RATHINAM COLLEGE OF ARTS AND SCIENCE

(AUTONOMOUS)

Rathinam Tech Zone, Eachanari, Coimbatore – 641021.

DEPARTMENT OF COMPUTER SCIENCE

Syllabus for

B.Sc. Computer Science (Artificial Intelligence)

(I and VI Semester)

2024 – 2025 Batch onwards

Vision and Mission of the Institution:

VISION

To emerge as a world-renowned Institution that is integrated with industry to impart Knowledge, Skills, Research Culture and Values in youngsters who can accelerate the overall development of India.

MISSION

To provide quality education at affordable cost, build academic and research excellence, maintain eco-friendly and robust infrastructure, and to create a team of well qualified faculty who can build global competency and employability among the youth of India.

MOTTO

Transform the youth into National Asset.

Vision and Mission of the Department

Vision

To establish a department with global recognition deeply intertwined with the technology sector, facilitating the exchange of knowledge and skills, cultivating a culture of research, and imbuing aspiring computer scientists with values, thereby empowering them to spearhead India's comprehensive technological progress.

Mission

To empower students, nurturing academic and research excellence, while equipping them to utilize technology as a catalyst for innovation, enhancing global competitiveness and employability across diverse fields.

Motto

Industry – Ready Education

Program Educational Objectives (PEO)

Within a few years of graduation, our alumni will:

PEO1	:	Be successful in top graduate schools and in professional positions within academic & research institutions and industries, and in entrepreneurial and consultancy ventures.
PEO2	:	Contribute their Artificial Intelligence expertise effectively as members of technological Teams.
PEO3	:	Demonstrate lifelong learning and engagement through continued professional development, and participation and leadership in professional societies and organizations.
PEO4	:	Conduct themselves in a responsible, professional, and ethical manner.
PEO5	:	Emerge as a globally competent and universally employable professional who accelerates the overall development of India.

Mapping of Institute Mission to PEO

Institute Mission	**PEO's**
To provide quality education at affordable cost, build academic and researchexcellence maintain eco-friendly and robust infrastructure, and	PEO1, PEO2
To create a team of well qualified faculty who can build global competency andemployability among the youth of India.	PEO2, PEO5

Mapping of Department Mission to PEO

Department Mission	**PEO's**
To empower students and cultivate academic and research brilliance	PE01, PE02
Provide them to leverage Technology as a tool for innovation	PEO3
Fostering global competitiveness and employability in diverse field	PE04,PE05

Program Outcomes (PO):

During the completion of the program, the graduate will be able to:

PO1 (Disciplinary Knowledge)	:	Demonstrate knowledge competency in required disciplines in University level courses appropriate to the study program.
PO2 (Problem Analysis)	:	Apply appropriate knowledge and adopt suitable skills to identify, formulate, analyze and solve complex problems in real life situations and reach substantiated conclusions.
PO3 (Investigation)	:	Conduct investigation of complex problems by following scientific approach to knowledge development that include appropriate experiments, analysis, evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; interpretation of data, formulation of coherent arguments and synthesis of information (assumptions, hypothesis or implications) in order to reach valid conclusions.
PO4 (Design of Solutions)	:	Design solutions for complex, open-ended real-life problems and to design systems, components or processes that meet specific needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
PO5 (Modern Tool Usage)	:	Create, select, apply, adapt, and extend appropriate techniques, resources, and modern tools to a range of activities, from simple to complex, with an understanding of the associated limitations.
PO6 (Individual and Team Work)	:	Work effectively and respectfully as a member and leader in teams, facilitate cooperative or coordinated effort, act together as a group or a team in the interests of a common cause and work efficiently, preferably in a multi-disciplinary setting. Possess knowledge of the values and beliefs of multiple cultures and a global perspective. Task mapping, setting direction, building a team, formulating an inspiring vision, motivating and inspiring team members who can help achieve the vision, and guide people to the right destination.
PO7 (Communication)	:	Express complex concepts within the profession and with society at large. Such ability includes listening, speaking, reading and writing, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
PO8 (Professionalism)	:	Understand the professional roles and responsibilities in society, especially the primary role of protection of the public and the public interest.
PO9 (Environment and Sustainability)	:	Analyze social and environmental aspects of-------activities. Such ability includes an understanding of the interactions that ----- has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.

P10 (Moral and Ethical Awareness)	:	Embrace moral/ ethical values; formulate a position/ argument about an ethical issue from multiple perspectives and apply professional ethics, accountability and equity.
P11 (Economics and Project Management)	:	Appropriately incorporate economics and business practices including project, risk, and change management into the practice of ----- and to understand their limitations.
P12 (Life-long Learning)	:	Identify and address their own educational needs in a changing World in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.

Program Specific Outcomes (PSO):

PSO1	:	Ability to develop, evaluate, and effectively communicate data-driven policy recommendations and its impact with the aid of predictive modeling and address societal challenges thereby improving public services
PSO2	:	Ability to understand AI practices and develop data governance frameworks with ethical guidelines ensuring the ethical use of data in public service delivery, regulatory compliance, and citizen engagement.
PSO3	:	Frame strategies in partnerships with public safety agencies, healthcare institutions, and disaster response teams to develop early warning systems, streamline resource distribution, and lessen the repercussions of disasters and crises on communities

Correlation between the PO/PSO and the PEOs

Program Outcomes		PEO1	PEO2	PEO3	PEO4	PEO5
PO1	:	L	M	M	M	L
PO2	:	M	S	L	S	S
PO3	:	L	S	S	M	M
PO4	:	S	S	L	S	S
PO5	:	M	L	S	S	S
PO6	:	S	S	M	M	S
PO7	:	S	L	S	S	M
PO8	:	M	M	L	M	S
PO9	:	S	S	S	L	M
PSO1	:	S	M	M	M	L
PSO2	:	M	S	M	S	M
PSO3	:	M	M	S	S	M
PSO4	:	L	S	S	M	S

3 – Strong correlation; 2-moderate correlation; 1-Less correlation; Blank-no correlation

Components considered for Course Delivery is listed below:

1. Class room Lecture
2. Laboratory class and demo
3. Assignments
4. Mini Project
5. Project
6. Online Course
7. External Participation
8. Seminar
9. Internship

Mapping of POs with Course Delivery:

Program Outcomes	Course Delivery								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
PO1	L	M	S	S	L	M	S	S	M
PO2	M	S	M	M	S	M	L	S	S
PO3	S	S	S	S	S	M	S	M	M
PO4	M	L	S	M	S	M	M	L	M
PO5	S	M	M	L	M	S	S	M	M
PO6	M	S	L	S	M	S	M	S	S
PO7	L	M	S	S	L	S	M	M	S
PO8	S	S	M	S	S	S	S	S	S
PO9	S	S	S	M	S	S	L	S	S
PSO1	S	M	M	S	L	M	M	M	S
PSO2	S	S	M	M	S	L	S	S	M
PSO3	S	M	S	S	M	M	S	L	M
PSO4	S	S	S	L	S	S	M	S	S

3 – Strong correlation; 2-moderate correlation; 1-Less correlation; Blank-no correlation

RATHINAM COLLEGE OF ARTS AND SCIENCE (Autonomous)

B.Sc. Computer Science (Artificial Intelligence) Curriculum Structure - Regulation - 2024

S.No.	Sem	Part	Sub Type	Course Code	Course Name	Credit	Hours	INT	EXT	Total
1	1	1	L1		Language - I	3	5	50	50	100
2	1	2	L2		English - I	3	5	50	50	100
3	1	3	Core		Core Course – I Theory Problem Solving Techniques in C	4	5	50	50	100
4	1	3	Core		Core Course – II Theory / Practical Programming Lab in C	4	4	50	50	100
5	1	3	Allied		Allied-I Mathematics for Computer Science	4	5	50	50	100
6	1	4	SEC		Skill Enhancement Courses – I Database Management System / Practical – Database Management system Lab	4	4	50	50	100
7	1	4	AEC		Ability Enhancement Course I Environmental Studies or Universal Human Values & Professional Ethics	2	2	50	0	50
						24	**30**	**350**	**300**	**650**
1	2	1	L1		Language - II	3	5	50	50	100
2	2	2	L2		English - II	3	5	50	50	100
3	2	3	Core		Core Course – III Theory Python Programming	4	5	50	50	100
4	2	3	Core		Core Course – IV Theory / Practical Python Programming Lab	4	4	50	50	100
5	2	3	Elective		Elective - I Entrepreneurship Development	4	4	50	50	100
6	2	3	Allied		Allied-II Discrete Mathematics	4	5	50	50	100
7	2	4	AEC		Ability Enhancement Course II Design Thinking	2	2	50	0	50
8	2	5	Ext		Extension Activity - I (NASA)	1	0	25	0	25
						25	**30**	**375**	**300**	**675**

1	3	1	L1		Language - III	3	4	50	50	100
2	3	2	L2		English - III	3	4	50	50	100
3	3	3	Core		Core Course – V Theory Artificial Intelligence	4	6	50	50	100
4	3	3	Core		Core Course – VI Theory / Practical Artificial Intelligence Lab	4	4	50	50	100
5	3	3	Allied		Allied-III Numerical Methods	4	5	50	50	100
6	3	4	SEC		Skill Enhancement Courses – II Practical / Training Internet of Things	4	5	50	50	100
7	3	4	AEC		Ability Enhancement Course III Soft Skill-1	2	2	50	0	50
8	3	3	ITR		Internship / Industrial Training (Summer vacation at the end of II semester activity)	2	0	50	0	50
9	3	5	Ext		Extension Activity - II (NASA)	1	0	25	0	25
						27	**30**	**425**	**300**	**725**
1	4	1	L1		Language - IV	3	4	50	50	100
2	4	2	L2		English - IV	3	4	50	50	100
3	4	3	Core		Core Course – VII Theory Big Data Analytics	4	6	50	50	100
4	4	3	Core		Core Course – VIII Theory / Practical Big Data Analytics Lab	4	4	50	50	100
5	4	3	Allied		Allied-IV Statistical Methods and its application	4	5	50	50	100
8	4	3	Elective		Elective – II Option 1: AI in Cloud Computing Option 2: Deep Learning Option 3: AI and Expert System	4	5	50	50	100
7	4	4	AEC		Ability Enhancement Course IV Soft Skill-2	2	2	50	0	50
8	4	5	Ext		Extension Activity - III (NASA)	1	0	25	0	25
						25	**30**	**375**	**300**	**675**
1	5	3	Core		Core Course – IX Theory	4	6	50	50	100

					Artificial Neural Networks					
2	5	3	Core		Core Course – X Theory / Practical Artificial Neural Networks Lab	4	6	50	50	100
3	5	3	Elective		Elective – III Option 1: Network Security and Cryptography Option 2: AI in Cyber Security Option 3: Data Communication and Networking	4	6	50	50	100
	5	3	PRJ		Project	0	6	0	0	0
4	5	4	SEC		Skill Enhancement Courses – III Practical / Training Power BI	4	6	50	50	100
5	5	3	ITR		Internship / Industrial Training (Summer vacation at the end of IV semester activity)	2	0	50	0	50
6	5	5	Ext		Extension Activity - IV (NASA)	1	0	25	0	25
						19	**30**	**275**	**200**	**475**
1	6	3	Core		Core Course – XI Theory Computing Intelligence	4	6	50	50	100
2	6	3	Core		Core Course – XII Theory / Practical Computing Intelligence Lab	4	4	50	50	100
3	6	3	Elective		Elective – IV Option 1: Deep Learning Option 2: Data Mining and Warehousing Option 3: Mobile Computing	4	6	50	50	100
4	6	3	PRJ		Core Project	8	8	100	100	200
5	6	4	SEC		Skill Enhancement Courses – IV Practical / Training R Programming	4	6	50	50	100
						24	**30**	**300**	**300**	**600**
					Total credit	**144**	**180**	**2100**	**1700**	**3800**

Additional Credits										
S.No	**Sem**	**Part**	**Sub Type**	**Course Code**	**Course Name**	**Credit**	**Hours**	**INT**	**EXT**	**Total**
1	2	6	VAC		VAC - Microsoft CoE Course / NPTEL	2	2	50	0	50
3	4	6	IDC		VAC - Microsoft CoE Course / NPTEL	2	2	50	0	50
4	5	6	VAC		VAC - Microsoft CoE Course / NPTEL	2	2	50	0	50

Certificate on Minor Discipline										
S. No	**Sem**	**Part**	**Sub Type**	**Course Code**	**Course Name**	**Credit**	**Hours**	**INT**	**EXT**	**Total**
1	2	6	MD		Course - I	5	2	0	100	100
2	3	6	MD		Course - II	5	2	0	100	100
3	4	6	MD		Course - III	5	2	0	100	100
4	5	6	MD		Course - IV	5	2	0	100	100

Core - Theory

S. No.	**Sem**	**Pre-requisite**	**Course Code**	**Course Name**	**Offering Department**	**Type Theory / Practical**
1	1			Problem Solving Techniques in C	**CS-Industry Training**	**Theory**
2	2			Python Programming	**CS-Industry Training**	**Theory**
3	3			Artificial Intelligence	**CS-Industry Training**	**Theory**
4	4			Big Data Analytics	**CS-Industry Training**	**Theory**
5	5			Artificial Neural Networks	**CS-Industry Training**	**Theory**
6	6			Computing Intelligence	**CS-Industry Training**	**Theory**

Core - Theory / Practical

S.No.	Sem	Pre-requesite	Course Code	Course Name	Offering Department	Type Theory / Practical
1	1			Programming Lab in C	**CS-Industry Training**	**Practical**
2	2			Python Programming Lab	**CS-Industry Training**	**Practical**
3	3			Artificial Intelligence Lab	**CS-Industry Training**	**Practical**
4	4			Big Data Analytics Lab	**CS-Industry Training**	**Practical**
5	5			Artificial Neural Networks Lab	**CS-Industry Training**	**Practical**
6	6			Computing Intelligence Lab	**CS-Industry Training**	**Practical**

Allied

S.No.	Sem	Pre-requesite	Course Code	Course Name	Offering Department	Type Theory / Practical
1	1			Mathematics for Computer Science	**Mathematics**	**Theory**
2	2			Discrete Mathematics	**Mathematics**	**Theory**
3	3			Numerical Methods	**Mathematics**	**Theory**
4	4			Statistical Methods and its application	**Mathematics**	

Skill Enhancement Course

S.No.	Sem	Pre-requesite	Course Code	Course Name	Offering Department	Type Practical / Training
1	1			Database Management System	**Computer Science**	**Training**
2	3			Internet of Things	**Computer Science**	**Training**
3	5			Power BI	**Computer Science**	**Training**

4	6			R Programming	**Computer Science**	**Training**
5						

Elective

S.No.	Sem	Pre-requesite		Course Code	Course Name	Offering Department	Type Practical / Training
1	4				AI in Cloud Computing	**Computer Science**	**Theory**
2	4				Deep Learning	**Computer Science**	**Theory**
3	4				AI and Expert System	**Computer Science**	**Theory**
4	5				Network Security and Cryptography	**Computer Science**	**Theory**
5	5				AI in Cyber Security	**Computer Science**	**Theory**
6	5				Data Communication and Networking	**Computer Science**	**Theory**
7	6				Deep Learning	**Computer Science**	**Theory**
8	6				Data Mining and Warehousing	**Computer Science**	**Theory**
9	6				Mobile Computing	**Computer Science**	**Theory**

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part I	3	3	3	3			12
Part II	3	3	3	3			12
Part III	12	16	15	16	15	20	94
Part IV	6	2	6	2	4	4	24
Part V		1	1	1	1		4
Total	**24**	**25**	**28**	**25**	**20**	**24**	**146**

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type

22BGE11T	Part I Tamil	**3**	**6**	**1**	**0**	**Theory**

Introduction:

பகுதி முதல் பாடமாக அமையும், தமிழ்ப்பாடம் கவிதைகள், இலக்கணம், இலக்கியவரலாறு ஆகியவைகள் கொண்டு அமைந்து உள்ளது. ஐந்து அலகுகளாக பகுக்கப்பட்டுள்ளது.

Course Outcome:

CO1	:	பாரதியார், பாரதிதாசன், சிற்பி, சுரதா ஆகிய கவிதைகளின் விளக்கத்தை மாணவர்கள் அறிந்து கொள்ளுவதால், தன்னம்பிக்கையை வெளிக்கொணரும் வகையில் உள்ளது.
CO2	:	பெண் கவிஞர்களின் படைப்பு கவிதையை அறிவதன் மூலம் வாழ்வியல் செய்திகளையும், யதார்த்த நிலையும் அறிய உதவுகிறது.
CO3	:	எண்ணங்களே ஏணிப்படிகள் -வாழ்வில் வெற்றி பெற வேண்டுமானால் எண்ணங்களை வளர்ந்துக் கொள்ள வேண்டும். சிந்தனையில் மூழ்கினர்ல் தெளிவு கிடைக்கும் என்ற கருத்துக்களை அறியும் வகையில் அமைந்துள்ளது.
CO4	:	படைப்புத்திறனை வெளிப்படும் விதமாகவும், இலக்கணத்தை அறிய பயனுள்ளதாக அமைகிறது.
CO5	:	இலக்கியவரலாறு பற்றியச் செய்திகளைக் கொண்டு அதன் வளர்ச்சி நிலையை அறிவும் வகையில் உள்ளது

Unit I : [12 periods]

பாரதியார் - பெண் விடுதலை, பாரதிதாசன் - வீரத் தமிழன், சிற்பி – நிலவுப்பூ, சுரதா - நாடு ஆகியவற்றின் விளக்கம் தருதல்

Unit II: [12 periods]

தாமரை - தொலைந்துபோனேன், அ. வெண்ணிலா - நீரிலலையும் முகம் மாலதி மைத்ரி - கன்னியாகுமரி, க்ருஷாங்கினி - புன்னை மரம் ஆகிய பெண் கவிதைகளின் செய்திகளை அறிவதால் வாழ்வியல் சூழலையும், யாதர்த்த நிலையையும் விளக்குதல்.

Unit III: [12 periods]

எண்ணங்களே ஏணிப்படிகள் - தெளிவான இலக்கு - ஆற்றல் நதி பெருகட்டும் - அறிவை விரிவு படுத்துக்கள் - முன்னேற்றப் படிகள் - வெற்றிச் சிகரம்- எப்பொழுதும் வெற்றி ஆகியவைகள் வாழ்வின் முன்னேற்றதுக்கான செய்திகள் அறியப்பயன்படும்.

Unit IV: [12 periods]

பெயர் சொல், வினைச்சொல், இடைச்சொல், உரிச்சொல், எச்சம் - இலக்கணத்திற்கு விளக்கம் அளித்தல் - படைப்பிலக்கியப் பயிற்சி, கவிதை எழுதல் வானொலித் தமிழ், தொலைக்காட்சித் தமிழ், பயன்பாட்டுத்தமிழ், இலக்கண நோக்கில் பயிற்றுவித்தல் எழுதுதல் கவிதை + வானொலி பேச்சுத்திறன் வளர்த்தல். ஆகியவைகள் கொண்டு திறன் வளர்க்க உதவுதல்.

Unit V: [12 periods]

இலக்கியவரலாறு பற்றியச் செய்திகள் மற்றும் புதுக்கவிதைகளின் தோற்றங்கள், வளர்ச்சிகள் அறிவும்

வகையில் உள்ளது. ஹைக்கூ, குக்கூ, சென்ட்ரியூ, கஜல். ஆகியவற்றுக்கு விளக்கம் தருதல்.

Text books:

1. பாரதியார் கவிதைகள், 2. பாரதிதாசன் கவிதைகள், 3. சுரதா கவிதைகள், 4. சிற்பி கவிதைகள்5. அ. வெண்ணிலா

Reference Books :

1 இலக்கியவரலாறு பாக்கியமேரி, 2. இலக்கண நூல், 3. மு.வ. தமிழ் இலக்கிய வரலாறு

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
23BGE12E	English for Communication-1	4	0	0	4	Theory

Introduction:

To encourage students to inculcate and use effective communication skills in their day-to-day life. To develop the LSRW skills to enhance the culture and thoughts through language

Course Outcome:

CO1	:	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking, and Writing
CO2	:	Understand the total content and underlying meaning in the context
CO3	:	Form the habit of reading for pleasure and for information
CO4	:	Comprehend material other than the prescribed text
CO5	:	Develop the linguistic competence that enables them, in the future, to present the culture and civilization of their nation.

Unit I: [12 periods]

A Patch of Land – Subramania Bharathi, JRD-Harish Bhat, The Faltering Pendulum- BhabaniBhattacharya
Listening for General and Specific Information, Vocabulary: Synonyms, Antonyms, Word Formation

Unit II: [12 periods]

The Sparrow-Paul Lawrence Dunbar, Us and Them-David Sedaris (From Dress your Family in Corduroy and Denium), How I taught my grandmother to read-Sudha Murthy, Appropriate use of /articles and Parts of Speech, Listening to Giving Instructions/Directions

Unit III: [12 periods]

A Nation's Strength- Ralph Waldo Emerson, Uncle Podger Hangs a Picture-Jerome K.Jerome
Self-Introduction, Greeting, Introducing Others, Error Detection

Unit IV: [12 periods]

Love Cycle, The Gold Frame-R.K Laxman, Communication and its types, Close Reading

Unit V: [12 periods]

Translation, Dialogue Writing, Free Writing, Sentence Types

Text books:

Steel Hawk and other stories by Bhattacharya, Bhabani, New Delhi Sahitya Akademi, 1967
How I Taught my grandmother to Read and Other Stories, Murthy, Sudha, Penguin Books, India, 2004

Reference Books:

English in use - A textbook for College Students (English, Paperback, - T.Vijay Kumar, K Durga Bhavani,

YL Srinivas
Practical English Usage - 4th Edition by Michael Swan
The Art of Civilized Conversation: A Guide to Expressing Yourself with Style and Grace -Margaret Shepherd, Penny Carter, (Illustrator), Sharon Hogan, 2005.

Course Outcomes	**Program Outcomes**											
	P01	**PO2**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**P10**	**P11**	**P12**
CO1	3	3	3	3	3	3	3	2	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2	3	2
CO3	3	3	3	2	3	3	3	2	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2	3	2
CO5	3	2	3	3	3	3	3	2	2	3	3	2

Subject	**Subject Title**	**Credit**	**Lecture**	**Tutorial**	**Practical**	**Type**

Code						
	Core - I – Problem Solving Using C	**4**	**6**	**-**	**-**	**Core Theory**

Introduction:

This subject covers the C Programming Course. Throughout this course, students will learn the fundamental and advanced concepts of C programming, enabling them to write efficient and reliable programs for various applications.

Course Outcome:

CO1	:	Understand basic C programming concepts and create simple programs confidently.
CO2	:	Use decision-making and looping tools to solve different problems in programming.
CO3	:	Use advanced methods to make decisions and organize data effectively in programs.
CO4	:	Manage input/output operations and files smoothly in programs.
CO5	:	Organize code effectively using functions and pointers to make programs run better.

Unit I : Introduction to C Programming and Basic Constructs [12 periods]

Getting Started with C - The C Character Set - Constants, Variables, and Keywords - Form of a C Program - Compilation and Execution - The First C Program - C Instructions - Types of Instructions - Type Declaration Instruction - Arithmetic Instruction - Control Instructions.

Unit II: Decision Making and Looping Constructs [12 periods]

Decision Control Instruction - The if Statement - The if-else Statement - Nested if-else - Use of Logical Operators - The Conditional Operators - Loop Control Instruction - Loops and the while Loop - The for Loop - The do-while Loop - Break and Continue Statements

Unit III: Functions, Modular Programming, and Pointers [12 periods]

Functions - Introduction to Functions - Passing Values between Functions - Scope Rule of Functions - Using Library Functions - Return Type of Function – Pointers - Call by Value and Call by Reference - Introduction to Pointers - Pointer Notation - Pointers and Arrays - Pointers to Functions - Recursion

Unit IV: Advanced Decision Making and Data Structures [12 periods]

Case Control Instruction - Decisions using switch - Comparison of switch and if-else Ladder - The goto - Keyword - Data Types Revisited - The C Pre-processor - Arrays and Multidimensional Arrays - Strings and String Functions - Structures and Array of Structures- Console I/O Functions

Unit V: Input / Output Operations and Structures in C [12 periods]

Data Organization - File Operations: Opening a File - Reading from a File - Closing the File - Counting Characters – A File-Copy Program - Writing to a File - File Opening Modes - Text Files and Binary Files -

Issues in Input / Output - Operations on Bits
Text books: Yashavant Kanetkar, "Let us C", Fourteenth Edition, BPB Publication, 2017.
Reference Books: Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGraw-Hill, 2021 Byron S Gottfried, "Programming with C", Fourth Edition, McGraw-Hill, 2018 E.Balagurusamy, "Programming in ANSI C", Seventh Edition McGraw Hill, 2017

Course Outcomes	**Program Outcomes**											
	P01	**PO2**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**P10**	**P11**	**P12**
CO1	1	3	1	1	3	1	3	1	1	1	1	3
CO2	1	3	2	1	1	3	3	1	1	1	1	1
CO3	1	3	3	3	1	2	1	3	3	1	3	1
CO4	1	2	3	3	1	1	1	3	2	3	2	1
CO5	1	2	3	3	1	3	1	3	2	3	1	1

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Core Practical - I – Programming in C Lab	**4**	**-**	**-**	**6**	**Core Practical**

Introduction:

This subject, C Programming Lab, will equip you with the foundational knowledge to excel in programming with C. Students will learn to effectively utilize basic constructs, implement arrays, manipulate strings, work with pointers, and understand structures and file processing techniques.

Course Outcome:

CO1	:	Understand and apply C programming constructs effectively.
CO2	:	Develop programs in C using basic constructs proficiently.
CO3	:	Implement arrays in C programs for various applications.
CO4	:	Utilize strings, pointers, and functions proficiently in C applications.
CO5	:	Implement structures and file processing techniques effectively in C applications.

Create a program that calculates the area of a circle given its radius.
Implement a program that determines whether a given year is a leap year or not.
Display whether the entered number is an Armstrong number or not
Create a program that compares three numbers and prints the largest one.
Write a program to print the Fibonacci series up to a certain number of terms using a while loop.
Write a program that takes an integer input n and prints a triangle pattern with n rows, where each row contains one more asterisk (*) than the previous row.
Write a program to find the sum of elements in a one-dimensional array.
Implement a program to count the number of vowels in a given string.
Create a program to reverse a given string.
. Write a function that receives marks received by a student in 3 subjects and returns the average and percentage of these marks. Call this function from main ( ) and print the results in main( ).
. Write a program to swap two numbers using pointers.
. Write a program to calculate the factorial of a number using a recursive function.
. Write a program to store and display information about students using structures.
. Write a program to read data from a file and display it on the screen.
. Write a program to copy contents of one file to another. While doing so replace all lowercase characters to their equivalent uppercase characters.

Text books:

Yashavant Kanetkar, “Let us C” , Fourteenth Edition, BPB Publication, 2017.

Reference Books:

Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGraw-Hill, 2021
Byron S Gottfried, "Programming with C", Fourth Edition, McGraw-Hill, 2018
E.Balagurusamy, "Programming in ANSI C", Seventh Edition McGraw Hill, 2017

Course Outcomes	Program Outcomes											
	P01	**PO2**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**P10**	**P11**	**P12**
CO1	1	3	1	1	1	2	1	1	1	1	1	1
CO2	1	3	1	1	1	3	1	1	1	1	1	1
CO3	1	1	2	3	3	1	1	1	1	1	2	1
CO4	1	1	1	3	3	1	1	3	1	1	2	1
CO5	1	1	1	3	3	1	1	3	1	1	1	1

MATHEMATICS FOR COMPUTER SCIENCE

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Allied- MATHEMATICS FOR COMPUTER SCIENCE	**4**	**4**	**-**	**-**	**Theory**

Goal: This paper focuses on the Mathematical logic, Relations& Functions, Formal languages and Graph Theories

Objective:

1. To understand the basic concepts of set theory.
2. To understand the various statements in light of mathematical logic.
3. To study various relations and funtions.
4. To understand graph theory in the course's context.
5. To understand the deeper concepts of graph theory.

Course Outcomes:

CO1	**:**	To demonstrate a working knowledge of set notation and elementary set theory with its corresponding set operations and also Venn diagram.
CO2	**:**	To apply the fundamental concepts of Mathematical Logic and Tautologies.
CO3	**:**	To apply and understand the fundamental concepts of Relations and Functions.
CO4	**:**	To demonstrate different traversal methods for graphs.
CO5	**:**	To demonstrate different methods for trees and its properties.

Unit I: [12 periods]

Set theory – Introduction-Basic definition – Types of sets – Operations on sets –Euler-Venn diagrams – Laws of set theory – Power sets and products – Inclusion and exclusion principle.

Unit II: [12 periods]

Mathematical logic – Introduction to propositional logic – Basic logical operations-Tautologies – Contradiction – Predicates and Quantification.

Unit III: [12 periods]

Relations – Binary Relations – Set operation on relations – Types of Relations – Partial order relation – Equivalence relation – Composition of relations – Functions – Types of functions – Invertible functions – Composition of functions

Unit IV: [12 periods]

Graph theory – Basic terminology – Paths, cycle and connectivity – sub graphs – Types of graphs – Representation of graphs in computer memory.

Unit V: [12 periods]

Trees – Properties of Trees – Binary trees – Traversing Binary Trees – Computer Representation of general trees.

Text Book:

1. Discrete Mathematics for Computer Science by Gary Haggard, JohnSchlipf and Sue Whitesides
2. Discrete Mathematics by J.K. Sharma second edition – 2005. Macmillan India Ltd.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

Course Outcomes	Program Outcomes							
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	M	M	L	L	L	L	L	L
CO2	M	M	L	L	L	L	L	L
CO3	H	M	M	L	L	L	L	L
CO4	H	M	M	L	L	L	L	L
CO5	H	H	M	M	L	L	L	L

H - High; M- Medium; L- Low

Course Code	Couse Title	Credit	Lecture	Tutorial	Practical	Type
	Database Management System	4	5	-	-	**Core Theory**

Course Introduction

This course enables the student skills and knowledge to tackle complex database challenges, optimize database performance, and design efficient database solutions using advanced DBMS and SQL techniques.

Course Outcomes	On completion of this course, students will
CO 1:	To provide a basic introduction about DBMS. To Understand the DBMS.
CO 2:	To Provide an overview of ER Diagrams and the Relational model. To Understand key constraints in DBMS.
CO 3:	Understand the various Normalization and implementations.
CO 4:	Explain DB applications, embedded SQL and overview of storage and indexing.

CO 5:	Understand the concept of ACID properties and Physical Database and Tuning.

Unit I:	**Overview of Database Systems**	**[12 Periods]**

Introduction - Overview of Database Management - What is Database System - History of DBMS - Managing Structured Data - File Systems vs. DBMS - Basics of DBMS – DBMS Architecture - Overview of Relational Model - Database languages – Queries - Transaction Management - Structure & Design of a DBMS - Object Relational and semi-structured DB - Users & Administrators- Client/Server Architecture - Case Study.

Unit II:	**Database Design Models**	**[12 Periods]**

The Relational Model - Relational Calculus - Introduction to Database Design - ER Diagrams – Entities, Attributes and Relationships. Design with ER Model - Conceptual Design for Large Enterprises - UML - Case Study.

Relational Model: The Relational Model Integrity Constraints - Key Constraints – Primary Key Constraints - Foreign Key Constraints - General Constraints - Relational Algebra- Selection and Projection- Set Operation - Relational Calculus - Tuple Relational Calculus- Domain Relational Calculus - Case Study.

Unit III:	**Schema Refinement and Normal Forms**	**[12 Periods]**

DB Design - Normal forms and Atomic Domain- Functional Dependencies and Decomposition - Database Design Process

SQL: SQL queries – Union – Intersect - and Except - Nested Queries – Aggregate Queries- Null values- Joins – Views - Stored Procedures - User defined Functions – Triggers – Transactions - Case Study

Unit IV:	**DB Application Development**	**[12 Periods]**

DB Access from applications – embedded SQL, Cursors, and Dynamic SQL. Introduction to JDBC & SQL/J - Stored Procedures.

Overview of Storage and Indexing: Data on external storage - File Organizations and Indexing - Index Data Structures - Comparison of File Organizations - Indexes and Performance Tuning.

Overview of Query Evaluation: System Catalog - Operator Evaluation - Algorithms for relational operations. Introduction to Query Optimization – Alternative Plans - Case Study.

Unit V:	**Transaction Management**	**[12 Periods]**

Introduction to Transaction - ACID Properties Serializability- Transactions and Schedules - Concurrent Execution of Transactions - Lock-based concurrency control - Transaction support in SQL commit - rollback – save point - Introduction to Crash Recovery.

Physical Database Design and Tuning: Introduction to Physical Database design - Index Selection - Clustering. Overview of Database Tuning - Choices in tuning queries and Views - Case Study

Text Books:

1. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke 3rd Edition, McGraw Hill 2003.
2. Database System Concepts, AbrahamSilberschatz, Henry F.Korth and S.Sudarshan, 5th Edition, McGraw Hill 2006.

Reference Books:

1. Fundamentals of Database Systems, Elmasri and Navathe, 5thEdition, Addison- Wesley, 2007.
2. An Introduction to Database Systems, C.J. Date, A. Kannan, S. Swamynatham, 8th Edition, Pearson education, 2006.

Web Resources:

1. https://www.javatpoint.com/dbms-tutorial
2. https://www.appdynamics.com/topics/database-management-systems

Mapping of Course Outcome with Programme Outcome and Programme Specific Outcome:

Course Outcome	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	2	2	1	1	1	2	1	1	1
CO2	3	3	3	1	1	3	2	1	2	1	1	1
CO3	3	3	3	1	2	2	1	3	2	1	3	1
CO4	2	1	3	2	1	3	2	3	1	2	2	2
CO5	3	1	3	1	2	2	2	3	2	2	2	1

Course Code	Couse Title	Credit	Lecture	Tutorial	Practical	Type
	Database Management System Lab	**4**	**0**	**0**	**5**	**Practical**

List of Practical Programs:

1. Practical Based on Data Manipulation.
   • Adding data with Insert, • Modify data with Update, • Deleting records with Delete
2. Practical Based on Implementing the Constraints.
   • NULL and NOT NULL, • Primary Key and Foreign Key Constraint • Unique, Check and Default Constraint
3. Practical for Retrieving Data Using following clauses.
   • Simple select clause, • Accessing specific data with Where, Ordered By, Distinct and Group By
4. Practical Based on Aggregate Functions.
   • AVG, • COUNT, • MAX, • MIN, • SUM, • CUBE
5. Practical Based on implementing all String functions.
6. Practical Based on implementing Date and Time Functions.
7. Practical Based on implementing use of union, intersection, set difference.
8. Implement Nested Queries & JOIN operation.
9. Practical Based on performing different operations on a view.
10. Practical Based on implementing use of triggers, cursors & procedures.

Mapping of Course Outcome with Programme Outcome and Programme Specific Outcome:

Course Outcome	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	1	1	2	1	1	1
CO2	2	2	3	1	2	3	2	1	2	1	1	1
CO3	3	3	2	1	1	2	1	3	2	1	2	1
CO4	1	1	3	3	1	2	2	3	1	2	2	2
CO5	3	1	3	1	3	2	2	3	1	2	2	1

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Environmental Studies	**2**	**2**	**0**	**0**	**FC**

Unit I

A Multidisciplinary Subject – Natural Resources – Forest Resources – Water Resources – Mineral Resources – Food Resources – Energy Resources – Land Resources.

Unit II

Ecosystem – Concepts of Ecosystem – Characteristics – Food Chains – Food Web – Ecological Pyramids – Energy Flow in an Ecosystem – Nutrient Cycling – Primary Production – Ecosystem Regulation – Ecological Succession – Major Ecosystem Types.

Unit III

Biodiversity and its Conservation – Diversity – Biogeographically Classification of India – Value of Biodiversity – Global Biodiversity – Biodiversity: National, Regional or Local – Hot Spots of Bio Diversity – Threats to Biodiversity – Loss of Habitat – Poaching – Man-wildlife Conflicts – Endangered Species of India – Endemic Species of India – Conservation of Biodiversity.

Unit IV

Environmental Pollution – Air pollution – Noise Pollution – Water Pollution – Thermal Pollution – Marine Pollution – Soil Pollution – Nuclear Hazards – Solid Waste Management – Role of an Individual in Prevention of Pollution – disaster Management.

Unit V

Social Issues and the Environment – From unsustainable to sustainable development – Urban problems related to energy – Water Conservation – Rainwater Harvesting – Watershed Management – Resettlement and Rehabilitation Issues – Environmental Ethics – Climate change – Global Warming – Acid Rain – Ozone Layer Depletion – Environmental Legislation.

Reference books:

1. Perspectives in Environmental Studies – Aubha Kaushik, C. P. Kaushik, New Age International Publishers, Second Edition, 2004.
2. Basics of Environmental Science – Michael Allaby, Routledge – London, 2nd Edition, 1996.
3. Principles of Environmental Science and Technology – K. Saravanan, S. Ramachandran and R. Baskar, New Age International Publishers, 2005.

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Part I Tamil	**3**	**6**	**0**	**0**	**Theory**

Introduction:

இரண்டாம் பருவப் பாடத்திட்டம் அற இலக்கியம், சிற்றிலக்கியம், சிறுகதைகள், இலக்கணம், இலக்கிய வரலாறு ஆகியவைகள் கொண்டு உருவாகியுள்ளது.

Course Outcome:

CO1	:	ஆறஇலக்கியத்தில் -நீதிநெறி கருத்துக்களை அறிந்து கொள்ளுவதால், வாழ்க்கையில் பண்புகளை பின்பற்றவும், அறெறிவோடு வாழவும் கருத்துக்கள் உள்ளடங்கி இருப்பதால் பயனுள்ளதாக அமையும்.
CO2	:	சிற்றிலக்கியத்தின் செய்திகளான அறம், விருந்தோம்பல் போன்றவற்றை மாணவர்கள் தெளிவாக அறிந்துகொள்ளுவது, அன்பின் மேன்மை, பண்பு ஆகியவைகளும் அறிந்து கொள்ள முடிகிறது.
CO3	:	அணி இலக்கணம் அறிவதால் இலக்கணத்தின் சிறப்பபையும் முக்கியக்கியத்துவத்தையும் அறியலாம்.
CO4	:	சிறுகதைகளில் உள்ள கதைகளில் உள்ள மையக்கருத்துகளைத் தெரிந்து கொள்ளுவது சமுதாயச் சிந்தனையையும், விழிப்புணர்வும் உருவாக்க உதவுகிறது.
CO5	:	தன்னம்பிக்கை கட்டுரை- தன்னம்பிக்கையே வெற்றி – சிந்தனைகளை தூண்டி செயலாக்கும் நுட்பங்களை அறிந்தல், தானாக வளர்வதற்கான வழிகாட்டி, வெற்றிக்கு வழிகாட்டுவதாக அமைகிறது.

அலகு I : [12 **பாட வகுப்புகள்**]

அற இலக்கியம் : திருக்குறள், அன்புடைமை, அறிவுடைமை, நாலடியார், பழமொழி நானூறு-ஆகியவைகள் நீதியின் கருத்துக்களைக் கொண்டு பாடமாக உள்ளது.

அலகு II : [12 **பாட வகுப்புகள்**]

சிற்றிலக்கியம்: நந்திக்கலம்பகம், சிற்றிலக்கிய உறுப்புகள்- குற்றலாக் குறவஞ்சி – மலைவளம், கலிங்கத்துப்பரணி, காடு பாடியது, அழகர் கிள்ளை விடு தூது, கலிங்கத்துப்பரணி– கோயில் பாடியது, கிள்ளை வயடட தூது ஆகிய சிற்றிலக்கியங்களின் கருத்துக்களைத் தெளிவாக எடுத்துரைத்தல்.

அலகு III: [12 **பாட வகுப்புகள்**]

ஆணி இலக்கணம் - சிலேடை அணி, பரியாய அணி, விபாவனை அணி, அதிசய அணி, இலக்கணம் - விளக்கத்துடன் கற்பிக்கப்படும்.

அலகு IV: [12 **பாட வகுப்புகள்**] சிறுகதைகள் : தேர்ந்தெடுக்கப்பட்ட 4-சிறுகதைகள் - மாணவர்களின் தனித்திறனை வளர்க்கும் பொருட்டு எடுக்கப்படும். சமுதாய செய்திகள் மற்றும் சமுதாய நோக்குப் பற்றி விளக்கம் தருதல்.
அலகு V : [12 **பாட வகுப்புகள்**] தன்னம்பிக்கை கட்டுரைகள் - தன்னம்பிக்கையே – முன்னேற்றச் சிந்தனைகள்திட்டமிடுதல்- தன்னம்பிக்கை தரும் வெற்றிகள்- வளமூட்டும் வார்த்தைகள்- திறமை தீபம் - ஏற்றுகள்- செயலினில் புதுமை செய்வோம் மாணவர்களுக்கு தன்னம்பிக்கை வளர்க்க உதவும்.
பாடநூல்கள்: **1.**பதினெண்கீழ்க்கணக்கு நூல்கள்**, 2.**நந்திக்கலம்பகம்**, 3.**குற்றலாக்குறவஞ்சி**, 4.** கலிங்கத்துப்பரணி
பார்வை நூல்கள் : 1. ஜெயகாந்தன் சிறுகதை, 2. புதுமைப்பித்தன் சிறுகதை, 3. சூடாமணி – சிறுகதை, 4. எஸ். ராமகிருஷ்ணன்- சிறுகதை , 5. மு.வ. -தமிழ் இலக்கிய வரலாறு , 6. டாக்டர் கே.கே பிள்ளை – தமிழக வரலாறு மக்களும் பண்பாடும், 7. பேரா.முனைவர் பாக்யமேரி - இலக்கணம் இலக்கிய வரலாறு மொழித்திறன்.

Subject Code	**Subject Title**	**Credit**	**Lecture**	**Tutorial**	**Practical**	**Type**

	General English	3	6	0	0	Theory

Introduction: To encourage students to inculcate and use effective communication skills in their day-to-day life. To develop the LSRW skills to enhance the culture and thoughts through language.

Course Outcome:

CO1	:	Learn to introduce themselves and talk about everyday activities confidently
CO2	:	Be able to write short paragraphs on people, places, and events
CO3	:	Identify the purpose of using various tenses and effectively employ them in speaking and writing
CO4	:	Gain knowledge to write subjective and objective descriptions
CO5	:	Identify and use their skills effectively in formal contexts.

12 Hours

Unit I:

1.1 Very Indian Poem in Indian English -Nissim Ezekiel - 1.2 If you Are Wrong Admit it-Dale Carnegie - 1.3 Reading for General and Specific Information (Charts, tables schedules, graphs, etc.) - 1.4 Homonyms, Homophones, Homographs

12 Hours

Unit II:

2.1 Still I Rise- Maya Angelou - 2.2 Kindly Adjust Please- Shashi Tharoor - 2.3 Verbs and Tenses
2.4 Subject Verb Agreement

12 Hours

Unit III:

3.1 Alchemist-Paulo Coelho

12 Hours

Unit IV:

4.1 The Flower- Tennyson - 4.2 The Spoon-Fed Age. W.R. Inge - 4.3 Paragraph Writing - 4.4 Error detection

12 Hours

Unit V:

5.1 On Killing a Tree- Gieve Patel - 5.2 Taking and Note Making - 5.3 Reading news and weather reports
5.4 Precis Writing.

Text books:

1. The Alchemist - Paulo Coelho Harper - 2005

Reference Books:

1 Advanced English Grammar. Martin Hewings. Cambridge University Press, 2000
2. Descriptive English. SP Bakshi, Richa Sharma • 2019, Arihant Publications (India) Ltd.
3. The Reading Book: A Complete Guide to Teaching Reading. Sheena Cameron, Louise Dempsey, S & L. Publishing, 2019.
4. Skimming and Scanning Techniques, Barbara Sherman, Liberty University Press, 2014
5 Brilliant Speed Reading: Whatever you need to read, however ...Phil Chambers

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Python Programming	**4**	**5**	**-**	**0**	**Theory**

Introduction: After learning the Syntax and Semantics and create Functions, Handle Strings and Files, Understand Lists, Dictionaries and Regular expressions, Implement Object Oriented Programming concepts, Build Web Services and introduction to Network and Database Programming students are able to develop rich dynamic websites in Python.

Course Outcome:

CO1	:	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions
CO2	:	Demonstrate proficiency in handling Strings and File Systems
CO3	:	Understand Lists, Dictionaries and Regular expressions in Python
CO4	:	Interpret the concepts of Object-Oriented Programming as used in Python
CO5	:	Implement exemplary applications related to Network Programming, Web Services and Databases in Python

Unit I: [12 periods]

Installing Python, Simple program using Python, Expressions and Values, Variables and Computer Memory, error detection, Multiple line statements, Designing and using functions, functions provided by Python, Tracing function calls in memory model, omitting return statement. Working with Text: Creating Strings of Characters, Using Special Characters in Strings, Creating a Multiline String, Printing Information, Getting Information from the Keyboard.

Unit II : [12 periods]

A Boolean Type , Choosing Statements to Execute, Nested If Statements , Remembering the Results of a Boolean Expression Evaluation , A Modular Approach to Program Organization, Importing Modules , Defining Your Own Modules, Testing Code Semi automatically Grouping Functions Using Methods: Modules, Classes, and Methods , Calling Methods the Object-Oriented Way, Exploring String Methods, Underscores.

Unit III: [12 periods]

Storing Collections of Data Using Lists: Storing and Accessing Data in Lists, modifying Lists, Operations on Lists, Slicing Lists, Aliasing, List Methods, Working with a List of Lists. Repeating Code Using Loops: Processing Items in a List, Processing Characters in Strings, Looping Over a Range of Numbers, Processing Lists Using Indices, Nesting Loops in Loops, Looping Until a Condition Is Reached, Repetition Based on User Input, Controlling Loops Using Break and Continue Reading and Writing.

Unit IV: [12 periods]

Files: Kinds of files, opening a File, Techniques for Reading Files, Files over the Internet, Writing Files, and Writing Algorithms That Use the File-Reading Techniques, Multiline Records. Storing Data Using Other Collection Types: Storing Data Using Sets, Storing Data Using Tuples, Storing Data Using Dictionaries, inverting a Dictionary, Using the In Operator on Tuples, Sets, and Dictionaries, Comparing Collections.

Unit V: **[12 periods]**

Collection of New Information Object-Oriented Programming : Understanding a Problem Domain , Function "Isinstance," Class Object, and Class Book , Writing a Method in Class Book, Plugging into Python Syntax: More Special Methods, Creating Graphical User interface: Building a Basic GUI, Models, Views, and Controllers, Customizing the Visual Style Introducing few more Widgets, Object-Oriented GUIs, Keeping the Concepts from Being a GUI Mess.

Reference Books:

1. L. Halterman, "Fundamentals of Python Programming", Southern Adventist University July 26, 2018, Copyright © 2017 Richard L. Halterman Richard.
2. John V Guttag, ―Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, ―Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
4. Timothy A. Budd, ―Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd.,, 2015.
5. Kenneth A. Lambert, ―Fundamentals of Python: First Programs‖, CENGAGE Learning, 2012.

Charles Dierbach, Introduction to Computer Science using Python: A Computational ProblemSolving Focus, Wiley India Edition, 2013

Course Outcomes	Program Outcomes												
	P01	**P02**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**PS01**	**PS02**	**PS03**	**PS04**
CO1	**1**	**3**		**3**		**2**				**3**	**3**		**3**
CO2		**2**	**3**		**1**		**3**	**2**	**3**				
CO3	**2**	**1**	**2**			**1**				**2**	**1**	**3**	**2**
CO4	**3**			**1**	**3**	**3**			**1**	**3**		**1**	**3**
CO5		**3**			**2**		**2**	**3**					

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Python Programming Lab	**4**	**0**	**-**	**5**	**Lab**

Introduction: Understand the basic operations and creations of various applications using python.

Course Outcome:

CO1	:	Write, test, and debug simple Python programs.
CO2	:	Implement Python programs with conditionals and loops for stack, sorting algorithms.
CO3	:	Read and write data from/to files in Python.
CO4	:	Use Python lists, dictionaries for representing compound data.
CO5	:	Write Script to SQL and Demonstrate Exception in Python.

Lab Experiments:

1. Create a calculator program using Python.
2. Create Python program using different String functions.
3. Implement Selection sort algorithm using Python Program.
4. Implement stack Operation using Python Program.
5. Read and Write into a file using Python Program.
6. Demonstrate use of Dictionaries in Python Program.
7. Create Comma Separate Files (CSV), Load CSV files into internal Data Structure.
8. Write script to work like a SQL SELECT statement for internal Data Structure made in earlier exercise.
9. Write script to work like a SQL Inner Join for an internal Data Structure made in earlier exercise.
10. Demonstrate Exceptions in Python.

Course Outcomes	**Program Outcomes**												
	P01	**P02**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**PS01**	**PS02**	**PS03**	**PS04**
CO1	**3**				**3**		**3**		**3**		**3**		**3**
CO2	**2**	**3**		**2**	**3**	**2**		**3**				**3**	
CO3	**3**	**2**	**3**			**3**	**2**		**2**	**1**	**3**		**1**
CO4			**2**	**3**	**3**					**1**		**2**	**2**
CO5	**1**	**3**		**1**		**2**	**2**		**3**		**1**		

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Elective I - Entrepreneurship Development	**4**	**6**	**-**	**-**	**Theory**

Introduction:

To build the necessary competencies and creativity and prepare them to undertake entrepreneurship as a desirable and feasible career option.

Course Outcome:

CO1	:	To know about the role of the entrepreneur in India and around and the globe, understand the benefits and drawbacks of entrepreneurship and students has to avoid them; entrepreneurial failure.
CO2	:	The course aims to develop student's ability to create, lead and coordinate projects within the textile and fashion sector. It also intends to provide tools and methods in order to make use of entrepreneurial thinking to develop a business project.
CO3	:	Students will be able to define, identify and/or apply the principles of new venture financing, growth financing, and growth financing for existing businesses.
CO4	:	To understand process of women entrepreneur and how faced their problems
CO5	:	To understand difference between Micro, small and medium Enterprise

Unit I:

[12periods]

Entrepreneur – importance- qualities, nature types – difference between entrepreneur and entrepreneurship and economic development – its importance – role of entrepreneurship – entrepreneurial environment.

UnitII:

[12periods]

Project management: sources of business idea – project classifications – identifications – formulation and design – feasibility analysis – preparation of project report and presentation. Financial analysis – concept and scope project cost estimate – operating revenue estimate – ratio analysis – investment.

UnitIII: **[12periods**

Project finance: sources of finance – institutional finance – role of IFC, IDBI, ICICI, LIC, SFC, SIPCOT, commercial bank – appraisal of bank for loans. Institutional aids for entrepreneurship development

UnitIV:

[12 periods]

The innovation process – the diagnosis – the consultation of group – selecting a strategy preparing the organization setting up the investment. Women entrepreneur – problems face by women entrepreneur – economic impact of women entrepreneur

Unit V: **[12 periods]**

Setting small scale industries – step in setting SSI unit – problems of entrepreneur – sickness in small industries – reason and remedies – Incentives and subsidies role of DICS, SIDCO, NSICS, IRCI,

NIDC, SIDBI, SISI, SIPCOT.

Text books:

1. Robert D. Hisrich, Mathew J Manimala, Michael P Peters, Dean A Shepherd, "Entrepreneurship", McGraw Hill Education, 2014

Reference Books:

1. Bhushan Y.K, "Entrepreneurial Development" Sultan Chand & Sons, Nineteenth Edition - 2013.
2. L.M. Prasad, "Entrepreneurial Development", 5th Edition, Himalaya publication, Mumbai – 2006.

Course Outcomes	Program Outcomes												
	P01	**P02**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**PS01**	**PS02**	**PS03**	**PS04**
CO1	**3**	**3**	**3**	**1**	**3**	**1**	**1**	**1**	**3**	**3**	**3**	**1**	**3**
CO2	**3**	**2**	**3**	**1**	**3**	**1**	**2**	**1**	**3**	**3**	**2**	**2**	**2**
CO3	**3**	**3**	**3**	**1**	**3**	**1**	**2**	**1**	**3**	**3**	**3**	**1**	**3**
CO4	**3**	**2**	**3**	**1**	**3**	**1**	**2**	**1**	**3**	**3**	**2**	**3**	**2**
CO5	**3**	**3**	**3**	**1**	**3**	**1**	**2**	**1**	**3**	**3**	**3**	**2**	**3**

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Allied – DISCRETE MATHEMATICS	**4**	**4**	**-**	**-**	**Theory**

Goal: This paper enables the students to relate mathematics with Data Science and improve their logical thinking.

Course Outcomes:

CO1	:	Students will gain an understanding of the Basic definition of Logics with examples.
CO2	:	Students will gain knowledge of Predicate Logic.
CO3	:	Students will be able to implement and evaluate types of Lattices and Boolean Algebra
CO4	:	Students will learn about Pigeon Hole principle and Permutation and Combination
CO5	:	Students will be able to gather information about Formal Languages.

UNIT 1: [12 Periods]

Propositional Logic: Definition, Statements & Notation, Truth Values, Connectives, Statement Formulas & Truth Tables, Well-formed Formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Examples

UNIT 2: [12 Periods]

Predicate Logic: Definition of Predicates; Statement functions, Variables, Quantifiers, Predicate Formulas, Free & Bound Variables; The Universe of Discourse, Examples, Valid Formulas & Equivalences, Examples.

UNIT 3: [12 Periods]

Lattices & Boolean Algebra: Properties of lattices – Lattice as Algebraic System-Sub lattices- lattice Homomorphism- Special Lattices – Boolean Algebra- sub algebra- Boolean Expression and Boolean functions- expression of a Boolean function in canonical formlogic Gates- Karnaugh Map Method.

UNIT 4: [12 Periods]

Basics of Counting: The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations, Inclusion-Exclusion Principle.

UNIT 5: **[12 Periods]**

Formal Language: Introduction- Phrase –Structure Grammar- Types – BNF- Finite state Machine – Input output strings Finite state Automata

Text Books:

1. Discrete mathematics – T. Veerarajan – McGraw Hill Education 2017

2. Ralph P. Grimaldi, "Discrete and Combinatoral Mathematics – An applied introduction", Third Edition, Addison Wesley Publishing Company, 1994.

Reference Books:

1. Discrete Mathematical Structures with application to Computer Science, Tremblay and Manohar – (Tata McGraw Hill, New Delhi) 1997.

2. Discrete mathematics, Venkataraman .M.K. and others –2000 The National Publishing Company.

	1	2	3	4	5	6	1	2	3
CO 1	3	1	3	2	1	1	3	3	2
CO 2	1	3	2	2	1	1	3	3	2
CO 3	3	2	1	2	1	1	3	3	2
CO 4	2	2	3	2	1	1	3	3	2
CO 5	3	2	1	2	1	1	3	3	2

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
31T	Part I Tamil	**3**	**6**	**1**	**0**	**Theory**

Introduction: மூன்றாம் பருவப் பாடத்திட்டம் சிறுகதை, வானொலி, தொலைக்காட்சி, கணிப்பொறி,
மொமிப்பெயர்ப்பு ஆகியவைகள் கொண்டு உருவாகியுள்ளது.

Course Outcome:

CO1	:	சிறுகதை எழுதுதல்- சிறுகதையின் வடிவம் மையக்கதாபாத்திரம். பயனுள்ளதாக அமையும். சிறுகதை இலக்கணம் அறிதல், தலைப்பு, கதைக்களம் சிறுகதையின் அமைப்பு அறிந்து கொள்ள முடிகிறது.
CO2	:	வானொலியில் இடம் பெறும் நிகழ்ச்சிகள் - தமிழ் சார்ந்த பேச்சு, விவாதம், மாணவர்கள் அறிந்து கொள்ள பயன் உள்ளது.
CO3	:	தொலைக்காட்சியின் இயல்பு-தொலைக்காட்சியின் நன்மைகள், நிகழ்ச்சி தயாரிக்கும் முறை- நிகழ்ச்சி ஒருங்கிணைப்புகள், நிகழ்;ச்சி நடத்துதல்.
CO4	:	கணிப்பொறி வரலாறு- கணிப்பொறி வகைகள்,. கணிப்பொறி பயன்பாடுகள் ஆகியவைகள் மாணவர்களுக்கு பயனுள்ளது.
CO5	:	மொழிப்பெயர்ப்;பு வரலாறு, மொழிபெயர்ப்பு இயல்புகள் மற்றும் முக்கியத்துவம் பற்றித் தெளிவாக புரிந்து கொள்ள முடியும்.

அலகு I : [12 **பாட**
வகுப்புகள்]

சிறுகதை எழுதுதல் - சிறுகதையின் வடிவம். மையக்கதாபாத்திரம், எதிர் கதாபாத்திரங்கள். சிறுகதை இலக்கணம் அறிதல், தலைப்பு கதைக்களம் சிறுகதையின் அமைப்பு சிறுகதை பயன்பாடு, சிறுகதையின் தொடக்கம் தெளிவுரையுடன் விளக்கம் கொடுத்து கற்பிக்கப்படும்.

அலகு II : [12 **பாட**
வகுப்புகள்]

வானொலி வரலாறு. வானொலி பயன்பாடு, வானொலியில் இடம் பெறும் நிகழ்ச்சிகள் தமிழ் சார்ந்த பேச்சு, விவாதம்,பட்டிமன்றம். வானொலியில் கல்வி ஒலிபரப்பு வேலைவாய்ப்பு, வேளாண்மை நிகழ்ச்சிகள், மருத்துவக் குறிப்புகள் ஆகியவைகள் பற்றி விளக்கம் மற்றும் பேச்சுக்கலைகள் வளர்க்க கற்றுக்கொடுக்கப்படும்.

அலகு III: [12 **பாட**
வகுப்புகள்]

தொலைக்காட்சியின் வரலாறு-தொலைக்காட்சி தன்மைகள், இயல்பு, நன்மைகள் நிகழ்ச்சி தயாரிக்கும் முறை-நிகழ்ச்சி ஒருங்கிணைப்புகள், நிகழ்ச்சி நடத்துதல் தொலைக்காட்சி வர்ணனைகள் விருதுகள், நிகழ்ச்சிகள் ஆகியவைகள் பற்றி விளக்கம் தருதல்.

அலகு IV: [12 **பாட**
வகுப்புகள்]

கணிப்பொறி வரலாறு- கணிப்பொறி வகைகள், கணிப்பொறி பயன்பாடுகள், மாத.

நாட்காட்டி தயாரித்தல் விளம்பரம் உருவாக்கம், மதிப்பெண் பட்டியல் தயாரித்தல் கணினி கலைச்சொல்லாக்கம் விளக்கம் கொடுத்து கற்பிக்கப்படும்.
அலகு V : [12 **பாட வகுப்புகள்**] மொழிப்பெயர்ப்பு வரலாறு, இயல்புகள் பயன் ஆகியவைகள் அறிந்து கொள்ள பயிற்சிகள் கொடுத்து கற்பிக்கப்படும்.
பாடநூல்கள்: **1.** எழுதுவது எப்படி- மகரம் வாசகர் வட்டம், **2.** தமிழ் இணைய இதழ்கள் - அண்ணா கண்ணன் **3.** .மொழிபெயர்ப்புக்கலை : மு.வளர்மதி, **4.** மொழிபெயர்ப்பியல் : சு.சண்முக வேலாயுதம், **5.** மொழி பெயர்ப்பும், சொல்லாக்கமும் தென்புலோலியூர், மு.கணபதிப்பிள்ளை

Subject	Subject Title	Credit	Lecture	Tutorial	Practical	Type

Code						
32E	**General English**					

Introduction: To encourage students to inculcate and use effective communication skills in their day-to-day lives. To develop the LSRW skills to enhance the culture and thoughts through language

Course Outcome:

CO1	:	Broaden their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives.
CO2	:	Be updated with basic informatics skills and attitudes relevant to the emerging knowledge society
CO3	:	Produce grammatically and idiomatically correct language
CO4	:	Gain knowledge in writing techniques to meet academic and professional needs
CO5	:	Be equipped with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career-oriented tests.

Unit I: **12 Hours**

The Voice of the Mountains - Mamang Dai - Romeo & Juliet- The Balcony Scene - Writing Letters and Emails - Data Interpretation and Reporting

Unit II: **12 Hours**

Sita- Toru Dutt - Macbeth-Banquet Scene - Writing and messaging on Social Media Platforms (blogs, Twitter, Instagram, Facebook)

Unit III: **12 Hours**

A Song of Hope- Oodgeroo Noonuccal - Julius Caesar- Murder Scene - Tryst with Destiny-Jawaharlal Nehru - Learning netiquette, email etiquette

Unit IV: **12 Hours**

In an Artist's Studio- Christina Rossetti - Yes, We Can Barack Obama - Meeting Etiquettes- Language, dress code, voice modulation. - Online Meetings- Terms and expressions used - Framing Questions

Unit V: **12 Hours**

You've Got to Find What You Love- Steve Jobs - Group Discussion - Conducting and participating in meetings - Voices

Text books:

Arden Shakespeare Complete works by Shakespeare (Author), William (Author), Bloomsbury, 2011

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type

	Artificial Intelligence	**4**	**4**	**0**	**0**	**Theory**

Introduction:
To expose the student sot the fundamental concepts of Artificial Intelligence and its applications.

Course Outcome:

CO1	:	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
CO2	:	Understanding about the basic concepts of Software agent's ad representation of knowledge
CO3	:	Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
CO4	:	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
CO5	:	Design, implement, and evaluate AI solutions using contemporary tools and frameworks, ensuring effective deployment and integration in various domains.

Unit:Introduction [12periods]

Introduction – Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents – Typical Intelligent Agents – Problem Solving Approach to Typical AI Problems

Unit II: Problem Solving Methods [12 periods]

Problem Solving Methods – Search Strategies – Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games.

Unit III: Knowledge Representation [12 periods]

Knowledge Representation – First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining – Backward – Chaining – Resolution – Knowledge Representation – Ontological Engineering – Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning with Default Information

Unit IV: Software Agents [12 periods]

Software Agents – Architecture for Intelligent Agents – Agent Communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent Systems.

UnitV: AIApplications [12periods]

AI Applications – Language Models – Information Retrieval – Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning - Moving.

Text books:

1. S. Russell and P. Norvig, ―Artificial Intelligence: A Modern Approach‖, Prentice Hall, Third Edition,

2009.
2. I. Bratko, - Prolog: Programming for Artificial Intelligence, Fourth Edition, Addison-Wesley Educational Publishers Inc., 2011.

Reference Books:

1. M. Tim Jones, - Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers Inc.; First Edition, 2008.
2. Nils J. Nilsson, - The Quest for Artificial Intelligence, Cambridge University Press, 2009
3. William F. Clocksin and Christopher S Mellish, Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003.

		Program Outcomes						
Course Outcomes	**P01**	**PO2**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**
CO1	3	1	1	1	1	1	1	1
CO2	1	1	1	1	1	1	1	1
CO3	2	1	2	2	1	1	1	1
CO4	3	3	2	2	1	1	1	1
CO5	1	1	1	2	1	1	1	1

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Practical- Artificial Intelligence Lab	**2**	**0**	**0**	**4**	**Practical**

Introduction:

This course provides a comprehensive introduction to the field of Artificial Intelligence (AI). It covers fundamental concepts and techniques used in AI, including search strategies, game playing, constraint satisfaction problems (CSPs), logical reasoning, probabilistic reasoning, and machine learning. Through a combination of theoretical foundations and practical implementations, students will gain the skills necessary to design and develop AI systems that can solve complex problems.

Course Outcome:

CO1	:	Design and implement various search strategies to solve problems.
CO2	:	Implement game playing algorithms and techniques for solving constraint satisfaction problems.
CO3	:	Develop systems that utilize logical reasoning for decision-making.
CO4	:	Construct probabilistic reasoning models for dealing with uncertainty.
CO5	:	Develop and analyze machine learning models for data-driven applications.

1. 1 Implement basic search strategies 8-puzzle problem
2. Implement basic search strategies – 8-Queens Problem
3. Implement basic search strategies – Crypt arithmetic
4. Implement A* Algorithm
5. Implement Mini-Max algorithm for game playing (Alpha-Beta pruning)
6. Solve constraint satisfaction problems
7. Propositional Model Checking Algorithms
8. Implement Forward Chaining Algorithm
9. Implement backward Chaining Algorithm
10. Implement Naïve Bayes Models
11. Implement Bayesian Networks and perform inferences

Course Outcomes	Program Outcomes							
	P01	**PO2**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**
CO1	1	3	2	2	1	1	1	1
CO2	1	3	2	2	1	1	1	1
CO3	1	3	3	2	1	1	1	1
CO4	1	3	3	2	2	1	1	1
CO5	1	3	3	2	3	2	1	1

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Allied – NUMERICAL METHODS	**4**	**4**	**-**	**-**	**Theory**

NUMERICAL METHODS

Goal: This paper enables the students to learn numerical approximation strategies and a basic knowledge on the theory that supports numerical algorithms.

Course Outcomes:

CO1	:	To demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problem
CO2	:	To apply numerical methods to obtain approximate solutions to mathematical problems
CO3	:	To analyse and evaluate the accuracy of common numerical methods
CO4	:	To analyse error obtained in the numerical solution of the problem
CO5	:	To apply numerical methods in modern scientific computing with finite precision computation.
CO6	:	To relate the subject knowledge with their experiments during their course of study.

UNIT 1: **[12 Periods]**

Solutions of algebraic and transcendental equations: Introduction – Bisection method – The Iteration method – Newton-Raphson Method – Ramanujan's method.

UNIT 2: **[12 Periods]**

Interpolation – Errors in Polynomial interpolation, Finite differences, Differences of a polynomial, Newton's forward and backward interpolation, Central differences, Gauss, Stirling, Bessel's and Everett's Formulae, Lagrange's Interpolation formula.

UNIT 3: **[12 Periods]**

Linear systems of equations: Consistency of Linear System of equations, Solutions of Linear Systems by direct method: Gaussian elimination, Gauss Jordan, solution of tridiagonal systems, Solutions of linear systems by iterative methods: Jacobi method, Gauss-Seidel method.

UNIT 4: **[12 Periods]**

Numerical integration: Trapezoidal rule – Geometrical interpretation and error of Trapezoidal rule – Simpson's one third rule and three eighth rule formulae - Romberg integration.

UNIT 5: **[12 Periods]**

Numerical solution for ordinary differential equation-Solution of first order ODE by Taylor series method – Solution of first order ODE by Euler method – Error estimates for the Euler method – Modified Euler method – Runge - Kutta method of second, third and fourth order.

Text Book:

1. Introductory Methods Numerical Analysis, S. S. Sastry Fifth Edition, Prentice-Hall Of India.

Reference Books:

1. Venkataraman M.K., "Numerical methods in Science and Engineering", National Publishing Company, Revised Edition, 2005.
2. Kandasamy P., "Numerical Methods", S.Chand and Co, Reprint 2010
3. M.K.Jain., Iyengar. S.R.K., Jain R.K., "Numerical Methods for Scientific and Engineering Computation", (6th Edition), New Age International, 2012.

Subject	Subject Title	Credit	Lecture	Tutorial	Practical	Type

Code						
	Internet of Things	**4**	**6**	**-**	**-**	**Theory**

Introduction:

The internet of things paradigm promises to make things including consumer electronic devices or home appliances, such as medical devices, fridge, cameras, and sensors, part of the internet environment.

Course Outcome:

CO1	:	Students can understand and develop their knowledge of Internet of Things
CO2	:	Analyze basic protocols in wireless sensor network
CO3	:	Students can develop their knowledge of applications related with IOT.
CO4	:	Design IoT applications in different domain and be able to analyze their performance
CO5	:	Implement basic IoT applications on embedded platform.

Unit I: **12 Hours**

Introduction to IOT: Defining IoT - Characteristics of IoT - Physical design of IoT – Logical design of IoT - Functional blocks of IoT - Communication models & APIs - Machine to Machine - Difference between IoT and M2M - Software define Network.

Unit II: **12 Hours**

Networks & Communication aspects: Wireless medium access issues - MAC protocol survey - Survey routing protocols - Sensor deployment & Node discovery - Data aggregation & dissemination.

Unit III: **12 Hours**

Challenges in IOT: Design challenges - Development challenges - Security challenges - Other challenges.

Unit IV: **12 Hours**

Domain specific applications of IoT: Home automation - Industry applications - Surveillance applications - Other IoT applications

Unit V: **12 Hours**

Developing IoTs: Introduction to Python - Introduction to different IoT tools - Developing applications through IoT tools - Developing sensor-based application through embedded system platform - Implementing IoT concepts with python.

Text books:

1. Vijay Madisetti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach” VPT Publication 2014
2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice.

Reference Books:

1.Maciej Kranz, Building the Internet of Things: Implement New Business Models, Disrupt Competitors, Transform Wiley 2016.

Course Outcomes	Program Outcomes											
	P01	**PO2**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**P10**	**P11**	**P12**
CO1	**3**	**3**		**2**		**2**			**2**		**3**	
CO2	**3**		**3**	**3**	**3**		**1**		**3**	**3**		**2**
CO3		**2**				**3**		**3**		**1**		
CO4	**3**		**1**	**3**		**2**	**3**	**3**	**3**		**3**	**3**
CO5		**3**			**3**			**2**		**3**		**3**

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
41T	**Part I Tamil**	**3**	**6**	**1**	**0**	**Theory**

Introduction: நான்காம் பருவப் பாடத்திட்டம் புதுக்கவிதை. தகவல்தொடர்பு**,** ஓரங்க நாடகம்**,** இதழியல்பு. நூல் மதிப்புரை ஆகியவைகள் கொண்டு உருவாகியுள்ளது**.**

Course Outcome:

CO1	:	புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்..கவிதையின் அமைப்பு முறை, புதுக்கவிதை, மரபுக்கவிதை, புதுக்கவிதை, மரபுக்கவிதை வேறுபாடுகள், கரு. வடிவம், உத்திகள் மாணவர்களுக்கு படைப்புத்திறன் வளர்வதற்கு பயன் உள்ளது.
CO2	:	தகவல் தொடர்பின் அடிப்படைகள்- பண்புகள்- சிறப்புகள், பயன்பாடுகள் ஆகியவைகள் குறித்து மாணவர்களுக்கு விளக்கம் தருதல்.
CO3	:	தொலைக்காட்சியின் இயல்பு-தொலைக்காட்சியின் நன்மைகள், நிகழ்ச்சி தயாரிக்கும் முறை நிகழ்ச்சி ஒருங்கிணைப்புகள், நிகழ்ச்சி நடத்துதல். ஆகியவைகள் மாணவர்கள் தெரிந்து கொள்ளல்.
CO4	:	கணிப்பொறி வரலாறு- கணிப்பொறி வகைகள்.. கணிப்பொறி பயன்பாடுகள் ஆகியவைகள் மாணவர்களுக்கு பயனுள்ளது.
CO5	:	மொழிப்பெயர்ப்பு வரலாறு, மொழிபெயர்ப்பு இயல்புகள் பற்றி தெளிவாக புரிந்து கொள்ள முடியும்.

அலகு I : [12 **பாட வகுப்புகள்**]

புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும் - கவிதையின் அமைப்பு முறை, புதுக்கவிதை, மரபுக்கவிதை - புதுக்கவிதை, மரபுக்கவிதை வேறுபாடுகள், கரு, வடிவம், உத்திகள் - கவிதை எழுதுவதின் நோக்கம். எழுதும் முறைகள், வரிகள் வரையறை - கவிதை உருவாக்கம் தலைப்பு தேர்வுசெய்யும் முறைகள்.

அலகு II : [12 **பாட வகுப்புகள்**]

தகவல் தொடர்பின் அடிப்படைகள்- பண்புகள்- சிறப்புகள், பயன்பாடுகள் - தகவல் தொடர்பு சாதனங்களின் பணிகள் - தகவல் தொடர்பில் ஏற்படும் தடைகள், தகவலை ஏற்பவரின் தகுதிகள் - பொதுமக்களும் தகவல் தொடர்பு சாதனங்களும்.

அலகு III: [12 **பாட வகுப்புகள்**]

ஓரங்க நாடகம் வரலாறு, நடகத்தின் தோற்றமும், வளர்ச்சியும். - ஓரங்க நாடகம்

எழுதுதல், கதை அமைப்பு, அடிப்படைக்கூறுகள் - வானொலி அல்லது தொலைக்காட்சி மற்றும் திரைப்படத்துக்கு - ஓரங்க நாடகம் எழுதுதல்.
அலகு IV: [12 **பாட வகுப்புகள்**] இதழியல் விளக்கம் - பத்திரிக்கை நிர்வாக அமைப்பு மற்றும் ஆசிரியர்கள் - 3.இன்றைய தமிழ் நாளிதழ்கள் பற்றிய செய்கள் (தினமணி, தினமலர், தினத்தந்தி, தினகரன்).
அலகு V : [12 **பாட வகுப்புகள்**] 1. நூல் மதிப்புரை - திறனாய்வு செய்தல் - 2.கடிதம் மற்றும் விண்ணப்பம் எழுதுதல் - கட்டுரை திறனை வளர்த்தல்- கட்டுரை தலைப்பு, கட்டுரை அமைப்பு முறைகள்
பாடநூல்கள்: 1.புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும் வல்லிக்கண்ணன் மக்கள் தகவல் தொடர்பியல்- முனைவர் கி.இராசா 3. கலைச்சொல்லாக்கம் இராதா செல்லப்பன் 4 இதழியல் கலை டாக்டர் மா.பா.குருசாமி

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
42E	**English for Communication-II**					

Introduction: To encourage students to inculcate and use effective communication skills in their day-to-day lives. To develop the LSRW skills to enhance the culture and thoughts through language and Literature

Course Outcome:

CO1	:	Learn to communicate effectively and appropriately in real-life situation
CO2	:	Use English effectively for study purposes across the curriculum
CO3	:	Develop interest in and appreciation of Literature
CO4	:	Develop and integrate the use of the four language skills
CO5	:	Enhance their language skills, especially in the areas of grammar and pronunciation

12 Hours

Unit I:

1.1 I am Malala -Malala Yousafzai- Chapter1 - 1.2 Nelson Mandela's Interview with Larry King - 1.3 Job Applications: Cover Letters, CV/Resume - 1.4 Refuting, Discussion & Debating.

12 Hours

Unit II:

2.1 The Zoo Story- Edward Albee - 2.2 Rakesh Sharma's Interview with Indira Gandhi from Space - 2.3 Making Suggestions& Responding to Suggestions, asking for and Giving Advice or Help – 2.4 Creating a digital profile-LinkedIn

12 Hours

Unit III:

3.1 My Inventions-Nikola Tesla- Chapter 2 - 3.2 Lionel Messi with Sid Love-(Print) - 3.3 Body Language-Practical Skills for Interviews - 3.4 Interviews (face-to-face, telephone, and video conferencing)

12 Hours

Unit IV:

4.1 The Proposal- Anton Chekhov - 4.2. Filling forms (Online & Manual) creation of account, railway reservation, ATM, Credit/ Debit card - 4.3. Speaking in a Formal situation (welcome address, Vote of the thanks

12 Hours

Unit V:

5.1 Public Speaking - 5.2 Chicago Address-Swami Vivekananda - 5.3 SWOT Analysis

Text books:

1 Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban by Malala Yousafzai, Christina Lamb, Little Brown, 2013

2. My Inventions by Nikola Tesla, Ingram Short title, 2011 Edition

Reference Books:

1. Writing Your Life: A guide to writing Autobiographies, Mary Borg Taylor Francis, 2021.
2. One-act Plays for Acting Students: An Anthology of Short Norman A. Bert • 1987
3. The One-Act Play Companion: A Guide to plays, playwrights ... Colin Dolley, Rex Walford • 2015
4. How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish,Bernish Communications Associates, LLC; 1st edition (May)

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Big Data Analytics	**4**	**4**	**-**	**-**	**Theory**

Introduction:

In this course, students to understand more advanced tools used to wrangle and analyze big data. Through this course the students got guided in basic approaches to querying and exploring data using higher level tools built on the top of a Hadoop platform.

Course Outcome:

CO1	:	To understand the meaning of big data, need of big data and how worth to study by understands their characteristics of big data.
CO2	:	To gain knowledge in evolution of Hadoop, understanding the components of Hadoop.
CO3	:	To understand the value of data analyst and how to implementing a big data in organization.
CO4	:	To analysis the big data in context, getting the knowledge of predictive analytics and big data.
CO5	:	To understanding the concepts of humanizing and consumerization of big data analytics.

Unit I: **[12 periods]**

Big Data- Form the Business perspective: What is big data- Characteristics of big data- Can There be enough? The Volume of the Data- Variety Is the spice of Life- How Fast Is Fast? The Velocity of Data- Data in the Warehouse and Data in Hadoop- Wrapping It Up.

Unit II: **[12 periods]**

Big data- From the Technology perspective: All about Hadoop- The Histroy of Hadoop- Components of Hadoop- Application Development in Hadoop- Getting your Data into Hadoop.

Unit III: **[12 periods]**

Getting Started with the big data Analytics- Changing Focus with big data- The role of the Data Analyst- Implementing Big Data Analytics within an Organization Using Alteryx- Blending Data from Multiple Sources- Looking at Alteryx Designer Desktop.

Unit IV: **[12 periods]**

Analyzing big data in context: Focus on Context: Focus on Context, Not just Integration- Combining Big Data with Spatial Data- Leveraging External Data provider Resources. **Getting Value form predictive Analytics and big data:** Why do Predictivew Analytics on Big data?- Moving predicitive Analytics to the from predictive analysis.

Unit V: **[12 periods]**

Humanizing Big Data Analytics: Putting Big Data in the Hands of Those Who Need it- Humanizing Data

Design Principles- Humanizing Big Data Analytics Workflow- Considering Consumerization of Big Data Analytics- Getting an Alteryx Analytics Gallery overview- publishing Data and Analytics to Cloud Service- focusing on Consuming Applications- The Best platform for Strategic Analytics.
Text books: 1. Understanding Big Data (Analytics for Enterprise Class Hadoop and Streaming Data), Chris Eaton, k Deroos, Tom Deutsch, George Lapis, Paul Zikopoulos, 2011 (Unit-I, II). 2. Big Data Analytics for Dummies, Micheal Wessler, OCP & CISSP, 2012 (Unit-III, IV, V)
Reference Books: 1. Big Data Analytics Using Splunk, Peter Zadrozny and Rahu Kodali, Apress 2013.

Course Outcomes	**Program Outcomes**							
	P01	**PO2**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**
CO1	1	3	3	1	1	1	1	1
CO2	2	3	1	1	1	1	2	1
CO3	1	1	1	1	1	1	1	3
CO4	2	3	2	1	1	1	1	1
CO5	1	3	3	3	1	3	1	2

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Practical - Big Data Analytics Lab	**2**	**-**	**-**	**4**	**Practical**

Introduction:
In this course, students to understand more advanced tools used to wrangle and analyze big data.

Course Outcome:

CO1	:	Understanding the necessary infrastructure and software for setting up a single node Hadoop cluster.
CO2	:	Develop programs in Setting up the single node cluster, configuring and installing required software.
CO3	:	Implement Testing the cluster and exploring the Hadoop ecosystem via Web UI.
CO4	:	Executing basic Hadoop commands to manage HDFS
CO5	:	Implement Setting up Eclipse IDE to run and debug MapReduce jobs, highlighting the role of dependent libraries in processing.

1. Prepare infrastructure and understand objective for software requirement for setting up single node Hadoop cluster.

- WinSCP
- Putty
- Ubuntu
- VMPlayer
- Hadoop version

2. Create single node Hadoop cluster.

- Installing Ubuntu on VM
- Installing Java
- SSH Configuration
- Core-site.xml Configuration
- Hdfs-site.xml Configuration
- Yarn-site.xml Configuration

3. Testing Single Node cluster, Web UI ports and Exploring different daemons of Hadoop Cluster.

4. Perform / Execute below sets of Hadoop basic commands:

- appendToFile
- cat
- chgrp
- chmod
- chown
- copyFromLocal

- copyToLocal
- count
- cp

5. Install eclipse IDE on single node cluster for executing Map Reduce Job and understand the role of dependent libraries for processing job.

STATISTICAL METHODS AND ITS APPLICATION

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Allied – STATISTICAL METHODS AND ITS APPLICATION	**4**	**4**	**-**	**-**	**Theory**

Goal: To encourage students to explore and unshackle their creative abilities in statistics and thus to apply them.

Objective:

1. To understand the basic concepts of statistics and probability
2. To understand the description of data using statistical techniques
3. To understand the statistical methods involved in hypothesis testing
4. To understand the difference between parametric and non-parametric tests
5. To understand the random variables, statistical expectation and its statistical and mathematical properties and concepts of regression and correlation analysis.

Course Outcomes:

CO1	**:**	Students shall learn to use the basic statistical concepts.
CO2	**:**	To get knowledge about the statistical terms and techniques.
CO3	**:**	Able to translate real-world problems into probability models.
CO4	**:**	Calculate probabilities, and derive the marginal and conditional distributions.
CO5	**:**	Analyze data in terms of normal distribution.

Unit I:

Introduction of Statistics – Meaning and Scope – Importance and Scope of Statistics Limitations of statistics – Distrust of Statistics.

Unit II:

Permutation and Combination – Definition – simple problems – Mathematical or Classical or 'A Priori' Probability – Statistical or Empirical Probability – Axiomatic Probability – Addition and Multiplication Theorem of Probability – Inverse Probability – Bayes Theorem – Simple Problem.

Unit III:

Random Variable – Discrete and continuous random variable – moments mathematical Expectations – Covariance – Probability distribution – Simple Problems.

Unit IV:

Theoretical Distributions: Binomial Distribution – Probability function of Binomial Distribution – Poison Distribution – Simple Problems.

Unit V:

Normal Distribution: Standard normal distribution – properties of normal distribution – Importance of normal distribution – Simple Problems.

Textbook:

1. Business Statistics: SC.Gupta - Himalaya Publishing House. second edition 2013.

References:

1. Fundamentals of mathematical statistics – SC Gupta and VK Kapoor, Sultan Chand & Sons Publication, New Delhi.
2. An introduction to Probability and Statistical Inference – George Roussas, Academic Press.

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	AI in Cloud Computing	**4**	**6**	**0**	**0**	**Theory**

Introduction:
The integration of AI with cloud computing revolutionizes data processing and decision-making by enhancing scalability, efficiency, and intelligence. This synergy enables businesses to leverage advanced analytics and automation, driving innovation and operational transformation across various sectors.

Course Outcome:
CO1 : Understand basic intelligent agent frameworks.
CO2 : Use decision-making and Apply problem solving techniques.
CO3 : Apply game playing and CSP techniques.
CO4 : Perform logical reasoning.
CO5 : Perform probabilistic reasoning under uncertainty.

Unit I
Introduction to AI – Agents and Environments – concept of rationality – nature of environments – structure of agents. Problem solving agents – search algorithms – uninformed search strategies.

Unit II
Heuristic search strategies – heuristic functions. Local search and optimization problems – local search in continuous space – search with non-deterministic actions – search in partially observable environments – online search agents and unknown environments.

Unit III
Desktop Virtualization – Network Virtualization – Storage Virtualization – System-level of Operating Virtualization – Application Virtualization – Virtual clusters and Resource Management – Containers vs. Virtual Machines – Introduction to Docker – Docker Components – Docker Container – Docker Images and Repositories.

Unit IV
Google App Engine – Amazon AWS – Microsoft Azure; Cloud Software Environments – Eucalyptus – OpenStack

Unit V
CLOUD SECURITY: Virtualization System-Specific Attacks: Guest hopping – VM migration attack – hyperjacking. Data Security and Storage; Identity and Access Management (IAM) - IAM Challenges -

IAM Architecture and Practice.

Text books:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson Education, 2021
2. Krutz, R. L., Vines, R. D, "Cloud security. A Comprehensive Guide to Secure Cloud Computing", Wiley Publishing, 2010.

Reference Books:

1. Dan W. Patterson, "Introduction to AI and ES", Pearson Education,2007
2. Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008
3. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
4. James Turnbull, "The Docker Book", O'Reilly Publishers, 2014

Course Outcomes	Program Outcomes							
	P01	**PO2**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**
CO1								
CO2								
CO3								
CO4								
CO5								

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Deep Learning	**4**	**5**	**0**	**0**	**Theory**

Introduction:

- To introduce students to the basic concepts and techniques of deep Learning.
- Importance of Deep Learning lies in solving many problems that are difficult or impossible for traditional algorithms or human experts.
- It can handle large and complex data sets, such as images, videos, audio, text, and more.

Course Outcomes

CO1	Understanding of neural networks, machine learning principles, and their practical applications
CO2	Solid understanding of TensorFlow, its core concepts
CO3	Apply Convolutional Neural Networks
CO4	To apply this knowledge to implement and optimize models using TensorFlow for a variety of tasks, including sequence processing, language translation, and tasks requiring memory and reasoning.
CO5	To apply this knowledge to design, implement, and optimize reinforcement learning models for various sequential decision-making tasks.

UNIT I:

Introduction to Learning Basic Neural Network – Limits of Traditional Computer Program – The Mechanics of Machine Learning – Neuron – FF Neural Networks – Types of Neurons –Soft max output layers.

UNIT II

Creating and Manipulating TensorFlow Variables – TensorFlow Operations – Place holders Tensors– Sessions in TensorFlow – Navigating Variable Scopes and Sharing Variables– Managing Models over the CPU and GPU – Leveraging TensorBoard to Visualize Computation Graphs and Learning.

UNIT III

Convolutional Neural Network – Full Architectural Description of Convolution Networks – Max Pooling - Full Architectural Description of Convolution Networks – Building a Convolutional Network for CIFAR-10- Visualizing Learning in Convolutional Networks – Learning Lower-Dimensional Representation – Principal Component Analysis – Motivating the Autoencoder Architecture – Implementing an Autoencoder in TensorFlow.

UNIT IV

Analysing Variable – Length Inputs - RNN 17 Recurrent Neural Networks – Long Short-Term Memory (LSTM) Units — TensorFlow Primitives for RNN Models – Augmenting Recurrent Networks with attention – Dissecting a Neural Translation Network – Differentiable Neural Computers – The DNC Controller Network – Implementing the DNC in TensorFlow.

UNIT V

Reinforcement Learning Networks - Reinforcement Learning 18 Reinforcement Learning – MDP – Q (Learning and Deep Q-Networks) – Deep Q-Network – Target Q-Network – Updating our target Q-Network – DQN Main Loop – Improving and Moving Beyond DQN – Deep Recurrent Q-Networks (DRQN).

Text Book(s)

1. NikhilBuduma, Nicholas Locascio **—** Fundamentals of Deep Learning: Designing Next Generation Machine Intelligence Algorithms, O'Reilly Media.
2. Josh Patterson & Adam Gibson – Deep Learning, O'Reilly Media.

Reference Book(s)

1**.** IanGoodfellow, YoshuaBengio, AaronCourville, Deep Learning (Adaptive Computation and Machine Learning series, MITPress,2017.

2. Pattern Classification- Richard O. Duda, Peter E. Hart, David G. Stork, John Wiley & Sons Inc.

Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Program Outcomes							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	L	L	L	L	L	L	M	M
CO2	L	L	L	L	L	L	L	L
CO3	L	L	M	M			M	M
CO4	M	M			M			
CO5	L	L	L	M	L	M	M	

Course Code	Couse Title	Credit	Lecture	Tutorial	Practical	Type
	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	4	5	-	-	Core Theory

Course Introduction

The evolution of Information Communication Technology (ICT) and growing security concerns demands flexible and generally comprehensive approach to the issue of cyber security. The rapid growth of ICT has raised various complex questions which need to be addressed. A need has been felt to address cyber security broadly, as also in sufficient depth so that even students from non-technical streams will develop a more complete picture of the cyber security issues. The syllabus has been prepared with an aim to create more aware, responsive and responsible digital citizens, thereby contributing effectively to an overall healthy cyber security posture and ecosystem

Course Focus on: Skill Development/ Entrepreneurship / Employability / Research

Unit I:	Introduction	[12 Periods]

Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber.

Unit II:	PROGRAMMING AND LOGICS IN ARTIFICIAL INTELLIGENCE	[12 Periods]

Classification of cybercrimes, Common cybercrimes- cybercrime targeting computers and mobiles, cybercrime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi , Reporting of cybercrimes, Remedial and mitigation measures, Legal perspective of cybercrime, IT Act 2000 and its amendments, Cybercrime and offences, Organisations dealing with Cybercrime and Cyber security in India, Case studies.

Unit III:	SEARCH METHODS AND KNOWLEDGE REPRESENTATION	[12 Periods]

Introduction to Social networks. Types of social media, social media platforms, social media monitoring, Hashtag, Viral content, social media marketing, social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate

content, Laws regarding posting of inappropriate content, best practices for the use of social media.

Unit IV:	KNOWLEDGE ORGANISATION AND COMMUNICATION IN EXPERT SYSTEMS	[12 Periods]

Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payment Settlement Act,2007.

Unit V:	PATTERN RECOGNITION AND LEARNING TECHNIQUES	[12 Periods]

Web Mining: Introduction – Web Content Mining – Web Structure Mining – Web Usage Mining – Text Mining – Hierarchy of Categories – Text Clustering. Enumerations, Auto boxing and Annotations: Enumerations, Java Enumeration are class types, Auto boxing, Annotations (metadata) Generics: Generics Fundamentals Bounded Types, Methods, Constructors, Some Generic Restrictions. Applets: basics - Skeleton, life cycle of applet – applet methods - Passing parameters to Applets.

Text Books:

1. Robert J Schalkoff, ‘Artificial intelligence An Engineering Approach’, McGraw Hill

Reference Books:

1. Russel (Stuart), ‘Artificial Intelligence- Modern approach, Pearson Education series in AI’, 3rd Edition, 2009.
2. Dan W Patterson, ‘Introduction to Artificial intelligence and Expert systems’, Prentice Hall of India Pvt. Ltd,2001
3. Eugene Charniak, Drew Mc Dermot, ‘Introduction to Artificial intelligence’, Addison Wesley Longman Inc.,2009
4. George. F, William. A. Stubblefield, ‘Artificial intelligence and the design of expert systems’, The Benjamin Cummins Publishing Co., Inc 2nd Edition, 1992.
5. Robert J Schalkoff, ‘Artificial intelligence An Engineering Approach’, McGraw Hill

Web Resources:

1. https://www.tutorialspoint.com/AI AND EXPERT

Mapping of Course Outcome with Programme Outcome and Programme Specific Outcome:

Course Outcome	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	1	1	2	1	1	1
CO2	3	2	3	1	1	3	2	1	2	1	1	1
CO3	3	3	2	1	2	2	1	3	2	1	2	1
CO4	1	1	3	3	1	3	2	3	1	2	2	2
CO5	3	1	3	1	3	2	2	3	1	2	2	1

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Artificial neural network	**4**	**4**	**0**	**0**	**Theory**

Introduction:

To understand the various concepts and artificial neural networks (ANNs), including neurons, layers, activation functions, and feed forward propagation.

Course Outcome:

CO1	:	To Describe the basic concepts of artificial neural networks (ANNs), including neurons, layers, activation functions, and feed forward propagation.
CO2	:	To Implement neural network models using popular frameworks and libraries such as TensorFlow, Keras, or PyTorch.
CO3	:	To Develop proficiency in programming neural networks in Python, including defining layers, configuring optimization algorithms, and setting hyper-parameters.
CO4	:	To Apply neural networks to solve various machine learning tasks such as classification, regression, image recognition, natural language processing (NLP), and speech recognition.
CO5	:	To developed a solid foundation and practical skills in artificial neural networks. .

Unit I **[12 Periods]**

Basics of Artificial Neural Networks: Characteristics of Neural Networks, Historical Development of Neural Network Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws.

Unit II **[12 Periods]**

Activation and Synaptic Dynamics: Introduction, Activation Dynamics Models, Synaptic Dynamics Models, Learning Methods.

Unit III **[12 Periods]**

Feed forward Neural Network: Introduction, Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks,

Unit IV **[12 Periods]**

Feedback Neural Networks: Introduction, Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks.

Unit V **[12 Periods**]

Applications of ANN: Introduction, Direct Applications

Textbook:

1.B. Yegnanarayana - Artificial neural network PHI Publication.2005
2. S. Raj sekaran, Vijayalakshmi Pari - Neural networks, Fuzzy logic and Genetic Algorithms.

References:

1.Kevin L. Priddy, Paul E. Keller – Artificial neural networks: An Introduction - SPIE Press, 2005
2. Mohammad H. Hassoun – Fundamentals of artificial neural networks - MIT Press ,1995.

Mapping of Course Outcomes with Program Outcomes:

Course Outcomes	Program Outcomes							
	P01	**PO2**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**
CO1	L	H	H	L	L	L	L	L
CO2	M	H	L	L	L	L	M	L
CO3	L	L	L	L	L	L	L	H
CO4	M	H	M	L	L	L	L	L
CO5	L	H	H	H	L	H	L	M

H - High; M- Medium; L- Low

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Artificial neural network Lab	2	0	0	4	Practical

Introduction

The Artificial Neural Network (ANN) Lab provides students with hands-on experience in designing, implementing, training, and evaluating neural networks.

Course Outcome:

CO1 : To Describe the basic concepts of artificial neural networks (ANNs), including neurons, layers, activation functions, and feedforward propagation.

CO2 : To Implement neural network models using popular frameworks and libraries such as TensorFlow, Keras, or PyTorch.

CO3 : To Develop proficiency in programming neural networks in Python, including defining layers, configuring optimization algorithms, and setting hyperparameters.

CO4 : To Apply neural networks to solve various machine learning tasks such as classification, regression, image recognition, natural language processing (NLP), and speech recognition.

CO5 : To developed a solid foundation and practical skills in artificial neural networks. .

Lab Experiments:

1. Implementation of different activation functions to train Neural Network.
2. Implementation of different Learning Rules.
3. Implementation of Perceptron Networks.
4. Implementation of Adeline network for system identification.
5. Implementation of Madeline network
6. Pattern matching using different rules.
7. Project related to application of machine learning in healthcare**.**
8. Project related to application of machine learning in business analysis.
9. Project related to application of machine learning in sports analytics

10. Project related to application of machine learning in Time Series Analysis & Forecasting.

Mapping of Course Outcomes with Program Outcomes:

Course Outcomes	Program Outcomes							
	P01	**PO2**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**
CO1	L	H	H	L	L	L	L	L
CO2	M	H	L	L	L	L	M	L
CO3	L	L	L	L	L	L	L	H
CO4	M	H	M	L	L	L	L	L
CO5	L	H	H	H	L	H	L	M

H - High; M- Medium; L- Low

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Elective III- Network Security and Cryptography	**4**	**6**	**-**	**-**	**Core Theory**

Introduction:

Network security and cryptography are crucial for protecting sensitive information from cyber threats. They ensure the secure transmission of data across networks, safeguard privacy, and maintain trust in digital systems. Without these measures, individuals and organizations are vulnerable to a wide range of cyber risks, including identity theft, financial loss, and reputational damage. As cyber threats continue to evolve, the importance of robust network security and cryptographic practices cannot be overstated.

Course Outcome:

CO1	:	Remember the basic concept of Cryptography and various types of attacks.
CO2	:	Understand about various types of protocols for Internet Security.
CO3	:	Implement various algorithms for Cryptography
CO4	:	Review Firewall and IP security
CO5	:	To be familiar with network security threats and countermeasure

Unit I:SERVICE MECHANISM [12periods]

Service mechanism and attacks – The OSI security architecture – A model for network security – symmetric Cipher model – Substitution techniques – transposition techniques – simplified des – block chipper principles – the strength of des – block chipper design principles and modes of operation.

Unit II: TYPES OF DES [12 periods]

Triple des-blow fish – RCS Advanced Symmetric Block Ciphers –RC4 stream Cipher confidentially using symmetric encryption – introduction to number theory – public – key cryptography and RSA.

Unit III: KEY MANAGEMENT [12 periods]

Key management – Diffle Hellman key exchange – message authentication and hash function – hash algorithm – digital signature and authentication protocols – digital signature standard.

Unit IV:
AUTHENTICATION [12 periods]

Authentication application – pretty good privacy – S/MIME – IP security – web security considerations –secure socket layer transport layer security –secure electronic transaction.

Unit V: INTRUDERS **[12 periods]**

Intruders –intrusion detection – password management –viruses and related threats – virus counter measures – fire wall design principles – trusted systems

Text books:

1. William Stallings, Cryptography and Network Security Principles and Practices, Fourth edition, PHI Education Asia.

Reference Books:

1. Atul Kahate, Cryptography and Network Security, 2nd Edition, TMH.
2. 2 Behrouz A.Forouzan, Cryptography and Network Security, TMH.

Course Outcomes	Program Outcomes												
	P01	P02	P03	P04	P05	P06	P07	P08	P09	PS01	PS02	PS03	PS04
CO1	3	3	3	1	3	1	1	1	3	3	3	1	3
CO2	3	2	3	1	3	1	2	1	3	3	2	2	2
CO3	3	3	3	1	3	1	2	1	3	3	3	1	3
CO4	3	2	3	1	3	1	2	1	3	3	2	3	2
CO5	3	3	3	1	3	1	2	1	3	3	3	2	3

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Elective -III AI with cyber-Security	**4**	**6**	**-**	**-**	**Core Theory**

Introduction:

AI in cybersecurity is revolutionizing the way organizations protect their digital assets and respond to cyber threats. By leveraging artificial intelligence, cybersecurity systems can analyse vast amounts of data, detect anomalies, predict potential attacks, and automate responses in real-time.

Course Outcome:

CO1	:	Explain intelligent agent frameworks
CO2	:	Apply problem solving techniques
CO3	:	Apply game playing and CSP techniques
CO4	:	Perform logical reasoning
CO5	:	Perform probabilistic reasoning under uncertainty

Unit I: INTELLIGENT AGENTS **[12 periods]**

Introduction to AI – Agents and Environments – concept of rationality – nature of environments – structure of agents. Problem solving agents – search algorithms – uninformed search strategies.

Unit II: PROBLEM SOLVING [12 periods]

Heuristic search strategies – heuristic functions. Local search and optimization problems – local search in continuous space – search with non-deterministic actions – search in partially observable environments – online search agents and unknown environments

Unit III: GAME PLAYING AND CSP [12 periods]

Game theory – optimal decisions in games – alpha-beta search – monte-carol tree search – stochastic games – partially observable games. Constraint satisfaction problems – constraint propagation – backtracking search for CSP – local search for CSP – structure of CSP.

Unit IV: LOGICAL REASONING [12 periods]

Knowledge-based agents – propositional logic – propositional theorem proving – propositional model checking – agents based on propositional logic. First-order logic – syntax and semantics – knowledge representation and engineering – inferences in first-order logic – forward chaining – backward chaining – resolution.

Unit V: PROBABILISTIC REASONING [12 periods]

Acting under uncertainty – Bayesian inference – naïve Bayes models. Probabilistic reasoning – Bayesian networks – exact inference in BN – approximate inference in BN – causal networks.

Text books:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson Education, 2021.

Reference Books:

2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education,2007
3. Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008

Course Outcomes	Program Outcomes												
	P01	**P02**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**PS01**	**PS02**	**PS03**	**PS04**
CO1	**3**	**3**	**3**	**1**	**3**	**1**	**1**	**1**	**3**	**3**	**3**	**1**	**3**
CO2	**3**				**3**	**1**	**2**	**1**					
CO3	**3**	**3**	**3**				**2**	**1**	**3**	**3**	**3**		
CO4	**3**		**3**	**1**							**2**		
CO5	**3**	**3**	**3**	**1**	**3**	**1**	**2**				**3**	**2**	**3**

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Elective -III Data Communication and Networks	**4**	**6**	**-**	**-**	**Core Theory**

Introduction:

A data communication analyst oversees the operations of information and network systems. After conducting research on which technologies will best suit a company's needs, these analysts are in charge of designing, testing and maintaining these systems.

Course Outcome:

CO1	:	To become familiar with layered communication architectures (OSI and TCP/IP).
CO2	:	· To understand the client/server model and key application layer protocols
CO3	:	To learn sockets programming and how to implement client/server programs.
CO4	:	· To understand the concepts of reliable data transfer
CO5	:	To learn about TCP and implement it.

Unit I: Introduction to Computer Network **[12 periods]**

Structure of the communications network - point-to-point and multidrop circuits - data flow and physical circuits –Various network topologies - topologies and design goals. The telephone network, switched and non-switched options - channel speed and bit rate - voice communications and analogy waveforms - bandwidth and the frequency spectrum

Unit II: Layered Protocols & LAN **[12 periods]**

Layered Protocols and the OSI Model: Goals of Layered Protocols, network design problems" communication between layers- introduction to standard organizations and the OSI model - Layers of OSI. Local Area Networks: Why LANs? Primary attributes of a LAN - Broadband and baseband and base LANs - IEEE LAN standards - connection options with LANs

Unit III: Network Protocols **[12periods]**

Network Protocols: TCP, UDP, IP, ICMP, SNMP, and RMON.TCP/IP: TCP/IP and internetworking - related protocols ports and sockets - The IP address structure - major features of IP - IP datagram -

Major IP services -IP source routing -Value of the transport layer – TCP- Major features of TCP - Passive and active operation - the transmission control block (TCP) - route discovery protocols - application layer protocols.

Unit IV: Protocol [12 periods]

Polling/Selection Protocols: Character and bit protocols - binary synchronous control (BSC) HDLC - HOLC options - HDLC frame format - code transparency and synchronization -HDLC transmission process -HDLC subsets - SDLC Protocol conversion. Switching and Routing in Networks: Message switching - packet switching -packet routing - packet switching support to circuit switching networks

Unit V: Network Security [12 periods]

Network Security: IP Security: Architecture, Authentication header -Encapsulating security payloads- combines security associations - key management. DNS spoofing, VLAN hopping. Web Security: Secure socket layer and transport layer security - secure electronic transaction (SET). System Security: Intruders, Viruses and related threats - firewall design principles- trusted systems

Text books:

1. B. Forouzan, Debdeep Mukhopadhyay, 2015. Cryptography and Network Security, TMH.
2. Michael A. Miller, 2008. “Data & Network Communications”, Vikas Publication

Reference Books:

1. Stallings. W, 2007. “Computer Communication Networks”,4th edition, Prentice Hall of India.
2. Tanneabaum. A.S, 2003. “Computer Networks”, 4th edition, Prentice Hall of India

Course Outcomes	Program Outcomes												
	P01	**P02**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**PS01**	**PS02**	**PS03**	**PS04**
CO1	**3**	**3**	**3**	**1**	**3**	**1**	**1**	**1**	**3**	**3**	**3**	**1**	**3**
CO2	**3**				**3**	**1**	**2**	**1**					
CO3	**3**	**3**	**3**				**2**	**1**	**3**	**3**	**3**		
CO4	**3**		**3**	**1**							**2**		
CO5	**3**	**3**	**3**	**1**	**3**	**1**	**2**				**3**	**2**	**3**

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	COMPUTATIONAL INTELLIGENCE	**4**	**5**	**-**	**0**	**Theory**

Introduction: After learning the Syntax and Semantics and create Functions, Handle Strings and Files, Understand Lists, Dictionaries and Regular expressions, Implement Object Oriented Programming concepts, Build Web Services and introduction to Network and Database Programming students are able to develop rich dynamic websites in Python.

Course Outcome:

CO1	:	To provide a strong foundation on fundamental concepts in Computational Intelligence.
CO2	:	To enable Problem-solving through various searching techniques.
CO3	:	To apply these techniques in applications which involve perception, reasoning and learning.
CO4	:	To apply Computational Intelligence techniques for information retrieval
CO5	:	To apply Computational Intelligence techniques primarily for machine learning.

Unit I: INTRODUCTION [12 periods]

Introduction to Artificial Intelligence-Search-Heuristic Search-A* algorithm- Game Playing- Alpha-Beta Pruning- Expert Systems-Inference-Rules-Forward Chaining and Backward Chaining- Genetic Algorithms.

Unit II: KNOWLEDGE REPRESENTATION AND REASONING [12 periods]

Proposition Logic - First Order Predicate Logic – Unification – Forward Chaining - Backward Chaining - Resolution – Knowledge Representation - Ontological Engineering - Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information - Prolog Programming.

Unit III: UNCERTAINTY [12 periods]

Non monotonic Reasoning-Fuzzy Logic-Fuzzy rules-fuzzy Inference-Temporal Logic- Temporal Reasoning-Neural Networks-Neuro-fuzzy Inference.

Unit IV: LEARNING [12 periods]

Probability basics - Bayes Rule and its Applications - Bayesian Networks – Exact and Approximate Inference in Bayesian Networks - Hidden Markov Models - Forms of Learning - Supervised Learning - Learning Decision Trees – Regression and Classification with Linear Models - Artificial Neural Networks – Nonparametric Models - Support Vector Machines - Statistical Learning - Learning with Complete Data - Learning with Hidden Variables- The EM Algorithm Reinforcement Learning.

Unit V: [12 periods]

Natural language processing-Morphological Analysis-Syntax analysis - Semantic Analysis - AIl applications – Language Models - Information Retrieval – Information Extraction – Machine Translation – Machine Learning - Symbol-Based – Machine Learning: Connectionist – Machine Learning.

Reference Books:

1. Stuart Russell, Peter Norvig, ―Artificial Intelligence: A Modern Approach‖, Third Edition, Pearson Education / Prentice Hall of India, 2010.
2. Elaine Rich and Kevin Knight, ―Artificial Intel igence‖, Third Edition, Tata McGraw- Hill, 2010.
3. Patrick H. Winston. "Artificial Intelligence", Third edition, Pearson Edition, 2006.
4. Dan W.Patterson, ―Introduction to Artificial Intelligence and Expert Systems‖, PHI, 2006.
5. Nils J. Nilsson, ―Artificial Intelligence: A new Synthesis‖, Harcourt Asia Pvt. Ltd., 2000.

Course Outcomes	Program Outcomes												
	P01	P02	P03	P04	P05	P06	P07	P08	P09	PS01	PS02	PS03	PS04
CO1	3		3	3		1	3		3		3		3
CO2		2		2	1		2	3		1		2	

CO3	**1**	**3**	**2**	**1**		**2**	**1**	**2**			**1**	**3**	**2**
CO4		**2**		**1**	**3**	**3**			**1**	**3**		**1**	**3**
CO5		**3**	**1**		**2**		**3**	**1**		**2**	**2**		

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Deep Learning	**4**	**5**	**0**	**0**	**Theory**

Introduction:

- To introduce students to the basic concepts and techniques of deep Learning.
- Importance of Deep Learning lies in solving many problems that are difficult or impossible for traditional algorithms or human experts.
- It can handle large and complex data sets, such as images, videos, audio, text, and more.

Course Outcomes

CO1	Understanding of neural networks, machine learning principles, and their practical applications
CO2	Solid understanding of TensorFlow, its core concepts

CO3	Apply Convolutional Neural Networks
CO4	To apply this knowledge to implement and optimize models using TensorFlow for a variety of tasks, including sequence processing, language translation, and tasks requiring memory and reasoning.
CO5	To apply this knowledge to design, implement, and optimize reinforcement learning models for various sequential decision-making tasks.

UNIT I:

Introduction to Learning Basic Neural Network – Limits of Traditional Computer Program – The Mechanics of Machine Learning – Neuron – FF Neural Networks – Types of Neurons –Soft max output layers.

UNIT II

Creating and Manipulating TensorFlow Variables – TensorFlow Operations – Place holders Tensors– Sessions in TensorFlow – Navigating Variable Scopes and Sharing Variables– Managing Models over the CPU and GPU – Leveraging TensorBoard to Visualize Computation Graphs and Learning.

UNIT III

Convolutional Neural Network – Full Architectural Description of Convolution Networks – Max Pooling - Full Architectural Description of Convolution Networks – Building a Convolutional Network for CIFAR-10- Visualizing Learning in Convolutional Networks – Learning Lower-Dimensional Representation – Principal Component Analysis – Motivating the Autoencoder Architecture – Implementing an Autoencoder in TensorFlow.

UNIT IV

Analysing Variable – Length Inputs - RNN 17 Recurrent Neural Networks – Long Short-Term Memory (LSTM) Units — TensorFlow Primitives for RNN Models – Augmenting Recurrent Networks with attention – Dissecting a Neural Translation Network – Differentiable Neural Computers – The DNC Controller Network – Implementing the DNC in TensorFlow.

UNIT V

Reinforcement Learning Networks - Reinforcement Learning 18 Reinforcement Learning – MDP – Q (Learning and Deep Q-Networks) – Deep Q-Network – Target Q-Network – Updating our target Q-Network – DQN Main Loop – Improving and Moving Beyond DQN – Deep Recurrent Q-Networks (DRQN).

Text Book(s)

3. NikhilBuduma, Nicholas Locascio **—** Fundamentals of Deep Learning: Designing Next Generation Machine Intelligence Algorithms, O'Reilly Media.
4. Josh Patterson & Adam Gibson – Deep Learning, O'Reilly Media.

Reference Book(s)

1**.** IanGoodfellow, YoshuaBengio, AaronCourville, Deep Learning (Adaptive Computation and Machine Learning series, MITPress,2017.

2. Pattern Classification- Richard O. Duda, Peter E. Hart, David G. Stork, John Wiley & Sons Inc.

Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Program Outcomes							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	L	L	L	L	L	L	M	M
CO2	L	L	L	L	L	L	L	L
CO3	L	L	M	M			M	M
CO4	M	M			M			
CO5	L	L	L	M	L	M	M	

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	DATA MINING	**4**	**6**	**0**	**0**	**Theory**

Introduction:
This course is an introductory course on data mining. It introduces the basic concepts, principles, methods, implementation techniques, and applications of data mining, with a focus on two majors data mining functions: (1) pattern discovery and (2) cluster analysis.

Course Outcome:

CO1	:	Ability to understand the role of data mining in knowledge discovery process
CO2	:	To study the different data mining techniques
CO3	:	To familiarize with various data mining functionalities and how it can be applied to various real-world problems.
CO4	:	To learn about finding data characteristics and evaluating the outcome of data mining process.
CO5	:	To apply Data mining concepts in different fields

Unit I : **[12 periods]** Basic Data Mining Tasks – Data Mining Versus Knowledge Discovery in Data Bases – Data Mining Issues – Data Mining Matrices – Social Implications of Data Mining – Data Mining from Data Base Perspective.
Unit II: **[12 periods]** Data Mining Techniques – a Statistical Perspective on data mining – Similarity Measures – Decision Trees – Neural Networks – Genetic Algorithms.
Unit III: **[12 periods]** Classification: Introduction – Statistical – Based Algorithms – Distance Based Algorithms – Decision.
Unit IV: **[12 periods]** Clustering Tree – Based Algorithms – Neural Network Based Algorithms – Rule Based Algorithms – Combining Techniques: Introduction – Similarity and Distance Measures – Outliers – Hierarchical Algorithms. Partitioned Algorithms.
Unit V: **[12 periods]** Association Rules: Introduction - Large Item Sets – Basic Algorithms – Parallel & Distributed Algorithms – Comparing Approaches – Incremental Rules – Advanced Association Rules Techniques – Measuring the Quality of Rules.
Text books: 1. Jiawei Han & Micheline Kamber, "Data Mining Concepts & Techniques", 2011, 3rd Edition
Reference Books: 1. Margaret H.Dunbam, "Data Mining Introductory and Advanced Topics", Pearson 2. Education 2003.

Course Outcomes	**Program Outcomes**							
	P01	**PO2**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**
CO1	1	3	1	1	3	1	3	1
CO2	1	3	2	1	1	3	3	1
CO3	2	1	3	3	1	2	1	3
CO4	1	2	3	2	1	1	1	3
CO5	2	2	3	3	1	2	1	3