Objective

- Provide students with the knowledge of user- centered design, user -centered methods in design, graphic design on screens, simulation and prototyping techniques, Usability testing methods, interface technologies and user centered design in corporate perspective.
- To analyzethe iterative design of a graphical user interface to organize information about users into useful summaries with affinity diagrams, to convey user research findings with personas and scenarios and to learn the skill of sketching as a process for user experience design.
- Provide Exposure to wireframing and Prototyping software in the various UI/UX Design tools

Course Outcome

CO Number	CO Statement	Knowledge Level
CO1	Build UI for user Applications	K3
CO2	Evaluate UX design of any product or application	K4
CO3	Demonstrate UX Skills in product development	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	Hrs

Program 1: Create a basic HTML structure (header, footer, body) **Program 2**: Create a simple webpage with HTML tags (headings, paragraphs, links, images) **Program 3**: Create a wireframe for a simple website (Home page, About Us page, Contact page) using Figma or Sketch **Program 4**: Design a simple button and form UI with CSS **Program 5**: Build a personal profile page using basic HTML (name, photo, short biography, contact form) **Program 6**: Design a contact form with HTML input elements (text, email, password) **Program 7**: Style the personal profile page with CSS (add colors, fonts, layout) **Program 8**: Create a simple navigation bar using CSS (horizontal or vertical) **Program 9**: Create a responsive layout using Flexbox (e.g., card design or grid gallery) **Program 10**: Build a responsive website using Bootstrap or Tailwind CSS (landing page example) **Program 11**: Create an interactive webpage with JavaScript (a button that changes the background color) **Program 12**: Build a simple form validation script (validate if the input field is filled) **Program 13**: Create a dynamic image gallery with JavaScript (click to open a modal view) **Program 14**: Build an interactive to-do list (add, delete, mark completed) **Program 15**: Create a slide-in menu using CSS animations **Program 16**: Implement an image carousel (JavaScript or CSS-based) **Program 17**: Redesign an existing website (improve typography, layout, and color schemes) **Program 18**: Create a user persona and design a wireframe based on it **Program 19**: Create a mobile-first website that adapts to tablets and desktop using media queries **Program 20**: Build a fully responsive landing page (use Flexbox, Grid, and media queries) **Program 21**: Test an existing webpage for accessibility using Lighthouse or WAVE tool **Program 22**: Redesign a website to meet WCAG 2.0 accessibility standards **Program 23**: Create a simple "To-Do" app using React (CRUD operations) **Program 24**: Build a static website with React, implementing React Router for navigation **Program 25**: Build a weather app that fetches data from a weather API (using fetch/Axios) **Program 26**: Develop a React app with state management (e.g., Shopping Cart) **Program 27**: Develop a full-stack project (e.g., Blog, Portfolio, or E-commerce site) incorporating responsive design, UI/UX principles, and React **Program 28**: Final project presentation and code walkthrough with peer review	30
Total Contact Hrs	**30**

Text Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Joel Marsh,	UX for Beginners,	OReilly	2024
2	Jon Yablonski,	Laws of UX using Psychology to Design Better Product & Services	OReilly	2021

Reference Books:

S.NO	**AUTHOR**	**TITLE OF THE BOOK**	**PUBLISHERS \ EDITION**	**YEAR OF PUBLICATION**
1	Russ Unger and Carolyn Chandler.	A Project Guide to UX Design: For user experience designers in the field or in the making	New Riders Publishing, USA, (2nd. ed.).	2012
2	Wilbert O. Galitz	The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques	Wiley Publishing, 2007Third 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**
Name: Dr.S.Niraimathi Signature	Name: Dr.S.Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Dr. R .ManicaChezian Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI2S2			**Title**	**Batch:**	2025 - 2028
				SEC I: NaanMudhalvan : Industry 4.0	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem.**	30		**Credits:**	2

Course Objective

To impart knowledge on Industry 4.0, need for digital transformation and the following Industry 4.0 tools: Artificial Intelligence , Big Data and Data Analytics , Internet of Things

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Know the reason for adopting Industry 4.0 and Artificial Intelligence.	K1
CO2	Understand the need for digital transformation.	K2
CO3	Apply the industry 4.0 tools.	K3
CO4	Analyze the applications of Big Data.	K4
CO5	Examine the applications and security of IoT 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	M
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	L
CO5	H	M	H	H	L	L	M	L	M	H	H	M

Units	Content	Hrs
Unit I	Industry 4.0: 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	Big Data and IoT : Evolution - Data Evolution - Data : Terminologies - Big Data Definitions - 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	6
Unit IV	Internet of Things (IoT) : Introduction to IoT - Architecture of IoT - Technologies for IoT - Developing IoT Applications - Applications of IoT - Security in IoT .	6
Unit V	Applications And Tools Of Industry 4.0: Applications of IoT – Manufacturing – Healthcare – Education – Aerospace and Defense – Agriculture – Transportation and Logistics – Impact of Industry 4.0 on Society.	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 Related Online	Higher Education for Industry 4.0 and Transformation to	Contents [MOOC, SWAYAM, NPTEL, Websites etc.] 1 https://nptel.ac.in/courses/106/105/106105195/	2020

		Education 5.0		

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
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. B.Azhagusundari Signature	Dr. S. Niraimathi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	**B.Sc**			**Programme Title:**	**Bachelor of Science (Computer Science with AI & ML)**	
Course Code:	25UAI2VA			**Title**	**Batch:**	**2025 - 2028**
				VAC-I Python for Data Science - Perspective of Cutting Edge Technology	**Semester:**	**II**
Lecture Hrs./Week or Practical Hrs./Week		**Tutorial Hrs./Sem.**			**Credits:**	**2**

Course Objective

- To impart knowledge in Core python,
- To inculcate the work definitions of Data structures such as Lists, Tuples, Dictionaries & Sets.
- To imbibe the knowledge of Data Science tools to prepare the studentsto be effective Python programmers.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics and core constructs of Python programming	K1
CO2	Express proficiency in the handling of functions, strings,lists, dictionaries, tuples and sets	K2
CO3	Apply the concepts of file system.	K3
CO4	Illustration of Object-oriented Programming conceptsin Python	K4
CO5	Realize the power of modules like CSV, NumPy, pandasin developing solutions to problems related to data science	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

Unit	Course contents	Hours
I	**Python Basics:** Types - Expression and variables - Conditions and Branching- Loops-Functions	10
II	**Python Data structures and object orientation:** Strings operations - List and Tuple - Dictionaries and Set - Objects and Classes	10
III	**Files and Introduction to Data Science:**Types of Files - Creating and Reading Text Data - File Methods to Read and Write Data - Reading and Writing CSV Files - NumPy with Python – Pandas	10
Total		**30**

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. Gowrishankar, A. Veena,	Introduction to Python Programming,	CRC Press Taylor and Francis Group, Ist Edition	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Introduction to Computing and Problem Solving Using Python	McGraw Hill Education1st Edition	2016
2	Wesley J. Chun	Core PythonProgramming	, Pearson Education, 2nd Edition	2009

Web references

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

https://www.javatpoint.com/library-in-python

https://www.geeksforgeeks.org/libraries-in-python/

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. B.Azhagusundari Signature	Dr. S. Niraimathi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

SEMESTER III

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI307			**Title**	**Batch:**	2025 - 2028
				Core V: Python Programming	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objective

To impart knowledge in Core python, advanced concepts like Regular Expressions and Artificial Intelligence & Data Science tools which allow students to apply the concepts to become effective Python programmers.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the core programming constructs of Python	K1
CO2	Express proficiency in the handling of functions, strings,lists, dictionaries, tuples and sets	K2
CO3	Apply the use of regular expressions and built-in functionsto navigate the file system.	K3
CO4	Illustration of Object-oriented Programming conceptsin Python	K4
CO5	Realize the power of modules like NumPy, pandas, and Altair in developing solutions to problems related to data science	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	M
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	**Introduction:**Identifiers - Keywords - Statements and Expressions - Variables - Operators - Precedence and Associativity - Data Types - Indentation - Comments - Reading Input - Print Output - Type Conversions - The type() Function and Is Operator - Dynamic and Strongly Typed Language. Control Flow Statements - Functions: Built-In Functions - Commonly Used Modules - Function Definition and Calling the Function - The return Statement and void Function- Scope and Lifetime of Variables - Default Parameters - Keyword Arguments - *args and **kwargs - Command Line Arguments.	12
Unit II	**Strings :** Creating and Storing Strings - Basic String Operations - Accessing Characters in String by Index Number - String Slicing and Joining - String Methods - Formatting Strings – Lists: Creating Lists - Basic List Operations - Indexing and Slicing in Lists - Built-In Functions Used on Lists - List Methods - The del Statement**.**	11
Unit III	**Dictionaries:** Creating Dictionary - Accessing and Modifying key:valuePairs in Dictionaries - Built- In Functions Used on Dictionaries - Dictionary Methods - The del Statement - Tuples and Sets:Creating Tuples - Basic Tuple Operations - Indexing and Slicing in Tuples - Built-In Functions Used on Tuples - Relation between Tuples and Lists -Relation between Tuples and Dictionaries - Tuple Methods - Using zip() Function - Sets - Set Methods – Frozenset.	12
Unit IV	**Files:** Types of Files - Creating and Reading Text Data - File Methods to Read and Write Data - Reading and Writing Binary Files - The Pickle Module - Reading and Writing CSV Files - Python os and os.path Modules Regular Expression Operations: Using Special Characters - Regular Expression Methods - Named Groups in Python Regular Expressions - Regular Expression with glob Module.	12
Unit V	**Object-Oriented Programming:** Classes and Objects - Creating Classes in Python - Creating Objects in Python - The Constructor Method - Classes with Multiple Objects - Class Attributes versus Data Attributes - Encapsulation - Inheritance - The Polymorphism –Introduction to Data Science: Functional Programming - JSON and XML in Python - NumPy with Python - Pandas – Altair.	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	S. Gowrishankar, A. Veena,	Introduction to Python Programming,	CRC Press Taylor and Francis Group, Ist Edition	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Introduction to Computing and Problem Solving Using Python	McGraw Hill Education1st Edition	2016
2	Wesley J. Chun	Core PythonProgramming	, Pearson Education, 2nd Edition	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

Name: Dr. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc		**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI308		**Title**	**Batch:**	2025 - 2028
			CC VI : Artificial Intelligence	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.** 60		**Credits:**	4

Web References

https://www.python.org/about/gettingstarted/

https://www.geeksforgeeks.org/python-programming-language-tutorial/

https://www.programiz.com/python-programming

Course Objectives

To introduce the basic concepts of artificial intelligence and techniques of Machine Learning.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To remember the basic principles and practices of Typical AI	K1

	Problems	
CO2	To understand problem solving using search strategies and Game playing	K2
CO3	To Choose the suitable machine learning methods/algorithms for various type of learning problems	K3
CO4	To Analyse the Knowledge representation techniques	K4
CO5	To Apply appropriate Linear models to different contexts	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	M
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

Unit	**Contents**	**Hours**
I	**INTRODUCTION TO AI**: Introduction–Definition – History of AI - Future of Artificial Intelligence – Intelligent Agents: Agents & Environments-The Concept of Rationality – The Nature of Environments - PEAS representation for an Agent–The structure of Agents - Problem Solving Approach to Typical AI problems	12
II	**PROBLEM SOLVING**: Solving problems by Searching – Problem solving Agents- Example Problems –Searching for Solutions - UninformedSearch Strategies–Informed (Heuristics) Search Strategies – Local Search Algorithms and Optimization Problems -Searching with Partial Observations	12
III	**ADVERSARIAL SEARCH**: Games - Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games - Partially observable gamesCONSTRAINT SATISFACTION PROBLEMS:Defining Constraint Propagation problems – inference in CSP's - Backtracking Search for CSP's – Local search for CSP's- The Structure of Problems	12
IV	**LOGICAL AGENTS**: Knowledge Based Agents - Propositional Logic – Propositional Theorem proving- Propositional model Checking - Agents based on propositional logic - FIRST ORDER LOGIC:Syntax and Semantics of First Order Logic – Using First Order Logic-Knowledge Engineering in First Order Logic–Inferences in first-order logic - Unification – Forward Chaining-Backward Chaining – Resolution	13
V	**AI Applications** : Language Models – Information Retrieval –	11

	Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition	
Total		**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	Deepak Khemani	"Artificial Intelligence"	Tata McGraw Hill Education	2013
2	Stuart Russel and Peter Norvig	"Artificial Intelligence – A modern approach",(2nd Edn.)	Prentice Hall	2021

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Prachi Joshi, and ParagKulkarni	Artificial Intelligence: Building Intelligent Systems", (2nd Edn.),	MIT Press	2012
2	Elaine Rich, Kevin Knight and Shiva shankar B Nair	"Artificial Intelligence"	TMH	2010

Web references

https://www.geeksforgeeks.org/artificial-intelligence-an-introduction/
https://www.javatpoint.com/artificial-intelligence-ai
https://www.uc.edu/content/dam/uc/ce/docs/OLLI/Page%20Content/ARTIFICIAL%20INTELLIGENCEr.pdf

Course Designed by		Head of the Department		Curriculum Development Cell		Controller of the Examinations
Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI3A1			Title	GE III : Discrete Structures and its Applications	
Name and Signature	Name: Dr. S. Niraimathi	Name and Signature	Name: Dr. S. Niraimathi	Name and Signature	Name: Mr. K. Srinivasan	Name and Signature
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	Batch	2025 - 2028	Name: Mr. K. Srinivasan
				Semester:	III	
				Credits:	4	
Signature		Signature		Signature		Signature

Course Objectives

- Introduce students to the techniques, algorithms, and reasoning processes involved in the study of discrete mathematical structures.
- Introduce students to set theory, inductive reasoning, elementary and advanced counting techniques, equivalence relations, recurrence relations, graphs, and trees.
- Introduce students to prove mathematical statements by means of inductive reasoning

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand discrete mathematical preliminaries and apply discrete mathematics in formal representation of various computing constructs	K1
CO2	Demonstrate an understanding of relations ,functions, Combinatorics and lattices	K2

CO3	Apply the techniques of discrete structures and logical reasoning to solve a variety of problems and write an argument using logical notation	K3
CO4	Analyze and construct mathematical arguments that relate to the study of discrete structures	K4
CO5	Analyze and construct mathematical arguments that relate to the study of discrete structures	K5

Unit	Course contents	Hours
I	**Relations**: Cartesian product of two sets – Relations – Representation of Relation – Operations on Relations – Equivalence of Relation – Closures and Warshall's Algorithm – Partitions and equivalence classes	15
II	**Coding Theory**: Introduction – Hamming distance – Encoding a Message – Group codes –Procedure for Generating Group Codes – Decoding and error correction – An example of Simple Error Correcting Code.	16
III	**Mathematical Logic**: Introduction – True / False - Statements – Connectives – Atomic and Compound Statements – Well Formed (Statement) Formulae – The truth table of a formula – Tautology – Tautological implications and equivalence of a formula – Normal forms – Principal Normal Forms.	14
IV	**Graph Theory** :Graphs and sub graphs - Operations on Graphs - Isomorphism of Graphs - Walks, paths and cycles - Trees - spanning trees of graph - Algorithm for finding a spanning tree of a connected graph - Krushkal's algorithm to find an optimal tree of a weighted graph.	15
V	**Number Theory:** Divisibility: Divisibility of integer – Division algorithm – Common divisor – Greatest common divisor– The Euclidean algorithm – Primes and Composite Number: Definition of Prime, Composite, Twin prime – Euclid's theorem – Unique factorization theorem – To find GCD & LCM of two integers – Positional representation of on integers – Worked examples	15
Total		**75**

Text Book(s):

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dr.M.K.Venkataraman, Dr.N.Sridharan, N. Chandarasekaran (Unit – I, II, III)	"Discrete Mathematics"	The National Publishing Company, Chennai	2006
2	S.Kumaravelu&Susheela Kumaravelu (Unit – IV)	"Graph Theory"	JankiCalender Corporation, Sivakasi	1999
3	S.Kumaravelu&Susheela Kumaravelu (Unit – V)	"Elements of Number Theory"	Raja Sankar offset Printers, Sivakasi	2002

Reference Book(s):

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	J.P.Tremblay, R Manohar	"Discrete Mathematical Structures with Applications to Computer Science"	Tata McGraw Hill Education	2007
2	NarsinghDeo	Graph Theory with applications to engineering and computer science	Prentice hall of India, New Delhi	2003

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. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI309			**Title**	**Batch:**	2025 - 2028
				Core Lab III Python Programming Lab	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	2

Course Objective

To give a basic introduction to object-oriented and to demonstrate the concepts of Artificial Intelligence and Data science, using Python

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	To remember the principles of structured programming Recognize and construct common programming idioms: variables, loop, branch, subroutine, and input/output.	K3
CO2	To understand the common programming idioms: variables, loop, branch, subroutine, and input/output	K4
CO3	To figure out ability to analyze and solve the problems using advanced facilities of the Python language	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

Units	Content
	1. Program to find the factorial of a number using recursion 2. Program to implement the control structures 3. Program to implement the list 4. Program to implement the operations and methods of the String 5. Program to implement the Tuples 6. Program to implement the Dictionaries 7. Program to import and use the system libraries 8. Program to implement the modules 9. Program to implement the standard modules 10. Program to implement Exceptions and Error handling 11. Program to implement Objects and Class 12. Program to demonstrate File handling 13. Program to demonstrate JSON 14. Program to demonstrate Numpy 15. Program to Demonstrate Pandas
	Total Hours 60

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. Gowrishankar, A. Veena,	Introduction to Python Programming,	CRC Press Taylor and Francis Group, Ist Edition	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Introduction to Computing and Problem Solving Using Python	McGraw Hill Education1st Edition	2016
2	Wesley J. Chun	Core PythonProgramming	, Pearson Education, 2nd Edition	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**
Name: Dr.S.Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			**Programme Title:**	AI and ML	
Course Code:	25UAI310			**Title**	**Batch:**	2025-2028
				Title Core Lab IV : AI Lab	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	2

Course Objective

To make the students to work with relational AI Concepts

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To Understand the Typical AI problems	K3
CO2	To Analyze the search strategies	K4
CO3	To implement the Typical problems in AI	K5

	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 Python Program to implement the Water jug Problem.
2. Write a Python program to Implement Travelling Salesman Problem.
3. Write a Python Program to implement the Depth first Search Traversal.
4. Write a Python Program to implement the Breadth first Search Traversal.
5. Write a Python Program to implement Map Colouring.
6. Write a Python Program to emulate Simple-Reflex agent.
7. Write a Python Program to emulate Utility-Based Reflex agent.
8. Write a Python Program to emulate Goal-Based agent.

9. Write a Python Program to emulate Modern-Reflex agent. 10. Write a Python Program to Implement Hill-Climbing.
60 Hrs

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: Dr.S.Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI3N1			**Title**	**Batch:**	2025 - 2028
				Non-Major Elective Paper-I : Web Development Essentials	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem.**	30		**Credits:**	2

Course Objectives

To give the confidence for the students to build a customized Web Page

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To Understand the basic internet concepts	K3
CO2	To analyze the Tags required to build a webpage and using the CSS	K4
CO3	To implement the Web Pages	K5

	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

Contents	
Internet concepts 1. Write a HTML Program for Text Formatting 2. Write a HTML Program to display your education details in a tabular format 3. Write a HTML Program to illustrate the usage of the following: a) Ordered List b)Unordered List Definition List 4. Write a HTML code to create a Home page having three links: About Us, Our Services andContact Us. Create separate web pages for the three links. 5. Write a HTML Program to create a login form. On submitting the form, the user should getnavigated to a profile page 6. Write a HTML Program to demonstrate the Anchor Tag 7. Write a HTML Program to demonstrate inline image 8. Write a program to demonstrate inline CSS 9. Write a HTML program to demonstrate the usage of external CSS 10. Write a HTML program to demonstrate the embedding of sound and video files	
Total	**30**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

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: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI3N2			**Title**	**Batch:**	2025 - 2028
				Non-Major Elective Paper-I : Advanced Excel Lab(SEC)	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem.**	30		**Credits:**	2

Course Objectives

To create, edit and format Worksheet, analyze data using advanced features in Excel

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To Understand the basicsof Excel	K3
CO2	To analyze the features of Excel	K4
CO3	To implement the features of Excel	K5

	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

Contents

1. Enter the following data and save it in grade .xls
Name Marks1 Marks2 Marks3 Total Percentage Grade
Amit 80 70 80
Renu 70 60 90
Rajeev 60 50 80
Manish 50 30 90
Sanjeev 40 40 80
Anita 70 70 90
Do the following
(a) Compute the total marks and percentage of each student by entering appropriate formula.
(b) Draw a border around the worksheet
(c) Change the font size of heading to 14 points and underline it and hide column c
(d) Increase the width of column A to 15 characters
(e) Right Align the values in column B, C, F
2. Create a sheet containing Nation-wide sales results for Avon Helmets-Region, Vendor name, Helmet type, Helmet Color and Total sales.
a. Sort the data by Region, Vendor name and sales.

b. Sort the data according to a custom list of Helmet Color - Red, Blue, Yellow and Green. 3. Create a sheet containing Nation-wide sales results for Avon Helmets- Region, Vendor name Helmet type, Helmet Color and total sales. a. Use Filtering on Region and Helmet type. b. Use subtotal function to count the number of records and sum of sales for the filtered records. 4. Use Query Wizard to filter East, West Region transaction and sort them on Region and Total sales. 5. Perform the following a. Create a list of vendor and total sales by consolidating the total sales. b. Compute sub totals with no detail data. c. Create Subtotals by both Region and Vendor within Region. 6. Create a PIVOT TABLE to show the sales results by Region and Helmet type and summarize the total sales. 7. Create a PIVOT chart for the pivot table of total sales for the Region and Helmet types. 8. Create a bar chart to show the sales results for different Helmet type and to the following formats. a. Add a Secondary axis. b. Create picture markers.	
Total	**30**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

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: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

SEMESTER IV

Programme Code:	**B.Sc.**			**Programme Title:**	**AI and ML**	
Course Code:	**25UAI411**			**Title**	**Batch:**	**2025-2028**
				Core VII: Machine Learning Techniques	**Semester:**	**IV**
Lecture Hrs./Week or Practical Hrs./Week	**4**	**Tutorial Hrs./Sem.**	**60**		**Credits:**	**3**

Course Objective

- To understand basic concepts of machine learning
- Understand how to evaluate models generated from data
- Discover how to build machine learning algorithms, prepare data, and use different techniques using Python

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To remember the concept of Machine learning techniques and mathematical concepts in ML	K1
CO2	Understand a wide variety of learning algorithms.	K2
CO3	Understand how to evaluate models generated from data	K3
CO4	Provide a way to evaluate performance of machine learning algorithms.	K3
CO5	Apply the algorithms to a real-world problem and optimize the models learned.	K4

Mapping

PO /PSO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO 1**	**PSO2**
CO1	**L**	**M**	**H**	**M**	**M**	**M**	**L**	**L**	**L**	**L**	**H**	**M**

CO2	**M**	**L**	**L**	**L**	**M**	**H**	**M**	**M**	**M**	**M**	**H**	**H**
CO3	**S**	**M**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**H**
CO4	**S**	**M**	**L**	**L**	**L**	**M**	**L**	**L**	**L**	**L**	**H**	**L**
CO5	**M**	**M**	**L**	**H**	**M**	**H**	**M**	**M**	**M**	**M**	**M**	**H**

Unit	Course contents	Hours
I	Introduction: Machine Learning Foundations – Overview – Design of a Learning System – ML-Lifecycle - Types of Machine Learning –Supervised Learning and Unsupervised Learning – Semi Supervised Learning- Reinforcement Learning - Applications of Machine Learning - Overview of Tools for ML.	12
II	Supervised Learning – Working of Supervised Learning – Steps involved in Supervised Learning – Regression Analysis in ML-Supervised Learning – I: Linear Regression - Simple Linear Regression – Multiple Linear Regression – Polynomial Regression – Ridge Regression – LassoRegression - Implementation of Regression algorithms in Python – Evaluating Regression Models – Model Selection – Bagging – Ensemble Methods.	12
III	Supervised Learning – II: Classification – Logistic Regression – implementation of Logistic Regression in Python – K-Nearest Neighbour Decision – Implementation of KNN in Python – Decision tree Classification and Python implementation – Random Forest Classification and Python Implementation – Support Vector Machine - Implementation of SVM using Python– Evaluating Classification Models.	12
IV	Unsupervised Learning: Working of Unsupervised Learning-Types of Unsupervised Learning algorithms - Clustering – K-Means Clustering – Types of Clustering methods – K-Means Clustering Algorithm and Implementation in Python - Density-Based Clustering – DB Scan Algorithm in Python - Dimensionality Reduction techniques– Collaborative Filtering.	12
V	Association Rule Learning: Working of Association Rule Learning-Types of AL – Concepts related to ARL – ARL Algorithms – Apriori Algorithm and implementation in Python – Eclat – Concepts and Algorithm.	12
Total		**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	Kevin P. Murphy	Machine Learning: A Probabilistic Perspective	MIT Press	2012

REFERENCE BOOKS:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	EthemAlpaydin,	Introduction to Machine Learning	MIT Press, Third Edition	2014
2	Tom Mitchell	Machine Learning	McGraw-Hill, 1997	1997
3	Sebastian Raschka, VahidMirjilili	Python Machine Learning and deep learning",	kindle book,2nd edition	2018
4	Carol Quadros	Machine Learning with Python, Scikit-learnandTensorflow",	Packet Publishing,	2018

Web References

https://www.geeksforgeeks.org/machine-learning/

https://www.javatpoint.com/machine-learning

https://www.kaggle.com/learn/intro-to-machine-learning

https://www.mygreatlearning.com/blog/machine-learning-tutorial/

https://machinelearningmastery.com/start-here/

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: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI412			**Title**	**Batch:**	2025 – 2028
				Core VIII: Database System Concepts	**Semester:**	III
Lecture Hrs./Week or Practical rs./Week	**4**	**Tutorial Hrs./Sem.**	**60**		**Credits:**	3

Course Objectives

- This course has been designed for students to learn and understand
- To the foundations of of database management systems.
- To give a good formal foundation on the relational model of data.
- To use the database management systems in various real-time applications.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the foundations of database systems.	K2
CO2	Demonstrate the basics of SQL for database	K3
CO3	Execute various advanced SQL queries.	K4
CO4	Apply various normalization techniques on databases.	K4
CO5	Apply and relate the concept of transaction, concurrency control and recovery in database.	K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	M
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	Course contents	Hours
Unit I	**Introduction** :Database-System Applications - Purpose of Database Systems - View of Data - Database Languages - Relational Databases - Database Design- Object-Based and Semi structured Databases - Data Storage and Querying - Transaction Management – Data Mining and Analysis - Database Architecture - Database Users and Administrators - History of Database Systems. **Relational model** : Structure of Relational Databases - Fundamental Relational-Algebra Operations - Additional Relational-Algebra Operations - Extended Relational-Algebra Operations - Null Values - Modification of the Database	12
Unit II	**SQL** : Data Definition - Basic Structure of SQL Queries - Set Operations- Aggregatae Functions- Null Values -Nested Subqueries - Complex Queries - Views - Modification of the Database - Joined Relations **Advanced SQL**: Data Types and Schemas - Integrity Constraints - Authorization – Embedded SQL - Dynamic SQL - Functions and Procedural Constructs- Recursive Queries- Advanced SQL Features	12
Unit III	**Database Design and the E-R Model:** Overview of the Design Process - The Entity-Relationship Model - Constraints - Entity-Relationship Diagrams **Relational Database Design:** Features of Good Relational Designs - Atomic Domains and First Normal Form - Decomposition Using Functional Dependencies - Functional-Dependency Theory - Decomposition Using Functional Dependencies - Decomposition Using Multivalued Dependencies - More Normal Forms - Database-Design Process - Modeling Temporal Data. **NoSQL definition**: Overview and History of NoSQL Databases. Definition of the Four Types of NoSQL Database, Relational Vs non-relational database - Documents,col lections working with NoSQL -CRUD operations - Running MongoDB – Indexing- Aggregation operations	12
Unit IV	**ORACLE**: Introduction – CODD's Rule – Tools of ORACLE - Introduction to SQL – Benefits of SQL - Data Types – DDL – DML – DCL - TCL - Data Constraints. ORACLE SQL Functions –Single Row Functions: Date, Number, Miscellaneous, Conversions, Character Functions - Group Functions – SQL Operators: Arithmetic, Comparison and Logical Operators – Set Operators – Joins – Sub Queries – Views	11
Unit V	**PL/SQL** : Introduction–Advantages of PL/SQL – Architecture of PL/SQL – Introduction to PL/SQL Block - Data Types – Control Structures - Concepts of Error Handling – Cursor - Procedure - Functions – Triggers - Types of Triggers.	13
Total		**60**

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	ASilberschatz, H Korth,SSudarshan	Data base System and Concepts", (5th Edn.)	TMH.	2005

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Sadalage, P. & Fowler,	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence,	Pearson Education.	2005
2	Alexix Leon &MathewsLeon	"Essential of DBMS"	(2ndEdn.),Vijay NicolePublications	2009
3	Alexix Leon & Mathews Leon	"Fundamentals of DBMS"	2ndEdn.),Vijay NicolePublications	2014
4	Redmond, E. &Wilson	Seven Databases in Seven Weeks	Pragmatic Bookshelf	2018

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: Dr.B.Azhagusundari Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	25UAI4A1			Title	Batch:	2025-2028
				GE IV – 1Allied IV: Computer Networks	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60		Credits:	3

Course Objective

This course provides basics for understanding concept of statistics

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember computer network basics, network architecture, and TCP/IP and OSI reference models	K1
CO2	Understand the knowledge about essential protocols and their operations.	K2
CO3	Apply aspects of network security	K3
CO4	Familiarize the different types of protocols	K4
CO5	Evaluate detection and correction of errors in transmission.	K5

Mapping

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

Unit	Course Contents	Hours
I	Introduction: Uses of Computer Network-Network Hardware: LAN– WAN – MAN – Wireless – Home Networks. Network Software: Protocol Hierarchies – Design Issues for the Layers – Connection-oriented and connectionless services – Service Primitives – The Relationship of services to Protocols. Reference Models: OSI Reference Model– TCP/IP reference Model	12
II	Physical Layer - Guided Transmission Media: Magnetic Media – Twisted Pair – CoaxialCable – Fiber Optics. WirelessTransmission: Electromagnetic Spectrum – Radio Transmission – Microwave Transmission – Infrared and Millimeter Waves – Light Waves. Communication Satellites: Geostationary, Medium-Earth Orbit, Low Earth-orbit Satellites – Satellites versus Fiber. Data-LinkLayer: Error Detection and correction–Elementary Data-link Protocols– Sliding Window Protocols.	12
III	NetworkLayer: Routing algorithms – Congestion Control Algorithms – IPv4 Addresses – IPv6 Addresses. TransportLayer: Elements of Transport Protocols – Internet Transport Protocols: TCP – Quality of Service.	12
IV	SessionLayer: Session and Transport Interaction – Synchronization Points– Session Protocol Data Unit. Presentation Layer: Translation– Encryption/Decryption– Authentication– Data Compression	12
V	Application Layer: DNS –E-mail: SMTP, POP– File Transfer Protocol– HTTP – Telnet Protocols. Network Security: Conepts of symmetric and asymmetric key cryptography	12
Total		**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book(s):

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

1	Andrew S. Tanenbaum	Computer Networks	Tata Mcgraw–Hill Edition	2003, PHI
2	BehrouzA.Forouzan	Data Communication	Tata Mcgraw–Hill Edition	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	AchyutGodbole	Data Communication And Networks	Tata McGraw Hill Edition	2007
2	Uyless Black	Computer Networks Protocols,Standards, and Interfaces	Prentice Hall India, 2nd Edition.	1993

Web References

https://www.geeksforgeeks.org/basics-computer-networking/

https://www.javatpoint.com/computer-network-tutorial

https://ncert.nic.in/textbook/pdf/lecs110.pdf

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: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	25UAI4A2			Title	Batch:	2025-2028
				GE IV – 1Allied IV: Microprocessor and Microcontroller	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60		Credits:	3

Course Objective

This course provides basic of the architecture, operation, and programming of microprocessors and microcontrollers.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Summarize the concepts of 8085 microprocessor	K1
CO2	Explore microprocessor architecture and memory interfacing	K2
CO3	Manipulate various 8085 instructions	K3
CO4	Develop assembly language programs in 8085 and 8051	K4
CO5	Demonstrate the architecture and instruction set of 8051 microcontroller	K5

Mapping

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

Unit	Course Contents	Hours
I	**Microprocessors, Microcomputers, and Assembly Language:-** Microprocessors-Microprocessor Instruction set and Computer Language- From Large Computers to single chip Micro controllers-Applications: Microprocessor Controlled Temperature System (MCTS) **Introduction to 8085 Assembly Language Programming:-** The 8085 Programming Model-Instruction classification-Instruction, Data Format and Storage-How to write, Assemble and Execute a simple Program-Overview of 8085 Instruction Set.	12
II	**Microprocessor Architecture and Microcomputer System:-** Microprocessor Architecture and its Operations –Memory-Input and Output (I/O) Devices-Example of a Microcomputer System. **8085 Microprocessor Architecture and Memory Interfacing:-** The 8085 MPU-Example of an 8085 Based Microcomputer-Memory Interfacing-Interfacing the 8155 Memory Segments-Illustrative Example: Designing Memory for MCTS Projects	12
III	**Interfacing I/O Devices:-** Basic Interfacing concepts – Interfacing output displays- Interfacing Input Devices-Memory Mapped I/O-Testing and Troubleshooting I/O Interfacing circuits **Introduction to 8085 Instructions:-** Data Transfer (Copy) operations- Arithmetic Operations-Logic Operations-Branch Operations-Writing Assembly Language Programs	12
IV	**Programming Techniques With Additional Instructions:-** Programming Techniques: Looping, Counting and Indexing-Additional Data Transfer and 16 Bit Arithmetic Instructions-Arithmetic Operations Related to Memory-Logic Operations: Rotate, Compare . **Code Conversion, BCD Arithmetic Operations:-** BCD to Binary Conversion-Binary to BCD Conversion-BCD Addition-BCD Subtraction **Software Development Case Study:-** Addition of two 8/16 bit numbers- Subtraction of two 8/16 bit numbers - Find ones complement of 8/16 bit numbers- To find largest number in an array - To find smallest number in an array – Ascending order and descending order- Multiplication of two -8-bit data – Division of two -8-bit data.	12
V	**Introduction to Microcontroller**:- Introduction-Architecture of 8051 Micro controller-Memory Organization -Pin Diagram of 8051 Micro Controller- Timers/Counters-Serial Communication **Instruction Set and Programming of the 8051 Microcontroller:-**	12

	Introduction-Addressing Modes-8051 Instruction Set-Simple Examples in Assembly Language programs of 8051 Microcontrollers-Applications of Microcontrollers- Programming a Traffic Signal to Display, Keyboard Interfacing, Water Level Management	
Total		**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book(s):

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ramesh Gaonkar,	Microprocessor Architecture, Programming, and application with the 8085	Penram International Publication, Sixth Edition	Reprint 2019 [Unit I to IV]
2	Soumitra Kumar Mandal	"Microprocessors and Microcontrollers – Architectures, Programming and Interfacing using 8085, 8086, 8051",	Tata McGraw Hill Education Private Limited.	Reprint 2015 [Unit V].

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Mathur	Introduction to Microprocessor	3rd Edition-Tata McGraw-Hill	1993
2	Raj Kamal	Microcontrollers: Architecture, Programming, Interfacing and System Design	", Pearson Education,	2005.
3	Krishna Kant,	Microprocessors and Microcontrollers – Architectures, Programming and System Design	PHI Publication.	8085, 8086, 8051, 8096", PHI, 2008.

Web References

1. **https://www.tutorialspoint.com/microprocessor/microprocessor_overview.html**
2. **https://www.tutorialspoint.com/microprocessor/microcontrollers_overview.html**

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: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	25UAI413			Title	Batch:	2025-2028
				CC Lab V: MACHINE LEARNING LAB	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60		Credits:	2

Course Objective

To focus on the Machine learning Techniques**.**

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts and techniques of Machine Learning.	K3
CO2	Explain the regression methods, classification methods, clustering methods.	K4
CO3	Demonstrate Dimensionality reduction 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	H
CO3	M	H	M	H	M	M	H	M	M	L	H	H

Content
1.Write a python program to demonstrate the statistial libraries
2.Write a python program to demonstrate the math libraries in machine learning
3.Write a python program to demonstrate simple linear regression
4.Write a python program to demonstrate the linear and polynomial using the machine learning
5.Write a python program to demonstrate logistic regression using machine learning
6.Write a python program to demonstrate k- nearest neighbour algorithm using machine learning
7.Write a python program to demonstrate support vector mahine using machine learning
8.Write a python program to demonstrate random forest using machine learning
9.Write a python program to demonstrate the decision tree using machine learning
10.Write a python program to demonstrate the k-means clustering using machine learning

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: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			**Programme Title:**	AI and ML	
Course Code:	25UAI414			**Title**	**Batch:**	2025-2028
				Title Core Lab VI : DBMS Lab	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	3	**Tutorial Hrs./Sem.**	45		**Credits:**	2

Course Objective

To make the students to work with relational, Structured and unstructured Databases like SQL, NoSQL and Mongo DB

Course Outcomes

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

CO1	To remember the principles of relational databases.	K3
CO2	To understand the common constructs of relational databases to formulate queries	K4
CO3	To figure out ability to analyze and solve the problems using advanced facilities of SQL	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

Contents

- To implement the DDLCommands.
- Implementation of the DDL Commands with KeyConstraints.
- To Implement the DMLCommands.
- Implementation of DCL Commands andViews.
- Write a PL/SQL program to check whether a number is even orodd.
- DesignaPL/SQLblockofcodeforreversinganumber..
- Design a PL/SQL block to calculate the incentive of an employee.
- Write a PL/SQL program to check whether a given number is positive, negative orzero.
- Write a PL/SQL program using FOR loop to insert ten rows into a databasetable.

○ Write a PL/SQL program to check whether a given character is letter or digit.
45Hrs

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: Dr.B.Azhagusundari Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI4S1			**Title**	**Batch:**	2025 - 2028
				SEC II : NaanMudhalvan: **Advanced Java script Front end Framework with Angular**	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem.**	30		**Credits:**	2

Course Objective

- Master Angular modules, components, dependency injection, and change detection.
- Implement complex routing strategies (lazy loading, guards) and manage state with NgRx.
- Build reusable components, custom directives, and pipes.
- Deep dive into reactive and template-driven forms with validation and dynamic forms.

Course Outcome

CO Number	CO Statement	Knowledge Level
CO1	Create reusable components, directives, and services to enhance application modularity.	K3
CO2	Enhance application performance and security using best practices in AngularJS development and Integrate RESTful APIs and handle asynchronous data using AngularJS's	K4
CO3	Deploy and optimize AngularJS applications for real-world scenarios.	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	M
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

Content	Hrs
1. **Program 1**: Basic Angular Project Setup 2. **Program 2**: Create Angular Components with TypeScript 3. **Program 3**: Data Binding in Angular 4. **Program 4**: Working with Directives (ngIf, ngFor) 5. **Program 5**: Angular Service with Dependency Injection 6. **Program 6**: Fetching Data from APIs with Angular Service 7. **Program 7**: Implement Angular Routing for Multiple Pages 8. **Program 8**: Pass Parameters through Routes 9. **Program 9**: Reactive Forms for User Registration 10. **Program 10**: Template-driven Forms with Validation 11. **Program 11**: HTTP Client for Data Fetching 12. **Program 12**: Error Handling with HTTP Requests 13. **Program 13**: Lazy Loading in Angular Modules 14. **Program 14**: Sharing Services across Modules 15. **Program 15**: Using Angular Built-in Pipes 16. **Program 16**: Creating Custom Pipes in Angular 17. **Program 17**: Writing Unit Tests for Components 18. **Program 18**: Writing Unit Tests for Services 19. **Program 19**: Angular Performance Optimization 20. **Program 20**: Implement Angular Universal for SSR	
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	Adam Freeman	Pro Angular	Apress / 4th Edition	2022
2	Yakov Fain, Anton Moiseev	Angular Development with TypeScript	Manning / 3rd Edition	2022

3	Stephen Fluin, Minko Gechev	Learning Angular	O'Reilly / 3rd Edition	2023

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Clive Harber	Mastering JavaScript Functional Programming	Packt / 2nd Edition	2020

Online Resources/Web references

https://www.geeksforgeeks.org/angularjs?

https://www.udemy.com/course/modern-web-development-from-zero-to-advanced?

https://www.guvi.in/angular-pack?

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. S. Niraimathi Signature	Dr. S. Niraimathi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

ProgrammeCode:	UAP			**ProgrammeTitle:**	B.A., / B.Sc., / B. Com.,	
CourseCode:	25UAI4S2			**SEC II - Naan Mudhalvan:** Aptitude for Placement	**Batch:**	2025-2028
					Semester :	IV
Lecture Hrs./Week or PracticalHrs./Week	2	**Tutorial Hrs./Sem.**	30		**Credits:**	2

Course Objective

- To enable the students to refine their mathematical, logical, and analytical skills.
- The student will be able to answer real-life simple problems by using HCF and LCM.
- The student isable to apply the correct sequence of operations to find out the value of a given mathematical expression.
- The student will be able to solve the problem involving square roots, cube roots, and average.
- To make them prepare for various public and private sector exams and placement drives.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To have fundamental knowledge of Mathematics about problems of numbers using Mathematical formulae.	K1
CO2	To understand the concepts of profit & loss related processing, simplification, etc.,	K2
CO3	To apply the formulae to real time problems on probability, Areas of surfaces and apply data visualization tool for any data set.	K3
CO4	To analyze the problems solving related to Age, Time and Distance and Time and Work etc. To examine their employability skills.	K4

CO5	Use their logical thinking and analytical abilities to evaluatepuzzle and decision making related questions from company specific and other competitive tests / To critically evaluate numerous possibilities related to puzzles. To develop their Competitive skills and improve the decision-making skills. To generate analytical reports and presentations using Data Interpretation.	K5 K6

Mapping

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

*H-High;M-Medium;L-Low

Units	Content	Hrs
UnitI	Numbers-HCF And LCM of Numbers-Decimal Fractions- Comparison of Fractions - Simplification- Square Root and Cube Roots – Average.	6
UnitII	Time and Work - Time and Distance – Mixtures or Allegations - Problems on Numbers - Problems on Ages –Percentage - Profits and Loss.	6
Unit III	Ratio and Proportion - Time and Work - Time and Distance - Simple Interest - Compound Interest - Area-Volume and Surface Area.	6
UnitIV	Permutation and Combination-Probability, Height and Distances-Boats and Streams-Odd Man Out &Series.	6
UnitV	Interpretation: Tabulation, Bar Graphs, Pie Chart,Line Charts.	6
	Total Contact Hrs	**30**

Pedagogy

Direct

Assessment Methods

Seminar,Quiz,Assignments,GroupTas

TextBook

S.NO	AUTHOR	TITLEOFTH EBOOK	PUBLISHERS\EDITION	YEAR OF PUBLICATION
1	R.S. Aggarwal	Quantitative Aptitude for Competitive Examinations	S.Chand &CompanyLtd., NewDelhi.	2018

ReferenceBooks

S.NO	AUTHOR	TITLEOFTHEBOOK	PUBLISHERS \EDITION	YEAR OFPUBLICATION
1	Dinesh Khattar	The Pearson Guide to Quantitative Aptitude for Competitive Examinations	Pearson's Publications, New Delhi. 2nd Edition	2013
2	Praveen R.V	Quantitative Aptitude and Reasoning	PHI Learning Pvt. Ltd., New Delhi. 3rd Edition.	2016
3	Rajesh Varma	Fast Track Objective Arithmetic	Arihant PublicationsIndia Limited, New Delhi	2018
4	Abhijit Guha	Quantitative Aptitude for Competitive Examinations	McGraw Hill Education (India) Private Limited. 7th Edition	2020
5	Sarvesh K Verma	Quantitative Aptitude Quantum CAT	Arihant PublicationsIndia Limited, New Delhi; Twelve edition	2022

WebReferences

1. https://www.javatpoint.com/aptitude/quantitative
2. https://www.toppr.com/guides/quantitative-aptitude/
3. https://www.tutorialspoint.com/quantitative_aptitude/index.htm
4. https://www.sscadda.com/quantitative-aptitude/
5. https://prepinsta.com/learn-aptitude/
6. https://www.indiabix.com/
7. https://www.icai.org/post.html?post_id=17790
8. https://tnpsc.news/tnpsc-study-materials
9. http://www.kalvisolai.com/p/kalvisolai-tnpsc-study-materials.html
10. https://byjus.com/free-ias-prep/tnpsc-study-material/

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. B.Azhagusundari Signature	Dr. S. Niraimathi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI4N1			**Title**	**Batch:**	2025 - 2028
				Non Major Elective - II Web Application Development	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem.**	30		**Credits:**	2

Course Objectives

The objectives of this course are to have a practical understanding about how to write PHP code to solve problems.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Obtain knowledge and develop application programs using PHP	K3
CO2	Create dynamic Web applications such as content management, user registration, and e-commerce using PHP and to understand the ability to post and publish a PHP website.	K4
CO3	Develop a MySQL database and establish connectivity using MySQL.	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 PHP program which adds up columns and rows of given table 2. Write a PHP program to compute the sum of first n given prime numbers 3. Write a PHP program to find valid an email address 4. Write a PHP program to convert a number written in words to digit. 5. Write a PHP script to delay the program execution for the given number of seconds. 6. Write a PHP script, which changes the colour of the first character of a word 7. Write a PHP program to find multiplication table of a number. 8. Write a PHP program to calculate Factorial of a number. 9. Write a PHP script to read a file, reverse its contents, and write the result back to a new file 10. Write a PHP script to look through the current directory and rename all the files with extension .txt toextension .xtx. 11. Write a PHP script to read the current directory and return a file list sorted by last modification time. (using filem time()) 12. Write a PHP code to create a student mark sheet table. Insert, delete and modify records.	
Total	**30**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

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: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

<table>
<tr><td>Programme Code:</td><td colspan="3">B.Sc</td><td>Programme Title:</td><td colspan="2">Bachelor of Science
(Computer Science with AI & ML)</td></tr>
<tr><td rowspan="2">Course Code:</td><td colspan="3" rowspan="2">25UAI4N2</td><td>Title</td><td>Batch:</td><td>2025 - 2028</td></tr>
<tr><td rowspan="2">Non-Major Elective Paper-II : Transforming Data with Excel and Power BI</td><td>Semester:</td><td>IV</td></tr>
<tr><td>Lecture Hrs./Week or Practical Hrs./Week</td><td>2</td><td>Tutorial Hrs./Sem.</td><td>30</td><td>Credits:</td><td>2</td></tr>
</table>

Course Objectives

The objectives of this course are to have a practical understanding about how to build web Application using Photoshop

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Obtain knowledge and develop data visualization using Power BI	K3
CO2	Create dynamic visualization using Power BI	K4
CO3	Develop a Visualization using Power BI with Excel data	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	
Connect to Power BI datasets directly from Excel Import data from Excel spreadsheets into Power BI Desktop to create reports and dashboards Publish entire Excel workbooks to the Power BI Service Data transformation tool is available in both Excel and Power	
Total	**30**

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: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI4VA			**Title**	**Batch:**	2025 - 2028
					Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	2	**Tutorial Hrs./Sem.**	30	**VAC –IIA** Practical approach for Statistical problems using AI and Machine Learning	**Credits:**	2

Course Objective

The objectives of this course are to have a practical understanding about Statistical technique using python

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics and core constructs of Python programming	K1
CO2	Express proficiency in the handling of functions, strings,lists, dictionaries, tuples and sets	K2
CO3	Apply the concepts of file system.	K3
CO4	Illustration of Object-oriented Programming conceptsin Python	K4
CO5	Realize the power of modules like CSV, NumPy, pandasin developing solutions to problems related to statistics	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	M	H
CO4	M	H	M	H	M	L	H	L	M	L	M	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	Introduction to Descriptive Statistics -Types of Measures -Population and Samples- Outliers -Choosing Python Statistics Libraries Getting Started With Python Statistics Libraries -Calculating Descriptive Statistics	10
Unit II	Measures of Central Tendency -Measures of Variability-Summary of Descriptive Statistics-Measures of Correlation Between Pairs of Data Working With 2D Data -Axes-DataFrames	10
Unit III	Visualizing Data :Box Plots-Histograms-Pie Charts-Bar Charts-X-Y Plots-Heatmaps	10
	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	Jesus Rogel-Salazar,	Statistics and Data Visualisation with Python	CRC Press	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Introduction to Computing and Problem Solving Using Python	McGraw Hill Education1st Edition	2016
2	Wesley J. Chun	Core PythonProgramming	Pearson Education, 2nd Edition	2009

Web references

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

https://www.javatpoint.com/library-in-python

https://www.geeksforgeeks.org/libraries-in-python/

https://www.geeksforgeeks.org/descriptive-statistic/

https://www.tutorialspoint.com/python_pandas/python_pandas_descriptive_statistics.htm

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. B.Azhagusundari Signature	Dr. S. Niraimathi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

SEMESTER V

Programme Code:	**B.Sc.**			**Programme Title:**	**AI and ML**	
Course Code:	**25UAI517**			**Title**	**Batch:**	**2025-2028**
				CC IX: Natural Language Processing	**Semester:**	**V**
Lecture Hrs./Week or Practical Hrs./Week	**5**	**Tutorial Hrs./Sem.**	**75**		**Credits:**	**4**

Course Objective

- To be familiar with a breath of concepts and tasks in Natural Language Processing.
- To gain a foundational understanding about the methods and evaluation metrics for various NLP tasks.
- To understand the role of semantics of sentences and pragmatics

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To tag a given text with basic Language features	K1
CO2	Understand the linguistic phenomena and to explore the linguistic features relevant to each NLP task.	K2
CO3	Analyze how to evaluate models generated from data.	K3
CO4	Compare and contrast the use of different statistical approaches for different types of NLP applications	K3
CO5	Design an innovative application using NLP components.	K4

Mapping

PO /PSO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	**L**	**M**	**H**	**M**	**M**	**M**	**M**	**L**	**L**	**L**	**H**	**M**

CO2	**M**	**L**	**L**	**L**	**M**	**H**	**M**	**M**	**M**	**M**	**H**	**H**
CO3	**S**	**M**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**H**
CO4	**S**	**M**	**L**	**L**	**L**	**M**	**L**	**L**	**L**	**L**	**H**	**L**
CO5	**M**	**M**	**L**	**H**	**M**	**H**	**M**	**M**	**M**	**M**	**M**	**H**

Unit	Course contents	Hours
I	Overview - Origins and challenges of NLP – Phases of NLP - Language and Grammar-Processing Indian Languages- Components of NLP– NLP Pipeline –NLP Libraries – Natural Language Understanding and Generation – NLP Applications- Information Retrieval - Language Modeling: Various Grammar - based Language Models - Statistical Language Model.	15
II	Word Level Analysis - Regular Expressions - Finite-State Automata – Regular Expressions to NFA - Morphological Parsing - Spelling Error Detection and correction - Words and Word classes - Part-of Speech Tagging. Syntactic Analysis – Concept of Parser – Types of Parsing – Parse Trees- Context free Grammar - Constituency- Parsing - Probabilistic Parsing.	15
III	Semantic Analysis- Meaning Representation-Approaches to Meaning Representation - Lexical Semantics– Elements of Semantic Analysis - Ambiguity- Word Sense Disambiguation – Applications of WSD -Discourse Processing – Building Hierarchical Discourse Structure - cohesion - Reference Resolution - Discourse Coherence and Structure.	15
IV	Natural Language Generation – Working of NLG – Stages of NLG- Architecture of NLG Systems - Generation Tasks and Representations - Application of NLG. Machine Translation - Problems in Machine Translation - Characteristics of Indian Languages - Machine Translation Approaches - Translation involving Indian Languages.	15
V	Information extraction– Key components of Information Extraction – IE Techniques - Automatic summarization-Python implementation - Information retrieval and Question answering- Named entity recognition and relation extraction – Steps involves in NER – Python implementation of NER – Python implementation of NER and Relation Extraction - IE using sequence labeling – Python Implementation -Machine translation: Basic issues in MT – Statistical translation – word alignment - phrase-based translation and synchronous grammars – Relationship between Phrase based Translation and Synchronous Grammars-Python implementation	15
Total		**75**

TEXT BOOK:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	TanveerSiddiqui, U.S. Tiwary,	Natural Language Processing and Information Retrieval	Oxford University Press	2012

REFERENCE BOOKS:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Daniel Jurafsky and James H. Martin	Speech and Language Processing: An Introduction to Natural Language Processing	2e Prentice Hall	2013
2	Christopher Manning and HinrichSchütze	Foundations of Statistical Natural Language Processing	MIT Press,	2008.
3	James Allen	Natural Language Understanding	Addison Wesley.	1995
4	Steven Bird, Ewan Klein, and Edward Loper	Natural Language Processing with Python - Analyzing Text with the Natural Language Toolkit	O'Reilly Media, Sebastopol	2009

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

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: Dr. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: : Mr. K. Srinivasan

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)
Course Code:	25UAI518			**Title**	**Batch:** 2025 - 2028
				CC X: Big Data Technologies	**Semester:** V
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:** 4

Signature	Signature	Signature	Signature

Course Objective

- To understand the basics of Big data technology.
- To introduce some of the application areas where big data can be applied

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Identify Big Data and its Business Implications.	K1

CO2	List the components of Hadoop and Hadoop Eco-System	K2
CO3	Access and Process Data on Distributed File System	K3
CO4	To apply the concept in the real world problems	K4
CO5	Implementation using R	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	M	H
CO4	M	H	M	H	M	L	H	L	M	L	M	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**Introduction To Big Data:** Introduction to Big Data Platform – Challenges of Conventional Systems - Nature of Data Evolution Of Analytic Scalability - Intelligent data analysis- Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools	15
Unit II	**Mining Data Streams:** Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing -Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream –Real time Analytics Platform (RTAP) Applications	15
Unit III	**Advanced Analytics:** Analyzing, Visualization and Exploring the Data, Statistics for Model Building and Evaluation, Advanced Analytics - K-means clustering, Association rules-Speedup, Linear Regression, Logistic Regression, Naïve Bayes, Decision Trees, Time Series Analysis, Text Analysis	15
Unit IV	**Hadoop And Frameworks:** History of Hadoop- The Hadoop Distributed File System – Components of Hadoop - Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming - Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.	15

Unit V	**Introducing R:** Understanding features of R – Studying the popularity of R - Getting information about popular organizations that hold big data –Reason for using R and Hadoop together **Case Study:** walmart - uber – Netflix – eBay -Procter and Gamble – Travel and Tourism – Telcom Industry.	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	Maheswari	DataAnalytics	McGraw Hill, 1 st Edition	2017
2	VigneshPrajapathi,	Big Data Analytics with R and Hadoop,	PACKT Publishing,	2013

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Stephan Kudyba	Big Data, Mining, and Analytics: Components of Strategic Decision Making	Auerbach Publications	2014
2	Michael Minelli (Author), Michele Chambers (Author),	Analytics: Emerging Business Intelligence and Analytic Trends	Wiley Publications, 2	2013

	AmbigaDhiraj (Author),	for Today's Businesses		
3	Judith Hurwitz, Alan Nurgent, Dr. Fern Halper, Marcia Kaufman,(2013)	Big Data for Dummies	First Edition, AWiley Publication	2013

Web References

https://www.javatpoint.com/big-data-technologies

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

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

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

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. B.Azhagusundari Signature	Dr. S. Niraimathi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)
Course Code:	25UAI5E1			**Title**	**Batch:** 2025 - 2028
				DSE-I: IOT	**Semester:** V
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:** 5

Course Objective

- To understand the basics of Internet of things and protocols.
- To introduce some of the application areas where Internet of Things can be applied.
- To learn the middleware for Internet of Things.
- To understand the concepts of Web of Things

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand general concepts of Internet of Things (IoT)	K1

CO2	Recognize various devices, sensors and applications	K2
CO3	Apply design concept to IoT solutions	K3
CO4	Analyze various M2M and IoT architectures	K4
CO5	Create IoT solutions using sensors, actuators and Devices	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	M	M	M	M	L	M	H
CO4	M	H	M	H	M	L	H	L	M	L	M	H
CO5	H	M	H	H	L	H	M	L	M	H	H	H

Units	Content	Hrs
Unit I	**IOT:** What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.	15
Unit II	**IOT PROTOCOLS:** Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFIDProtocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE802.15.4– BACNet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security	14
Unit III	**IOT ARCHITECTURE:**IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models- IoTivity : An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction.	15
Unit IV	**WEB OF THINGS:** Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals andBusiness Intelligence	16
Unit V	**IOT APPLICATIONS:**IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc. Case Studies: A Case Study of Internet of Things Using Wireless Sensor	15

	Networks and Smart Phones, Security Analysis of Internet-of-Things: A Case Study of August Smart Lock, Open IoT Platform.	
	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
2	Olivier Hersent, David Boswarthick, Omar Elloumi	The Internet of Things – Key applications and Protocols	Wiley Publications	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	ArshdeepBahga, Vijay Madisetti,	Internet of Things – A hands-on approach,	Universities Press	2015

2	Jan Ho¨ ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle	From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence	Elsevier	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**
Dr. S. Niraimathi Signature	Dr. S. Niraimathi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	25UAI5E2			Title	Batch:	2025-2028
				DSE-I : Soft Computing	Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75		Credits:	5

Course Objective

- Soft computing refers to principle components like fuzzy logic, neural networks and genetic algorithm, which have their roots in Artificial Intelligence.
- Healthy integration of all these techniques has resulted in extending the capabilities of the technologies to more effective and efficient problem solving methodologies.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Identify and describe soft computing techniques and their roles in building intelligent machines	**K1**
CO2	Recognize the feasibility of applying a soft computing methodology for a particular problem	**K2**
CO3	Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems	**K3**
CO4	Apply genetic algorithms to combinatorial optimization problems	**K4**
CO5	Apply neural networks to pattern classification and regression problems	**K5**

Mapping

PO /PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	**L**	**M**	**H**	**M**	**M**	**M**	**M**	**H**	**L**	**H**	**H**	**M**
CO2	**M**	**L**	**M**	**L**	**M**	**H**	**M**	**M**	**M**	**M**	**H**	**H**
CO3	**S**	**M**	**L**	**H**	**H**	**L**	**M**	**L**	**M**	**M**	**L**	**H**
CO4	**S**	**M**	**M**	**L**	**M**	**M**	**L**	**M**	**L**	**H**	**H**	**L**

CO5	**M**	**M**	**L**	**H**	**M**	**H**	**M**	**M**	**M**	**M**	**M**	**H**

Unit	Course contents	Hours
I	**Neural Networks-1(Introduction & Architecture):** Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.	15
II	**Neural Networks-II (Back propagation networks):** Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications..	16
III	**Fuzzy Logic-I (Introduction):** Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.	14
IV	**Fuzzy Logic –II (Fuzzy Membership, Rules):** Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications &Defuzzificataions, Fuzzy Controller, Industrial applications.	15
V	**Genetic Algorithm(GA):** Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.	15
Total		**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	S.Rajasekaran, G.A.Vijayalaks	Neural Networks, Fuzzy Logic and	PHI Learning Pvt. Ltd.	2017

	hmiPai,	Genetic Algorithm, Synthesis and Applications		
2	N.P.Padhy, S.P.Simon,	Soft Computing with MATLAB Programming	Oxford University Press	2015

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S.N.Sivanandam , S.N.Deepa,	Principles of Soft Computing	Wiley India Pvt. Ltd., 2nd Edition	2011
2	SimanHaykin	Neural Networks and Learning Machines	Prentice Hall of India	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**
Name: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	25UAI5E3			Title	Batch:	2025-2028
				DSE -I	Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	Mobile Application Development	Credits:	5

Course Objective

- Understand system requirements for mobile applications
- Generate suitable design using specific mobile development frameworks
- Generate mobile application design
- Implement the design using specific mobile development frameworks
- Deploy the mobile applications in marketplace for distribution

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the requirements for mobile applications	**K1**
CO2	Explain the challenges in mobile application design and development	**K2**
CO3	Develop design for mobile applications for specific requirements	**K3**
CO4	Design using Android SDK	**K4**
CO5	Implement the design using Objective C and iOS	**K5**

Mapping

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

Unit	Course contents	Hours
I	**INTRODUCTION:** Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications	16
II	**BASIC DESIGN:** Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – user interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.	14
III	**ADVANCED DESIGN:** Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.	15
IV	**TECHNOLOGY I – ANDROID:** Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.	16
V	**TECHNOLOGY II – IOS:** Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace.	14
Total		**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	Jeff McWherter and Scott Gowell	Professional Mobile Application Development	Wrox	2012
2	Charlie Collins, Michael Galpin and Matthias Kappler	Android in Practice	DreamTech	2012

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	James Dovey and Ash Furrow,	Beginning Objective C	Apress	2013
2	David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson,	Beginning iOS 6 Development: Exploring the iOS SDK	Apress	2013

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: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI519			**Title**	**Batch:**	2025 - 2028
				CC Lab VI: Programming Lab in NLP	**Semester:**	V
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	2

Course Objectives

- To introduce the fundamental concepts and techniques of natural language processing(NLP).
- To understand natural language processing and to learn how to apply basic algorithms in this field.
- To understand the semantics and pragmatics of languages for processing.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	To demonstrate the computational properties of natural languages and the commonly used algorithms for processing linguistic information.	K3
CO2	To understand the syntax, semantics and pragmatics of various languages.	K4
CO3	To analyse natural language processing and to learn how to apply basic algorithms in this field.	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

Units	Content
	Implementingwordsimilarity. Implementingsimpleproblemsrelatedtoworddisambiguation. Simpledemonstrationofpartofspeechtagging. ImplementingLexicalanalyzer. ImplementingSemanticAnalyzer. ImplementingSentimentAnalysis.
	Total hrs 75

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Steven Bird, Ewan Klein, and Edward Loper	Natural Language Processing with Python - Analyzing Text with the Natural Language Toolkit	O'Reilly Media, Sebastopol	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Christopher Manning and HinrichSchütze	Foundations of Statistical Natural Language Processing	MIT Press,	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**
Name: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			**Programme Title:**	AI and ML	
Course Code:	25UAI520			**Title**	**Batch:**	2025-2028
				CC Lab VII : Big Data Technologies Lab	**Semester:**	V
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	2

Course Objective

- Get familiar with Hadoop distributions, configuring Hadoop and performing File management tasks
- Understand different approaches for building HadoopMapReduce programs for real-time application
- Provide students a hands-on exposure to scientific programming using R.
- Provide wider knowledge to know about data structures in R and its types.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Utilize R for Big Data analytics.	K3
CO2	Configure Hadoop and perform File Management Tasks	K3
CO3	Appreciate and apply the R programming from a statistical perspective.	K4
CO4	Apply MapReduce programs to real time datasets	K4
CO5	Analyze the data sets using R programming capabilities.	K5
CO6	Critically analyze huge data set using Hadoop distributed file systems	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

Units	**Content**
	1. Develop a MapReduce program to find the maximum temperature in each year.

2. Develop a MapReduce program to find the grades of student's.
3. Develop a MapReduce to find the maximum electrical consumption in each year given electrical consumption for each month in each year.
4. Develop a MapReduce program to find the tags associated with each movie by analyzing movie lens data.
5. XYZ.com is an online music website where users listen to various tracks, the data gets collected which is given below. The data is coming in log files and looks like as shown below.

UserId	TrackId	Shared	Radio	Skip
111115	242	0	1	0
111113	245	1	0	0
111117	243	0	1	1
111115	245	1s	0	0

Write a MapReduce program to get the following

- Number of unique listeners
- Number of times the track was shared with others
- Number of times the track was listened to on the radio
- Number of times the track was listened to in total Number of times the track was skipped on the radio
- Implement different data structures in R (Vectors, Lists, Data Frames)
- Write a program to read a csv file and analyze the data in the file in R
- Create pie charts and bar charts using R.
- Create a data set and do statistical analysis on the data using R.
- Write R program to find Correlation and Covariance
- Write R program for Regression Modeling
- Write R program to build classification model using KNN algorithm
- Write R program to build clustering model using K-mean algorithm

Total Hours 75

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Tom White	Hadoop: The Definitive Guide	Fourth Edition, O'reilly Media	2015
2	Dr. G. Sudhamathy& Dr. C. JothiVenkateswaran	R Programming An Approachto Data Analytics	MJP Publishers	2025

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Glenn J. Myatt,	Making Sense of Data	John Wiley & Sons,	2007
2.	Pete Warden	Big Data Glossary	O'Reilly	2011

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: Dr. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc		**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI5S1		**Title**	**Batch:**	2025 - 2028
			Skill Based Elective I : AI for Cyber Security	**Semester:**	V
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.** 60		**Credits:**	2

Course Objective

- The need for cyber security and its related threats and attacks.
- The methods for secure communication in the cyber world.
- The best practices and regulations related to cyber security

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 cybercrime	K1
CO2	Describe the Cyber Crime Strategy	K2

CO3	Identify the Cyber Crime Investigation Methodology	K3
CO4	Generalize the knowledge on Digital Forensics.	K3
CO5	Apply the Cyber Crime and Digital Forensics concepts in real-time scenarios.	K3

Mapping

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

Units	Content	Hrs
Unit I	**Basics of Cyber crime :** Introduction - Cyber Threat – Definition of Cyber Crime – Classification – Current Threats and Trends – Diversity of Cyber Crime – Cyber Hate Crimes – Cyber Terrorism - Need for cyber security.	12
Unit II	**Responding to Cyber crime :** Cyber Strategy – National Security Strategy – Cyber Security Strategy – Organized Crime Strategy – Cyber Crime Strategy - Policy Cyber Crime – International Response – National Cyber Security Structure – Strategic Policy Requirements – Police and Crime Commissioners.	11
Unit III	**Investigating Cyber crime :** Preventing Cyber Crime – Password Protection – Get Safe Online – Cyber Security Guidance for Business - Cyber Crime Investigation Skills – Criminal Investigation – Code of Ethics – Evidence – Hi-Tech Investigations – Capturing and Analyzing Digital Evidence.	12
Unit IV	**Foundations of Digital Forensics :**Introduction to Digital Forensics - Forensic Software and Hardware - Analysis and Advanced Tools - Forensic Technology and Practices - Forensic Ballistics and Photography - Face-Iris and Fingerprint Recognition - Audio Video Analysis - Windows System Forensics - Linux System Forensics - Network Forensics.	12
Unit V	Case Studies :Latest Study Topics on Cyber Crime and Investigations - Recent Cyber Crime Cases – Recent Digital Forensics Cases – Bridging the Gaps in Cyber Crime Investigations between the Cyber security stake holders.	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	Thomas Halt, Adam M. Bossler and Kathryn C. SeigfriedSpellar,	"Cybercrime and Digital Forensics: An Introduction"	Routledge Taylor and Francis Group	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bernadette H Schell, Clemens Martin	"Cybercrime"	ABC – ClioInc, California	2004

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. B.Azhagusundari Signature	Dr. S. Niraimathi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	**B.Sc.**			**Programme Title:**	**AI and ML**	
Course Code:	**25UAI5S2**			**Title**	**Batch:**	**2025-2028**
				Skill Based Elective –II Advanced Java script back end Framework(Node JS, Express JS)	**Semester:**	**V**
Lecture Hrs./Week or Practical Hrs./Week	**4**	**Tutorial Hrs./Sem.**	**60**		**Credits:**	**2**

Course Objective

- Understand the role of AngularJS in full-stack development and its interaction with backend technologies
- Handle asynchronous data fetching and real-time updates using WebSockets and Firebase.
- Optimize backend performance and security by implementing best practices in API development.
- Deploy full-stack AngularJS applications on cloud platforms like AWS, Firebase, or Heroku.

Course Outcomes

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

CO	CO Statement	Knowledge

Number		Level
CO1	Develop RESTful APIs using Express.js and integrate them with AngularJS applications and Connect AngularJS with databases (MongoDB, MySQL, or Firebase) for data storage and retrieval.	**K3**
CO42	Implement authentication and authorization using JWT and session-based authentication and handle real-time communication using WebSockets (Socket.io) and Firebase.	**K4**
CO3	Deploy full-stack applications on cloud services like AWS, Firebase, or Heroku.	**K5**

Mapping

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

Unit	Course contents	Hours
I	1. **Program 1**: Basic HTTP server using Node.js 2. **Program 2**: Reading files using the fs module in Node.js 3. **Program 3**: Creating an HTTP server that handles multiple routes 4. **Program 4**: Using callbacks and promises in Node.js 5. **Program 5**: Set up an Express.js app with basic routing 6. **Program 6**: Render views using EJS (or Pug) in Express.js 7. **Program 7**: Implement a custom middleware function in Express.js 8. **Program 8**: Error handling middleware in Express.js 9. **Program 9**: Create dynamic routes in Express.js 10. **Program 10**: Handle form submissions with POST request in Express.js 11. **Program 11**: Connect to MongoDB using Mongoose for CRUD operations 12. **Program 12**: Implement JSON-based API in Express 13. **Program 13**: JWT-based authentication in Express.js 14. **Program 14**: Use Passport.js for session-based authentication	12

	15. **Program 15**: Secure Express app with helmet.js and cors 16. **Program 16**: Input validation with express-validator 17. **Program 17**: Unit tests for Express routes with Mocha and Chai 18. **Program 18**: Mocking database calls in tests with Sinon.js 19. **Program 19**: Deploy Express app to Heroku 20. **Program 20**: Set up production-level logging in Express using Winston	
Total		**60**

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	Adam Freeman	Pro Angular	Apress, 4th Edition	2022
2	Brad Green & Shyam Seshadri	AngularJS: Up and Running	O'Reilly, 1st Edition,	2014

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Yakov Fain & Anton Moiseev	Angular Development with TypeScript	Manning, 3rd Edition	2022
2	Stephen Fluin & Minko Gechev	Learning Angular	O'Reilly, 3rd Edition	2023
3	Vishal Goyal & Anurag Mohnani	Full Stack Development with Angular and GraphQL	Packt, 1st Edition	2022
4	Clive Harber	Mastering JavaScript	Packt, 2nd Edition	2020

		Functional Programming		

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: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	**B.Sc.**			**Programme Title:**	**AI and ML**	
Course Code:	**24UAI5S3**			**Title**	**Batch:**	**2022-2025**
				DSE II:	**Semester:**	**VI**
Lecture Hrs./Week or Practical Hrs./Week	**5**	**Tutorial Hrs./Sem.**	**75**	**Human Computer Interaction**	**Credits:**	**5**

Course Objective

- To learn the foundations of Human Computer Interaction.
- To become familiar with the design technologies for individuals and persons with disabilities.
- To be aware of mobile HCI.
- To learn the guidelines for user interface

Course Outcomes

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

CO	CO Statement	Knowledge

Number		Level
CO1	Design effective dialog for HCI	K1
CO2	Design effective HCI for individuals and persons with disabilities.	K2
CO3	Assess the importance of user feedback.	K3
CO4	To explain the HCI implications for designing multimedia / ecommerce / e-learning Web sites.	K3
CO5	Develop meaningful user interface	K4

Mapping

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

Unit	Course contents	Hours
I	**FOUNDATIONS OF HCI:** The Human I/O channels – Memory – Reasoning and problem solving; The Computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms. – Case Studies.	15
II	**DESIGN & SOFTWARE PROCESS:** Interactive Design - Basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.	15
III	**MODELS AND THEORIES:** HCI Models - Cognitive models: Socio-Organizational issues and stakeholder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW.	15

IV	**MOBILE HCI:** Mobile Ecosystem - Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools – Case Studies.	15
V	**WEB INTERFACE DESIGN:** Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow – Case Studies.	15
Total		**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	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale	Human Computer Interaction	3rd Edition, Pearson Education,	2004
2	Brian Fling	Mobile Design and Development	First Edition, O'Reilly Media Inc.,	2009
3	Bill Scott and Theresa Neil,	Designing Web Interfaces	First Edition, O'Reilly	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Gerard Jounghyun Kim	Human-Computer Interaction: Fundamentals and Practice	CRC Press	2015
2	Biele, Cezary	Human Movements in Human-Computer Interaction(HCI),	Springer International Publishing	2021

3	. RohitRaja,Shilpa Rani,ShrikantTiwari, Sandeep Kumar	Cognitive Behavior and Human Computer Interaction Based on Machine Learning Algorithms,	Addison Wesley.	2022

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: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI5AL			**Title**	**Batch:**	2024 - 2027
				ALC I : Business Intelligence	**Semester:**	V
Lecture Hrs./Week or Practical Hrs./Week		**Tutorial Hrs./Sem.**			**Credits:**	2

Course Objective

- Be exposed with the basic rudiments of business intelligence system
- Understand the modeling aspects behind Business Intelligence
- Understand of the business intelligence life cycle and the techniques used in it
- Be exposed with different data analysis tools and techniques

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the fundamentals of business intelligence.	K1
CO2	Link data mining with business intelligence.	K2
CO3	Apply various modeling techniques.	K3
CO4	Explain the data analysis and knowledge delivery stages.	K4
CO5	Apply business intelligence methods to various domains	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	M	H

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

Units	Content	Hrs
Unit I	**BUSINESS INTELLIGENCE:** Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.	
Unit II	**KNOWLEDGE DELIVERY:** The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.	
Unit III	**EFFICIENCY:** Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models. Pattern matching – cluster analysis, outlier analysis	
Unit IV	**BUSINESS INTELLIGENCE APPLICATIONS:**Marketing models – Logistic and Production models – Case studies.	
Unit V	**FUTURE OF BUSINESS INTELLIGENCE:** Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology.	

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	Efraim Turban, Ramesh Sharda, DursunDelen,	Decision Support and Business Intelligence Systems	9th Edition,Pearson.	2013

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	David Loshin Morgan, Kaufman	Business Intelligence: The Savvy Manager‟s Guide	Second Edition	2012
2	.Carlo Vercellis	Business Intelligence: Data Mining and Optimization for Decision Making	Wiley Publications	2009
3	CindiHowson	Successful Business Intelligence: Secrets to Making BI a Killer App	McGraw- Hill	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
Dr. S.Niraimathi Signature	Dr. S. Niraimathi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

SEMESTER VI

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI621			**Title**	**Batch:**	2025 - 2028
				CC XI: Deep Learning	**Semester:**	VI
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	3

Course Objective

- TosolveawiderangeofproblemsinComputerVisionandNaturalLanguageProcessing.
- TolearnaboutthebuildingblocksusedintheseDeepLearningbasedsolutions.
- Tolearnaboutfeedforwardneuralnetworks,Convolutionalneuralnetworks,recurrentneuralnetworksandattentionmechanisms

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals of Deep Learning.	K1
CO2	To Know the main techniques in Machine and Deep Learning principles	K2
CO3	GainingknowledgeofthedifferentmodalitiesofDeeplearningcurrentlyused.	K3
CO4	Be able to design and implement deep neural network systems.	K4
CO5	Implement deep learning algorithms and solve 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	H	H	H	H	L	M	L	M	L	H	H
CO3	M	H	M	H	M	L	M	M	M	L	M	H
CO4	M	H	M	H	M	L	H	L	M	L	M	H

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

Units	Content	Hrs
Unit I	Introduction to Deep Learning – Applications of Deep Learning - The Neural Network – Limits of Traditional Computing – Machine Learning – Neuron – FF Neural Networks – Types of Neurons – Softmax output layers.	15
Unit II	Tensor flow – Components of TensorFlow - Use cases/ Applications of TensorFlow – Features of TensorFlow – Architecture of TensorFlow - Variables – Operations – Placeholders – Sessions – Sharing Variables – Graphs – Visualization.	15
Unit III	Convolution Neural Network – Introduction to image processing - CNN Architecture - Feature Selection – Max Pooling – Filters and Feature Maps – Convolution Layer –Applications.	15
Unit IV	Recurrent Neural Network – Basic Components of RL - Memory cells – sequence analysis – word2vec- LSTM - Memory augmented Neural Networks – NTM - Applications: Text Generation, Speech Recognition	15
Unit V	Reinforcement Learning – MDP – Q Learning –Applications & Case Studies - Deep Learning in Healthcare, Computer Vision – NLP – Robotics	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	NikhilBuduma,NicholasLocascio	FundamentalsofDeepLearning:DesigningNextGenerationMachineIntelligenceAlgorithms	O'ReillyMedia	2017
2	Ian Good fellow and YoshuaBengio and Aaron Courville	Deep Learning	MIT Press book	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	RaulRojas	NeuralNetworks:ASystematic Introduction		1996
2	ChristopherBishop	PatternRecognitionandMachineLearning		2007

Web References

https://www.geeksforgeeks.org/deep-learning-tutorial/

https://www.simplilearn.com/tutorials/deep-learning-tutorial

https://www.datacamp.com/tutorial/tutorial-deep-learning-tutorial

https://www.javatpoint.com/deep-learning

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. S.Niraimathi Signature	Dr. S. Niraimathi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	25UAI6E4			Title	Batch:	2025-2028
				Title: UI/UX Design	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60		Credits:	5

Course Objective

- Provide students with the knowledge of user- centered design, user -centered methods in design, graphic design on screens, simulation and prototyping techniques, Usability testing methods, interface technologies and user centered design in corporate perspective.
- To analyzethe iterative design of a graphical user interface to organize information about users into useful summaries with affinity diagrams, to convey user research findings with personas and scenarios and to learn the skill of sketching as a process for user experience design.
- Provide Exposure to wireframing and Prototyping software in the various UI/UX Design tools

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Build UI for user Applications	K1
CO2	Evaluate UX design of any product or application	K2
CO3	Demonstrate UX Skills in product development	K3
CO4	Implement Sketching principles	K4
CO5	Create Wireframe and Prototype	K5

Mapping

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

Unit	Course contents	Hours
I	**Foundations Of Design:** UI vs. UX Design – Core Stages of Design Thinking – Divergent and Convergent Thinking -Brainstorming and Game storming – Observational Empathy	12
II	**Foundations of UI Design:** Visual and UI Principles- UI Elements and Patterns – Interaction Behaviors and Principles –Branding- Style Guides	12
III	**Foundations Of UX Design:** Introduction to User Experience - Why You Should Care about User Experience - Understanding User Experience - Defining the UX Design Process and its Methodology - Research in User Experience Design - Tools and Method used for Research - User Needs and its Goals - Know about Business Goals	12
IV	**Wireframing, Prototyping And Testing:** Sketching Principles - Sketching Red Routes - Responsive Design – Wireframing - Creating Wireflows - Building a Prototype - Building High-Fidelity Mockups - Designing Efficiently with Tools - Interaction Patterns - Conducting Usability Tests - Other Evaluative User Research Methods - Synthesizing Test Findings - Prototype Iteration	12
V	**Research, Designing, Ideating, & Information Architecture:** Identifying and Writing Problem Statements – Identifying Appropriate Research Methods – Creating Personas – Solution Ideation – Creating User Stories – Creating Scenarios – Flow Diagrams – Flow Mapping – Information Architecture	12
Total		**60**

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	Joel Marsh,	UX for Beginners,	OReilly	2025
2	Jon Yablonski,	Laws of UX using Psychology to Design Better Product &	OReilly	2021

		Services		

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Russ Unger and Carolyn Chandler.	A Project Guide to UX Design: For user experience designers in the field or in the making	New Riders Publishing, USA, (2nd. ed.).	2012
2	Wilbert O. Galitz	The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques	Wiley Publishing, 2007Third 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**
Name: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	25UAI6E5			Title	Batch:	2025-2028
				DSE II: Gen AI	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60		Credits:	5

Course Objective

- **To learn the fundamental sofT Neural Networks and the various types.**
- **To explore Generative AI models like GANs, VAEs, and Transformers.**
- **To analyze the limitations of traditional RNNs and LSTMs.**
- **To discuss current trends and future directions in Generative AI researchCourse**

Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the evolution of AI and the significance of Deep Learning.	K1
CO2	Apply various Neural Network architectures for tasks like image recognition and sequence modeling.	K2
CO3	Analyze data preprocessing and training techniques for neural networks. .	K3
CO4	Design practical solutions using advanced neural networks for diverse applications	K3
CO5	Create a application using DL	K4

Mapping

PO /PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	L	M	H	M	M	M	M	H	L	H	H	M
CO2	M	L	M	L	M	H	M	M	M	M	H	H

CO3	**S**	**M**	**L**	**H**	**H**	**L**	**M**	**L**	**M**	**M**	**L**	**H**
CO4	**S**	**M**	**M**	**L**	**M**	**M**	**L**	**M**	**L**	**H**	**H**	**L**
CO5	**M**	**M**	**L**	**H**	**M**	**H**	**M**	**M**	**M**	**M**	**M**	**H**

Unit	Course contents	Hours
I	Foundational Concepts: Introduction to Artificial Intelligence - Machine Learning Fundamentals - Deep Learning Basics - Python Programming for AI.	12
II	Generative AI Models: Generative Adversarial Networks (GANs) - Variational Autoencoders (VAEs) - Transformers and Large Language Models (LLMs) – Auto encoders - Reinforcement Learning.	12
III	Hands-on Projects: Image Generation - Text Generation - Audio Generation - Application Development.	12
IV	Advanced Topics (Optional): Generative AI for Specific Domains - Medicine - Science - Art and Design - Ethical Considerations in Generative AI - Prompt Engineering.	12
V	Assessment: Quizzes and exams on theoretical concepts, Coding assignments and projects, and Final project presentation.	12
Total		**60**

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	**Altaf Rehmani**	"Generative AI for everyone: Understanding the essentials and applications of this breakthrough technology		2009
2	Numa Dhamani	Introduction to Generative AI	, Kindle Edition	2024

3	y Charu C. Aggarwal.	"Neural Networks and Deep Learning: A Textbook		

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Josh Kalin	"Generative Adversarial Networks Cookbook: Over 100 recipes to build generative models using Python, TensorFlow, and Keras		
2	Jesse Sprinter	"Generative AI in Software Development: Beyond the Limitations of Traditional Coding		2024
3				

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: Dr. B. Azhagusundari Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	25UAI6E6			Title	Batch:	2025-2028
				DSE -II	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Text Analytics	Credits:	5

Course Objective

- To study the nature of text as a data source for knowledge discovery and identify its relevance to the information needs of diverse individuals, communities and organizations.
- To study some of the techniques by which text is automatically processed.
- To demonstrate the types of information which can be extracted from text, and the applications of these types.
- To examine the tools which support various types of text processing and analysis and apply them to address information needs, questions, and issues.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the basics of text analytics	K1
CO2	Describe text analysis classification.	K2
CO3	Apply various text clustering techniques	K3
CO4	Explain n gram feature extraction and language models	K4
CO5	Interpret text data using visualization techniques	K5

Mapping

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

Unit	Course contents	Hours
I	**An Introduction to Text Mining:** Approaches to Text Analysis, Information Extraction from Text- Named Entity Recognition Rule-based Approach, Statistical Learning Approach. Relation Extraction -Feature-based Classification, Kernel Methods, Weakly Supervised Learning Methods - Unsupervised Information Extraction -Relation Discovery and Template Induction, Open Information Extraction. Basic text processing-tokenization, Stop word removal, Stemming and lemmatization, Language Models and Text Statistics.	12
II	**Text Summarization Techniques:** Topic Representation Approaches -Influence of Context Indicator Representations and Machine Learning for Summarization- Graph Methods for Sentence Importance Selecting Summary Sentences- Greedy Approaches: Maximal Marginal Relevance, Global Summary Selection	12
III	**Classification for Text Analysis:** Text Classification -Identifying Classification problems , Classifier Models ,Building a Text Classification Application -Cross-Validation , Model Construction ,Model Evaluation ,Model Operationalization Clustering for Text SimilarityUnsupervised Learning on Text -Clustering by Document Similarity- Distance Metrics , Partitive Clustering , Hierarchical Clustering -Modeling Document -Latent Dirichlet Allocation , Latent Semantic Analysis ,Non-Negative Matrix Factorization.	12
IV	**Context-Aware Text Analysis:** Grammar Based Feature Extraction - Context-Free Grammars , Syntactic Parsers ,Extracting Key phrases - Extracting Entities- n-Gram Feature Extraction , An n-Gram-Awar-Choosing the Right n-Gram Window- n-Gram Language Models - Frequency and Conditional Frequency ,Estimating Maximum Likelihood Text Visualization.-Visualizing Feature Space - Visual Feature Analysis , Guided Feature Engineering - Model Diagnostics - Visualizing Clusters ,Visualizing Classes ,Diagnosing Classification Error , Visual Steering - Silhouette Scores and Elbow Curves.	12
V	**Graph Analysis of Text:** Graph Computation and Analysis, Creating a Graph-Based Thesaurus ,Analyzing Graph Structure, Visual Analysis of Graphs , Extracting Graphs from Text - Creating a Social Graph. Entity Resolution -Entity Resolution on a Graph, Blocking with Structure, Fuzzy Blocking Cluster Computing with Spark- Sentiment Analysis- Deep Structure Analysis.	12
Total		**60**

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	Bilbro, Rebecca, Tony Ojeda, and Benjamin Bengfort.	Applied text analysis with Python	O'Reilly	2019
2	Aggarwal, Charu C., and ChengXiangZhai	Mining Text Data	Springer Publications Kindle Edition	2012

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ignatow, Gabe, and RadaMihalcea.	An introduction to text mining: Research design, data collection, and analysis.	Sage Publications	2017
2	Struhl, Steven.	Practical text analytics: Interpreting text and unstructured data for business intelligence.	Kogan Page Publishers.	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**
Name: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	25UAI6E7			Title	Batch:	2025-2028
				DSE- III : AR/VR	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75		Credits:	5

Course Objective

• To introduce the relevance of this course to the existing technology through demonstrations, case studies and applications with a futuristic vision along with socioeconomic impact and issues
• To understand virtual reality, augmented reality and using them to build Biomedical engineering applications
• To know the intricacies of these platform to develop PDA applications with better optimality

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Under the concept of realistic engineering	**K1**
CO2	Analyse& Design a system or process to meet given specifications with realistic engineering constraints.	**K2**
CO3	Identify problem statements and function as a member of an engineering design team	**K3**
CO4	Utilize technical resources	**K4**
CO5	Propose technical documents and give technical oral presentations related to design mini project results.	**K5**

Mapping

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

Unit	Course contents	Hours
I	INTRODUCTION :The three I's of virtual reality-commercial VR technology and the five classic components of a VR system - Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation-interfaces and gesture interfaces-Output Devices: Graphics displays-sound displays & haptic feedback.	15
II	VR DEVELOPMENT PROCESS :Geometric modeling - kinematics modeling- physical modeling - behaviour modeling – model Management.	15
III	CONTENT CREATION CONSIDERATIONS FOR VR :Methodology and terminology-user performance studies-VR health and safety issues-Usability of virtual reality system- cyber sickness - side effects of exposures to virtual reality environment	15
IV	VR ON THE WEB & VR ON THE MOBILE 9 JS-pros and cons-building blocks (WebVR, WebGL, Three.js, device orientation events)- frameworks (A-frame, React VR)-Google VR for Android-Scripts, mobile device configuration, building to android-cameras and interaction-teleporting-spatial audio-Assessing human parameters-device development and drivers-Design Haptics	15
V	APPLICATIONS medical applications-military applications-robotics applications- Advanced Real time Trackingother applications- games, movies, simulations, therapy.	15
Total		**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	Jos Dirksen, Packt	The JavaScript 3D Library for WebGL - Second Edition	II	2015
2	Jason Jerald	The VR Book: Human-Centred Design for Virtual Reality. Association for Computing Machinery and Morgan & Claypool		2015

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	JoergOsarek,	Virtual Reality Analytics	Gordon‟s Arcade	2016
2	Dieter Schmalstieg& Tobias Hollerer	Augmented Reality: Principles and Practice (Usability)	Pearson Education (US), Addison-Wesley Educational Publishers Inc, New Jersey, United States,	2016. ISBN: 9780321883575
3	Steve Aukstakalnis, Addison-Wesley Professional	Practical Augmented Reality: A Guide to the Technologies, pplications, and Human Factors for AR and VR (Usability)	I	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**
Name: Dr. B. Azhagusundari Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	25UAI6E8			Title	Batch:	2025-2028
				DSE- III	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	Open Source Technologies	Credits:	5

Course Objective

- To provide a basic idea of Open source technology and the software development process to understand the role and future of open source software in the industry
- Analyzing the impact of legal, economic and social issues of Open Source software
- Understand the policies, licensing procedures and ethics of FOSS.
- Awareness with Open-Source Technologies.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Differentiate between Open Source and Proprietary software and Licensing.	K1
CO2	Recognize the applications, benefits and features of Open-Source Technologies	K2
CO3	Analyze Open Source Technology and to interpret, contrast and compare open source products among themselves	K3
CO4	Gain knowledge to start, manage open-source projects.	K4
CO5	Implement Open Source Projects	K5

Mapping

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

Unit	Course contents	Hours
I	**Introduction:** Why Open Source – Open Source –Principles, Standards Requirements, Successes – Free Software – FOSS – Internet Application Projects	15
II	**Open source:** Initiatives, Principles, Methodologies, Philosophy, Platform, Freedom, OSSD, Licenses – Copy right, Copy left, Patent, Zero Marginal Technologies, Income generation opportunities, Internalization	15
III	**Case Studies:** Apache, BSD, Linux, Mozilla (Firefox), Wikipedia, Joomla, GCC, Open Office.	15
IV	**Open Source Project:** Starting, Maintaining –Open Source – Hardware, Design, Teaching & Media	15
V	**Open Source Ethics:**Open Vs Closed Source – Government – Ethics – Impact of Open source Technology – Shared Software – Shared Source	15
Total		**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	KailashVadera, Bhavyesh Gandhi	Open Source Technology	Laxmi Publications Pvt Ltd, 1st Edition.	2012
2	Fadi P. Deek and James A. M. McHugh,	Open Source: Technology and Policy	Cambridge Universities Press	2007

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Clay Shirky and Michael Cusumano	Perspectives on Free and Open-Source Software	MIT press.	2016
2	Andrew M. St. Laurent, O'Reilly Media	Understanding Open Source and Free Software Licensing	O'Reilly Media	2004
3	Dan Woods, GautamGuliani,	Open Source for the Enterprise	O'Reilly Media Inc.,	2005

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: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	25UAI6E9			Title	Batch:	2025-2028
				DSE-III	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	Robotics & its Applications	Credits:	5

Course Objective

- To understand the functions of the basic components of a Robot.
- To study the use of various types of End of Effectors and Sensors
- To impart knowledge in Robot Kinematics and Programming.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals of robots.	K1
CO2	Know the concepts of sensors and machine vision.	K2
CO3	Analyze navigation controls for operating robotics.	K3
CO4	Observe and analyze the planning and navigation of obstacle avoidance.	K4
CO5	Apply the principles using Robotic environment	K5

Mapping

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

Unit	Course contents	Hours
I	Introduction, brief history, types, classification and usage, science and technology of robots, Artificial Intelligence in Robotics, some useful websites, textbooks and research journals	15
II	**Elements of Robots-Joints, Links, Actuators, and Sensors:** Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kind of actuators, stepper-DC-servo-and brushless motors- model of a DC servo motor-types of transmissions-purpose of sensor-internal and external sensor-common sensors-encod00ers-tachometers-strain gauge-based force torque sensor-proximity and distance measuring sensors-and vision	15
III	**End Effectors:** Classification of end effectors-tools as end effectors-drive system for grippers-mechanical adhesive- vacuum magnetic-grippers-hooks and scoops-gripper force analysis-and gripper design- active and passive grippers	15
IV	**Planning and Navigation:** Introduction, path planning-overview-road map path planning-cell decomposition path planning- potential field path planning-obstacle avoidance-case studies	15
V	**Vision system:** Robotic vision systems-image representation-object recognition- and categorization-depth measurement- image data compression-visual inspection-software considerations. **Robot Programming:** Introduction to robot languages-VAL-RAPID-language-basic commands-motion instructions - pick and place operation using industrial robot manual mode-automatic mode-subroutine command based programming-move master command language-introduction-syntax-simple problems.	15
Total		**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	RicharedD.Klafter.Thomas,	Robotic Engineering an Integrated approach	Prentice Hall	2001

	Achmielewski and MickaelNegin,			
2	SaeedB.Nikku,	Introduction to Robotics, analysis, control and applications	Wiley-India 2nd edition	2011
3	Groover M.P.,	Industrial Robotics - Technology Programming and Applications	McGraw Hill	2001
4	Craig J.J.,	Introduction to Robotics Mechanics and Control	Pearson Education	2008

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Rajput R.K	Robotics and Industrial Automation	S.Chand and Company,	2008
2	S.R. Deb	Robotics technology and flexible automation	TMH	2009
3	R. Schalkoff,	Pattern Recognition – Statistical, Structural and Neural Approaches	John Wiley	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**
Name: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI622			**Title**	**Batch:**	2025 - 2028
				CC Lab IX: Deep Learning Lab	**Semester:**	VI
Lecture Hrs./Week or Practical Hrs./Week	6	**Tutorial Hrs./Sem.**	90		**Credits:**	2

CourseObjectives

- To Build The Foundation Of Deep Learning.
- To Understand How To Build The Neural Network.
- To enable students to develop successful machine learning concepts.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Learn The Fundamental Principles Of Deep Learning.	K3
CO2	Identify The Deep Learning Algorithms For Various Types of Learning Tasks in variousdomains.	K4
CO3	Implement Deep Learning Algorithms And Solve Real-world 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

Units	Content
	1. Setting up the Spyder IDE Environment and Executing a Python Program 2. Installing Keras, Tensorflow and Pytorch libraries and making use of them 3. Applying the Convolution Neural Network on computer vision problems 4. Image classification on MNIST dataset (CNN model with Fully connected layer) 5. Applying the Deep Learning Models in the field of Natural Language Processing 6. Train a sentiment analysis model on IMDB dataset, use RNN layers with LSTM/GRU notes 7. Applying the Autoencoder algorithms for encoding the real-world data 8. Applying Generative Adversial Networks for image generation and unsupervised tasks.
	Total Hours 90

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bishop, C, M. .	Pattern Recognition and Machine Learning,	Springer	2006
2	Yegnanarayana, B.	Artificial Neural Networks	PHI Learning Pvt. Ltd,	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ian Goodfellow, YoshuaBengio and Aaron Courville,	Deep Learning	MIT Press	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**
Name: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			**Programme Title:**	AI and ML	
Course Code:	25UAI623			**Title**	**Batch:**	2025-2028
				CC Lab X: Power BI Data Visualization Lab	**Semester:**	VI
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	2

Course Objective

- Provide students with the knowledge of user- centered design, user -centered methods in design, graphic design on screens, simulation and prototyping techniques, Usability testing methods, interface technologies and user centered design in corporate perspective.
- To analyze the iterative design of a graphical user interface to organize information about users into useful summaries with affinity diagrams, to convey user research findings with personas and scenarios and to learn the skill of sketching as a process for user experience design.
- Provide Exposure to wire framing and Prototyping software in the various UI/UX Design tools

Course Outcome

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

CO Number	**CO Statement**	**Knowledge Level**
CO3	Build UI for user Applications	K4
CO4	Demonstrate UX Skills in product development	K4
CO5	Create Wireframe and Prototype	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

Units	Content
	(PowerBI): Import data from different sources (CSV, text, web). **(Power BI):** Import data from Excel, databases, and other sources. **(Power BI):** Combine multiple tables using Merge Queries in Power Query Editor. **(Power BI):** Aggregate data using Group By in Power Query. **(PowerBI):** Transform date and time data. **(Power BI):** Create calculated columns and measures. **(Power BI):** Pivot and Unpivot data in Power Query. **(PowerBI):** Create charts and graphs for data visualization. **(Power BI):** Create basic reports and dashboards. **(Power BI):** Use slicers and filters to create interactive reports. **(Power BI):** Use Bookmarks and Selections for dynamic reports. **(Power BI):** Implement custom visuals. **(Power BI):** Set up Power BI refresh schedule for live data.
	Total Hours 75

Text Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Robert Spence	Information Visualization:An Introduction	Third Edition, Pearson Education	2014
2	Colin Ware	Information Visualization Perception for Design	Third Edition, Morgan Kaufmann	2012

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Matthew O.Ward, George Grinstein, Daniel Keim,	Interactive Data Visualization: Foundation, Techniques and Applications	Second Edition, A.K.Peters/CRC Press	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**
Name: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc		**Programme Title:**	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	23UAI624		**Title**	**Batch:**	2023– 2026
			Project	**Semester:**	VI
Lecture Hrs./Week or Practical Hrs./Week	**Tutorial Hrs./Sem.**			**Credits:**	2

Programme Code:	**B.Sc.**			**Programme Title:**	**AI and ML**	
Course Code:	**25UAI6S4**			**Title**	**Batch:**	**2025-2028**
				Skill Based Elective II Social & Ethical Issues in AI	**Semester:**	**VI**
Lecture Hrs./Week or Practical Hrs./Week	**3**	**Tutorial Hrs./Sem.**	**45**		**Credits:**	**2**

Course Objective

- To analyze whether AI poses an existential threat to humanity.
- To check learning algorithms from acquiring morally objectionable biases.
- To study the ethical rules to be followed in using self driving cars.
- To check the accountability while building artificial moral agents.

Course Outcomes

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

CO Number	**CO Statement**	**Knowledge Level**
CO1	Demonstrate knowledge of philosophical issues involved in ethics of AI.	**K1**
CO2	Develop a super intelligent system without having to reveal the system itself.	**K2**
CO3	Understand workplace automation in employment.	**K3**
CO4	Appreciate the potential responsibility in handling ethics of artificial moral agents	**K4**
CO5	To build intelligent systems those are safe without any global risk.	**K5**

Mapping

PO /PSO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	**L**	**M**	**H**	**M**	**M**	**M**	**M**	**H**	**L**	**H**	**H**	**M**
CO2	**M**	**L**	**M**	**L**	**M**	**H**	**M**	**M**	**M**	**M**	**H**	**H**
CO3	**S**	**M**	**L**	**H**	**H**	**L**	**M**	**L**	**M**	**M**	**L**	**H**

CO4	**S**	**M**	**M**	**L**	**M**	**M**	**L**	**M**	**L**	**H**	**H**	**L**
CO5	**M**	**M**	**L**	**H**	**M**	**H**	**M**	**M**	**M**	**M**	**M**	**H**

Unit	Course contents	Hours
I	Ethics in Machine learning and other domain-specific AI algorithms-Artificial general intelligence - machines with moral status - minds with exotic properties - super intelligence. Singularity - A philosophical Analysis: Argument for a singularity-Intelligence explosion without intelligence.	9
II	Orthogonality of motivation and intelligence-instrumental convergence. Racist AI: Rise of algorithmic decision making: contestable epistemic and normative assumptions-embodied values-algorithmic accountability as public reason-objections, limitations and challenges.	9
III	Real world of robots at war-autonomous weapon systems-robot warriors and crimes-human oversight for avoiding problem-responsibility for robot war crimes-robot warriors and child soldiers. Future of workplace automation-interaction of automation and employment.	9
IV	Moral agency and moral norms-moral turing test-Theoretical approaches: consequentialism- deontology-models of morality: Virtue approaches-associative learning-evolutionary approaches- role of emotions. Ethics of self driving cars: need for ethics settings-an applied trolley problem- empirical ethics.	9
V	Anthropomorphic bias: width of mind design space-Prediction and design-understanding thepower of intelligence-capability and motive: Optimization processes-aiming at the target-friendly AI- technical failure and philosophical failure - rates of intelligence increase-hardware-threats and promises - AI vs Human Intelligence Enhancement	9
Total		**45**

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	Bill Hibbord	Ethical Artificial Intelligence	Machine Intelligence Research Institute, CA	2015
2	eds. William Ramsey and Keith Frankish	Cambridge Handbook of Artificial Intelligence	Cambridge University Press	2011
2	Nick Bostrom And EliezerYudkowsky Edited by Keith Frankish and William M. Ramsey	The ethics of artificial intelligence	Published online by Cambridge University Press	2014

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Chalmers. D	The Singularity: A Philosophical Analysis,	Journal of Consciousness Studies	2010
2	Bostrom, N	The Superintelligent Will: Motivation and Instrumental Rationality in Advanced Artificial Agent	Minds & Machines	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**
Name: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	25UAI6S5			Title	Batch:	2025-2028
				Skill Based Elective II: Computer Vision	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	45		Credits:	2

Course Objective

- To understand the basic principles of image formation, image processing algorithms and recognition from single or multiple images (video).
- To emphasize the core vision tasks of scene understanding and recognition.
- To develop Applications to object recognition, image analysis, image retrieval and object tracking

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn fundamentals of computer vision and its applications	K1
CO2	Understand the basic image processing operations to enhance, segment the images.	K2
CO3	Understand the analyzing and extraction of relevant features of the concerned domain problem	K3
CO4	Analyze and apply the motion concepts and its relevance in real time applications	K4
CO5	Apply the knowledge in solving high level vision problems like object recognition, image classification	K5

Mapping

PO /PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	L	M	H	M	M	M	M	H	L	H	H	M

CO2	**M**	**L**	**M**	**L**	**M**	**H**	**M**	**M**	**M**	**M**	**H**	**H**
CO3	**S**	**M**	**L**	**H**	**H**	**L**	**M**	**L**	**M**	**M**	**L**	**H**
CO4	**S**	**M**	**M**	**L**	**M**	**M**	**L**	**M**	**L**	**H**	**H**	**L**
CO5	**M**	**M**	**L**	**H**	**M**	**H**	**M**	**M**	**M**	**M**	**M**	**H**

Unit	Course contents	Hours
I	**Overview of computer vision and its applications:** Image Formation and Representation: Imaging geometry, radiometry, digitization, cameras and Projections, rigid and affine transformation	9
II	**Image Processing:** Pixel transforms, color transforms, histogram processing, histogram equalization, filtering, convolution, Fourier transformation and its applications in sharpening, blurring and noise removal	9
III	**Feature detection:** Edge detection, corner detection, line and curve detection, active contours, SIFT and HOG descriptors, shape context descriptors, Morphological operations **Segmentation:** Active contours, split & merge, watershed, region splitting, region merging, graph-based segmentation, mean shift and model finding, Normalized cut	9
IV	**Camera calibration:** camera models; intrinsic and extrinsic parameters; radial lens distortion; direct parameter calibration; camera parameters from projection matrices; orthographic, weak perspective, affine, and perspective camera models. **Motion representation:** the motion field of rigid objects; motion parallax; optical flow, the image brightness constancy equation, affine flow; differential techniques; feature-based techniques; regularization and robust estimation	9
V	**Motion tracking:** statistical filtering; iterated estimation; observability and linear systems; the Kalman filter **Object recognition and shape representation:** alignment, appearance-based methods, invariants, image eigenspaces	9
Total		**45**

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	R. Szeliski,	Computer Vision: Algorithms and Applications	Springer	2011
2	D. A. Forsyth and J. Ponce	Computer Vision: A Modern Approach	Pearson Education,	2003

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E. Trucco and A. Verri,	Introductory techniques for 3D computer vision,	Prentice Hall	1998
2	R. Schalkoff,	Pattern Recognition – Statistical, Structural and Neural Approaches	John Wiley	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**
Name: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	**B.Sc.**			**Programme Title:**	**AI and ML**	
Course Code:	**25UAI6S6**			**Title**	**Batch:**	**2025-2028**
				Skill Based Elective II: Recommender Systems	**Semester:**	**VI**
Lecture Hrs./Week or Practical Hrs./Week	**3**	**Tutorial Hrs./Sem.**	**45**		**Credits:**	**2**

Course Objective

- To know the concept of recommender systems and machine learning algorithms used for prediction
- To get the knowledge of various algorithms to build recommendations based on contextual parameters
- To understand other related issues, such as evaluation methods, and implication of Recommender system on society

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Familiarize with recommender systems and their applications	K1
CO2	Analyze the different approaches towards recommendation	K2
CO3	Evaluate the effectiveness of recommender system	K3
CO4	Design recommender system	K4
CO5	Build an effective recommender system.	K5

Mapping

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

Unit	Course contents	Hours
I	**An Introduction to Recommender Systems:**Goals of Recommender Systems, Basic Models of Recommender Systems,Domain-Specific Challenges in Recommender Systems, introduction to Advanced Topics and Applications	9
II	**Collaborative Filtering:** User-based nearest neighbour recommendation, Itembased nearest neighbour recommendation, Model based and pre-processing basedapproaches, Attacks on collaborative recommender systems	9
III	**Content-based recommendation:** High level architecture of content-based systems, Advantages and drawbacks of content based filtering, Item profiles, Discovering features of documents, Obtaining item features from tags, Representing item profiles, Methods for learning user profiles, Similarity based retrieval, Classification algorithms	9
IV	**Knowledge based recommendation:** Knowledge representation and reasoning, Constraint based recommenders, Case based recommenders. **Hybrid approaches:** Opportunities for hybridization, Monolithic hybridization design: Feature combination, Feature augmentation, Parallelized hybridization design: Weighted, Switching, Mixed, Pipelined hybridization design: Cascade Meta-level, Limitations of hybridization strategies.	9
V	**Evaluating Recommender System:** Introduction, General properties of evaluation research, Evaluation designs, Evaluation on historical datasets, Error metrics, Decision-Support metrics, User-Centered metrics	9
Total		**45**

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	Jannach D., Zanker M. and FelFering A.,	Recommender Systems: An Introduction,	Cambridge University Press 1st ed.	2011
2	Ricci F., Rokach L., Shapira D., Kantor B.P	Recommender Systems Handbook	Springer, 1st ed.	2011
3	Aggarwal, C. C.	Recommender Systems: The Textbook.	Springer	2016

Reference Book:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Manouselis N., Drachsler H., Verbert K., Duval E.,	Recommender Systems For Learning	Springer 1st ed	2013

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
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Name: Dr. S. Niraimathi Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	**B.Sc**			**Programme Title:**	**Bachelor of Science (Computer Science with AI & ML)**	
Course Code:	**22UAI6AL**			**Title**	**Batch:**	**2025 - 2028**
				ALC-II: Quantum Computing	**Semester:**	**VI**
Lecture Hrs./Week or Practical Hrs./Week		**Tutorial Hrs./Sem.**			**Credits:**	**2**

Course Objective

- Learn key concepts such as superposition, entanglement, and quantum measurement.
- Study qubits, quantum gates, and quantum circuits.
- Analyze fundamental algorithms, including Shor's algorithm, Grover's search, and quantum Fourier transform.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic principles of quantum mechanics that underpin quantum computing.	K1
CO2	Learn the differences between classical computing and quantum computing.	K2
CO3	Explore the historical development of quantum computing and its potential future applications.	K3
CO4	Gain an understanding of key quantum mechanics concepts such as superposition, entanglement, and interference.	K4
CO5	Learn about quantum states, quantum bits (qubits), and how they differ from classical bits.	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	M	H
CO4	M	H	M	H	M	L	H	L	M	L	M	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Course Contents	Hrs
I	Introduction to Quantum Computing - What is Quantum Computing? - Difference Between Classical and Quantum Computers - Basic Concepts of Quantum Mechanics: Qubits vs. Classical Bits - Superposition and Entanglement (Simple Explanation) - Real-Life Examples of Quantum Effects - Case Study: Why Do We Need Quantum Computers?.	
II	Qubits and Quantum States: Understanding Qubits (Quantum Bits) - The Bloch Sphere (Basic Explanation) - Superposition: How a Qubit Can Be 0 and 1 at the Same Time - Quantum Measurement: How Qubits Collapse to 0 or 1 - Simple Demonstration: Simulating a Qubit Using Python (Optional).	
III	Basic Quantum Gates and Circuits: Introduction to Quantum Gates: NOT Gate (X Gate) - Hadamard Gate (H Gate) - CNOT Gate (Controlled NOT) - How Quantum Circuits Work - Simple Quantum Circuit Examples - Hands-On: Drawing a Quantum Circuit (Paper or Online Simulators).	
IV	Introduction to Quantum Algorithms: What is a Quantum Algorithm? - Simple Examples: Deutsch Algorithm (Basic Problem Solving) - Grover's Algorithm (Search Optimization) - How Quantum Computing Can Solve Problems Faster - Case Study: How Quantum Computing Can Help in Real Life.	
V	Applications and Future of Quantum Computing: How Quantum Computers Can Help in: Cryptography and Cybersecurity - Medicine and Drug Discovery - Artificial Intelligence (AI) - Solving Complex Scientific Problems - Challenges and Limitations of Quantum Computers - Future of Quantum Technology - Final Discussion: What's Next for Quantum Computing?.	
	Total	**SS**

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	Michael A. Nielsen and Isaac L. Chuang	"Quantum Computation and Quantum Information"	10th	2011
2	Jack D. Hidary	"Quantum Computing: An Applied Approach"	I	2021

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Chris Bernhardt	"Quantum Computing for Everyone"	The MIT Press	2019
2	Noson S. Yanofsky and Mirco A. Mannucci	"Quantum Computing for Computer Scientists"	I	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. S.Niraimathi Signature	Dr. S. Niraimathi Signature	Mr. K. Srinivasan Signature	Mr. K. Srinivasan Signature
