RATHINAM COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

Rathinam Tech Zone, Eachanari, Coimbatore – 641021.

DEPARTMENT OF COMPUTER SCIENCE

Syllabus for

B.Sc. Information Technology

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 become a globally recognized and deeply connected with the tech industry, fostering a culture of knowledge, skills, research, and values in aspiring computer scientists, empowering them to drive India's holistic technological advancement.

Mission

To empower students and cultivate academic and research brilliance and provide them to leverage Technology as a tool for innovation and fostering global competitiveness and employability in diverse field

Motto

Empowering Minds, Transforming Technology

Program Educational Objectives (PEO)

PEO1	:	Besuccessfulintopgraduateschoolsandinprofessionalpositionswithinacademic&researchinstitutionsand industries,andinentrepreneurialandconsultancyventures.
PEO2	:	ContributetheirInformationTechnologyexpertiseeffectivelyasmembersoftechnologicalTeams.
PEO3	:	Demonstratelifelonglearningandengagementthroughcontinuedprofessionaldevelopment,andparticipa tionandleadershipinprofessionalsocietiesandorganizations.
PEO4	:	Conductthemselvesinaresponsible,professional,andethicalmanner.
PEO5	:	Emergeasagloballycompetentanduniversallyemployableprofessionalwhoacceleratestheoveralldevelo pmentofIndia.

Mapping of Institute's Mission to PEO

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

Mapping of Department Mission to PEO

Department Mission	PEO's
Toempowerstudentsandcultivateacademicandresearchbrilliance	PE01,PE02
ProvidethemtoleverageTechnologyasatoolforinnovation	PEO3
Fosteringglobalcompetitivenessandemployabilityindiversefield	PE04, PE05
Toempowerstudentsandcultivateacademicandresearchbrilliance	PE01,PE02

Program Outcomes (PO):

PO1	**:**	Demonstrate knowledge competency in core discipline
PO2	**:**	Apply the appropriate knowledge and suitable skills in solving the complex problems
PO3	**:**	Conduct investigations of complex problems through various scientific approaches
PO4	**:**	Design solutions for complex and open ended real-life or real-time problems
PO5	**:**	Use appropriate and advanced tools for wide range of practices with an understanding on its associated limitations
PO6	**:**	Work effectively and responsibly as a member or a leader in a team
PO7	**:**	Express complex concepts within the profession and with society at large
PO8	**:**	Understand the professional roles and responsibilities
PO9	**:**	Analyze social and environmental aspects of the professional practices
PO10	**:**	Practice higher moral and ethical standards during the discharge of professional duties
PO11	**:**	Incorporate finer finance and business practices in all professional engagements
PO12	**:**	Identify and address their professional development through lifelong learning

Program Specific Outcomes (PSO):

PSO1	:	Ability to explore and comprehend technical expertise in varied domains of Computer Information Technology and establish a conducive environment for a thriving career prospect
PSO2	:	Possess strong analytical and problem-solving skills, allowing them to identify, analyze, and solve complex IT-related problems efficiently
PSO3	:	Adhere to ethical standards and professional codes of conduct in IT practice, demonstrating integrity, honesty, and respect for confidentiality, privacy, and intellectual property rights.

Correlation between the PO/PSO and the PEOs

Program Outcomes		PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
PO 1	:	3	1	3	2	3
PO 2	:	3	2	3	1	3
PO 3	:	1	2	3	3	2
PO 4	:	3	1	3	3	3
PO 5	:	3	3	2	3	1
PO 6	:	2	3	3	2	1
PO 7	:	2	3	1	2	3
PO 8	:	3	2	1	3	1
PO 9	:	2	2	3	2	2
PO 10	:	1	3	1	3	3
PO 11	:	3	2	2	2	1
PO 12	:	3	1	2	2	3
PSO 1	:	2	3	1	1	2
PSO 2	:	3	2	2	3	1
PSO 3	:	2	3	3	3	3
PSO 4	:	3	2	2	2	3
PSO 5	:	3	2	2	3	2

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

Components considered for Course Delivery is listed below:

a. Class room Lecture
b. Laboratory class and demo
c. Assignments
d. Mini Project
e. Project
f. Online Course
g. External Participation
h. Seminar
i. Internship

Mapping of POs with Course Delivery:

Program Outcome	Course Delivery								
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**
PO1	2	3	1	1	2	1	3	3	1
PO2	3	2	2	3	3	3	1	2	3
PO3	3	3	1	3	1	1	1	2	2
PO4	2	3	2	3	3	1	1	3	1
PO5	3	2	1	2	1	3	3	3	3
PO6	2	3	3	2	3	1	2	3	3
PO7	2	3	1	3	1	1	2	3	2
PO8	2	2	1	2	3	3	2	3	2
PO9	1	1	2	3	3	3	2	3	3
PO10	2	3	2	3	2	2	2	2	2
PO11	1	1	2	2	2	3	3	2	3
PO12	1	2	3	2	2	2	3	2	3
PSO1	2	3	1	3	2	3	1	3	3
PSO2	3	2	2	3	3	2	2	3	2
PSO3	2	3	3	2	2	3	3	2	3
PSO4	3	2	2	1	3	2	2	1	2

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

RATHINAM COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

B.SC. INFORMATION TECHNOLOGY DEGREE PROGRAMME

B. Sc (IT) Curriculum Structure - Regulation – 2024

(For students admitted from 2024-2025 and onwards)

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 using 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** Java Programming **R Smart: Python Programming**	4	5	50	50	100
4	2	3	Core		Core Course – IV Theory / **Practical** Java Programming Lab **R Smart: Python Programming Lab**	4	4	50	50	100
5	2	3	Elective		Elective - I Entrepreneurship Development	4	4	50	50	100

					R Smart: Data Structures					
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** Python Programming **R Smart: JAVA Programming**	4	6	50	50	100
4	3	3	Core		Core Course – VI **Theor**y / Practical Python Programming Lab **R Smart: JAVA Programming Lab**	4	4	50	50	100
5	3	3	Allied		Allied-III Probability and inferential statistics **R Smart: Quantitative Aptitude**	4	5	50	50	100
6	3	4	SEC		Skill Enhancement Courses – II Practical / Training Internet of Things **R Smart: Web Technologies**	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** Machine Learning **R Smart: Computer Networks**	4	6	50	50	100

4	4	3	Core		Core Course – VIII Theory / **Practical** Machine Learning Tools Lab **R Smart: Computer Networks Lab**	4	4	50	50	100
5	4	3	Allied		Allied-IV Industrial Statistics	4	5	50	50	100
8	4	3	Elective		Elective - II i) Data Communication and Networking ii) R Programming iii) Remote Process Automation Tools **R Smart: Software Engineering**	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 RDBMS **R Smart: Machine Learning**	4	6	50	50	100
2	5	3	Core		Core Course – X **Theory** / Practical RDBMS Lab **R Smart: Machine Learning Lab**	4	6	50	50	100
3	5	3	Elective		Elective - III i) Deep Learning ii) AI and Export System iii) Neural Networks **R Smart: Big Data Analytics**	4	6	50	50	100
	5	3	PRJ		Project	0	6	0	0	0
4	5	4	SEC		Skill Enhancement Courses – III Practical / Training Data Visualization **R Smart: Data Visualization**	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 Web Programming **R Smart: Server side Scripting**	4	6	50	50	100
2	6	3	Core		Core Course – XII Theory / **Practical** Web Programming Lab **R Smart: Server side Scripting Lab**	4	4	50	50	100
3	6	3	Elective		Elective – IV i) Mobile Computing ii) Augmented Reality vs Virtual Reality iii) Data Mining and Data Warehousing **R Smart: Software Testing**	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 Artificial Neural Networks **R Smart: Virtualization & Cloud security**	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**	**Sub Code**	**Subject**	**Credit**	**Hours**	**INT**	**EXT**	**Total**
1	1	6	VAC		Foundations of Full Stack Web Development **Rsmart : Analytics using excel**	2	2	50	0	50
2	2	6	VAC		IoT Essentials: A Beginner's Guide **Rsmart : Data Science**	2	2	50	0	50
3	3	6	VAC		Understanding Blockchain Technology **Rsmart : Data Visualization**	2	2	50	0	50

4	4	6	VAC		Software Engineering Principles **Rsmart : R- Programming**	2	2	50	0	50
5	5	6	VAC		Fundamentals of Data Science and Machine Learning **Rsmart : Data Analytics**	2	2	50	0	50
6	6	6	VAC		Problem Solving and Algorithm Development **Rsmart :Business Analytics**	2	2	50	0	50

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	12	15	12	19	20	90
Part IV	2	2	6	6	4	4	24
Part V	-	-	-	-	-	2	2
Total	**20**	**20**	**27**	**24**	**23**	**26**	**140**

Subject Code	**Subject Title**	**Credit**	**Lecture**	**Tutorial**	**Practical**	**Type**
22BGE11T	Part I Tamil	**3**	**6**	**1**	**0**	**Theory**

Introduction:

பகுதி முதல் பாடமாக அமையும், தமிழ்ப்பாடம்கவிதைகள், இலக்கணம், இலக்கியவரலாறு ஆகியவைகள் கொண்டு அமைந்து உள்ளது. ஐந்துஅலகுகளாக 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 - நாடுஆகியவற்றின் 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]**

இலக்கியவரலாறுபற்றியச்செய்திகள்மற்றும்புதுக்கவிதைகளின்தோற்றங்கள், வளர்ச்சிகள்அறிவும் வகையில்உள்ளது. ஹைக்கூ, குக்கூ, சென்ட்ரியூ, கஜல். ஆகியவற்றுக்குவிளக்கம்தருதல்.

Text books:

1. பாரதியார் கவிதைகள், 2. பாரதிதாசன் கவிதைகள், 3. சுரதா கவிதைகள், 4. சிற்பி கவிதைகள் 5. 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:

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

Reference Books :

1. English in use - A textbook for College Students (English ,Paperback, - T.Vijay Kumar, K Durga Bhavani, YL Srinivas
2. Practical English Usage - 4th Edition By Michael Swan
3. 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 Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Allied- Mathematics for Computer Science	**4**	**4**	**-**	**-**	**Core Theory**

Introduction:

This paper focuses on the Mathematical logic, Relations& Functions, Formal languages and Graph Theories to understand the basic concepts of set theory. To understand the various statements in light of mathematical logic. To study various relations and functions. To understand graph theory in the course's context. To understand the deeper concepts of graph theory.

Course Outcome:

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 books:

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.

Reference Books :

1. Nina Godbole and SunitBelpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley.
2. William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type

	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:

1. Yashavant Kanetkar , "Let us C" , Fourteenth Edition, BPB Publication, 2017.

Reference Books :

2. Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGraw-Hill, 2021
3. Byron S Gottfried, "Programming with C", Fourth Edition, McGraw-Hill, 2018
4. 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.

1. Create a program that calculates the area of a circle given its radius.
2. Implement a program that determines whether a given year is a leap year or not.
3. Display whether the entered number is an Armstrong number or not
4. Create a program that compares three numbers and prints the largest one.
5. Write a program to print the Fibonacci series up to a certain number of terms using a while loop.
6. 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.
7. Write a program to find the sum of elements in a one-dimensional array.
8. Implement a program to count the number of vowels in a given string.
9. Create a program to reverse a given string.
10. 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( ).
11. Write a program to swap two numbers using pointers.
12. Write a program to calculate the factorial of a number using a recursive function.
13. Write a program to store and display information about students using structures.
14. Write a program to read data from a file and display it on the screen.
15. 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:

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

Reference Books :

1. Herbert Schildt, “C: The Complete Reference”, Fourth Edition, McGraw-Hill, 2021
2. Byron S Gottfried, “Programming with C”, Fourth Edition, McGraw-Hill, 2018
3. 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

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

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.

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

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
	Value Added Course - Foundations of Full Stack Web Development	**2**	**3**	**-**	**0**	**Theory & Practical**

Introduction: To become knowledgeable about the most recent web development technologies. Idea for creating two tier and three tier architectural web applications. Design and Analyse real time web applications. Constructing suitable client and server-side applications. To learn core concept of both front end and back-end programming.

Unit I: **[5 hours]**

Web Development Basics: Web development Basics - HTML & Web servers Shell - UNIX CLI Version control - Git &Github HTML, CSS.

Unit II : **[5 hours]**

Frontend Development: JavaScript basics OOPS Aspects of JavaScript Memory usage and Functions in JS AJAX for data exchange with server jQuery Framework jQuery events, UI components etc. JSON data format

Unit III: **[5 hours]**

REACT JS: Introduction to React React Router and Single Page Applications React Forms, Flow Architecture and Introduction to Redux More Redux and Client-Server Communication

Unit IV: **[5 hours]**

Java Web Development: JAVA PROGRAMMING BASICS, Model View Controller (MVC) Pattern MVC Architecture using Spring RESTful API using Spring Framework Building an application using Maven

Unit V: **[5 hours]**

Databases & Deployment: Relational schemas and normalization Structured Query Language (SQL) Data persistence using Spring JDBC Agile development principles and deploying application in Cloud.

Text Book:

1. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett ProfessionalJavaScript for Web Developers Book by Nicholas C. Zakas
2. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-byStep Guide to CreatingDynamic Websites by Robin Nixon
3. Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB. Copyright © 2015 BYAZAT MARDAN

Reference Books:

1. Full-Stack JavaScript Development by Eric Bush
2. Mastering Full Stack React Web Development Paperback – April 28, 2017 by TomaszDyl , Kamil Przeorski , Maciej Czarnecki

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
21T	Part I Tamil	**3**	**6**	**1**	**0**	**Theory**

Introduction:

இ

ர

Course Outcome:

CO1	:	ஆ
CO2	:	
CO3	:	அ
CO4	:	
CO5	:	த

ப

வ

அ

அ

அ

அ

அ

அ

1

.

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	:	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.

Unit I : **[12 periods]**

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

Unit II: **[12 periods]**

Still I Rise- Maya Angelou-kindly Adjust Please- Shashi Tharoor-Verbs and Tenses-Subject Verb Agreement

Unit III: **[12 periods]**

Alchemist-Paulo Coelho

Unit IV: **[12 periods]**

The Flower- Tennyson-The Spoon-Fed Age. W.R. Inge- Paragraph Writing-Error detection

Unit V: **[12 periods]**

On Killing a Tree- Gieves Patel-Taking and Note Making-Reading news and weather reports-Precis Writing.

Text books:

1. The Alchemist - Paulo CoelhoHarper - 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.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	Program Outcomes

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Core – Java Programming	**4**	**4**	**-**	**-**	**Core Theory**

Introduction:

This course presents a conceptual and practical introduction to imperative and object-oriented programming, exemplified by Java.

Course Outcome:

CO1	:	Define the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
CO2	:	Identify the situations of Program Control Statements, Introducing Classes, Objects and Methods of their usages.
CO3	:	Identify String Handling, Arrays, classes, objects, members of a class and the relationships among them needed for a specific problem.
CO4	:	OOP concepts like inheritance, Interface & package in real time situations.
CO5	:	Develop Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access applet, multithreading) K3

Unit I: Fundamentals: [12 periods]

The Java Language, the Key Attributes of Object-Oriented Programming, the Java Development Kit, a First Simple Program, Handling Syntax Errors, the Java Keywords, Identifies in Java, the Java Class Libraries Introducing. Data Types and Operators: Java's Primitive Types, Literals, A Closer Look at Variables, The Scope and Lifetime of Variables, operators, Shorthand Assignments, Type conversion in Assignments, Using Cast, Operator Precedence, Expressions.

Unit II: Program Control Statements: [12 periods]

Input characters from the Keyword, if statement, Nested ifs, if-else-if Ladder, Switch Statement, Nested switch statements, for Loop, Enhanced for Loop, While Loop, do-while Loop, Use break, Use continue, Nested Loops. Introducing Classes, Objects and Methods: Class Fundamentals -Objects - Reference Variables and Assignment, Methods, Returning from a Method, Returning Value, Using Parameters, Constructors, constructor types, The new operator Revisited, Garbage Collection and Finalizers, The this Keyword.

Unit III: More Data Types and Operators: [12 periods]

Arrays, Multidimensional Arrays, Alternative Array Declaration Syntax, Assigning Array References, Using the Length Member, The Bitwise operators. String Handling: String Fundamentals, The String Constructors, Three String-Related Language Features, String Buffer and String Builder. A Closer Look at Methods and Classes: Controlling Access to Class Members, Pass Objects to Methods, How Arguments are passed, Returning Objects, Method Overloading, Overloading Constructors, Recursion, Understanding Static, Introducing Nested and Inner Classes, Var args: Variable-Length Arguments.

Unit IV: Inheritance: [12 periods]

Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, Method Overriding, Overridden Methods support polymorphism, Why Overridden Methods, Using Abstract Classes, Using final keyword. Interfaces: Fundamentals, Creating, Implementing, References, Implementing Multiple Interfaces, Constants, Interface extended, Nested Interfaces. Packages: Fundamentals, Packages and Member Access, Importing Packages, Static Import. Exception Handling: Hierarchy, Fundamentals, Uncaught Exception, Multiple catch clauses, tryblocks, throwing an Exception, finally, throws, Java's Built-in Exceptions.

Unit V: Multithreaded Programming: [12 periods]

Multithreaded Programming: fundamentals, thread creation types, Multiple Threads, Thread Priorities, Synchronization, using Synchronization Methods. 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. Herbert Schildt, Java The Complete Reference, 11th Edition, Copyright © 2019 by McGraw-Hill Education (Publisher).

Reference Books :

1. Mahesh Bhave and Sunil Patekar, "Programming with Java", First Edition, Pearson Education,2008, ISBN:9788131720806.
2. Rajkumar Buyya,S Thamarasi selvi, xingchen chu, Object oriented Programming with java, Tata McGraw Hill education private limited.
3. E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.
4. Anita Seth and B L Juneja, JAVA One step Ahead, Oxford University Press, 2017.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

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 – Java Programming lab	**2**	**0**	**0**	**4**	**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	:	Execute JAVA programs based on simple constructs like arrays, loops, decision statements, functions etc
CO2	:	Incorporate object-oriented concepts like classes, objects, inheritance, polymorphism resembling real time situation.
CO3	:	Demonstrate the use of packages and interfaces
CO4	:	Develop OOP programs containing User created Exception handling & Threading.
CO5	:	Familiarize with Java development Environment such as Eclipse, NetBeans etc. Suggestive list of programs.

1. To find the sum of any number of integers entered as command line arguments
2. To learn use of single dimensional array by defining the array dynamically.
3. To check if a number is prime or not, by taking the number as input from the keyboard
4. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line argument
5. Write a program that show working of different functions of String and StringBufferclasss like setCharAt(, setLength(), append(), insert(), concat()and equals().
6. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions (from lower to higher data type)
7. Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword
8. Write a program to demonstrate the concept of boxing and un-boxing.
9. Create a multi-file program where in one file a string message is taken as input from the user
10. Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate Fibonacci series is given in a different file belonging to the same package.
11. Write a program that creates illustrates different levels of protection in classes/subclasses belonging to same package or different packages

Vrite a program DivideByZero that takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.

13. Write a program to demonstrate priorities among multiple threads.
14. Write a program to generate a window without an applet window using main() function.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

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**	**-**	**-**	**Core Theory**

Introduction:

To understand the fundamental concepts of discrete mathematics. • To develop the ability to solve proble combinatorics, propositional and predicate logic, relations and recurrence relations. • To develop logical thinkin and problem-solving skills**.**

Course Outcome:

CO1	:	Define the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
CO2	:	Identify the situations of Program Control Statements, Introducing Classes, Objects and Methods of their usages.
CO3	:	Identify String Handling, Arrays, classes, objects, members of a class and the relationships among them needed for a specific problem.
CO4	:	OOP concepts like inheritance, Interface & package in real time situations.
CO5	:	Develop Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access applet, multithreading) K3

Unit : I **[12periods]**

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 II: **[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 III: **[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 IV: [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 V: **[12 periods]**

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

Text books:

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

Reference Books :

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

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

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 I - Entrepreneurial Development	**4**	**6**	**-**	**-**	**Core 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	:	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	:	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	:	CO4 : To understand process of women entrepreneur and how faced their problems
CO5	:	CO5 : To understand difference between Micro, small and medium Enterprise

Unit I : [12 periods]

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

Unit II:[12 periods]

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.

Unit III: [12 periods]

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

Unit IV: [12periods]

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.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

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
	Value Added Course - IoT Essentials: A Beginner's Guide	**2**	**3**	**-**	**-**	**Theory & Practical**

Unit I: Introduction to IoT and Development Setup **[5 Hours]**

Introduction to IoT: Overview and applications of IoT. - Setting Up the Development Environment: Installing and configuring Arduino/Raspberry Pi. - Basic programming (C/C++, Python) - Basic Concepts and Practices: Blinking an LED - Reading a button press.

Unit II: Working with Basic Sensors **[5 Hours]**

Humidity and Smoke Sensors: -Interfacing with humidity and smoke sensors - Light and Distance Sensors: Interfacing with light sensors - Interfacing with distance sensors.

Unit III: Display Modules and Additional Sensors **[5 Hours]**

LCD Display - Displaying data on an LCD screen - Vibration and Tilt Sensors: Basics and interfacing. RFID and Touch Sensors - Interfacing with RFID and touch sensors.

Unit 4: Advanced Sensors and Actuators: **[5 Hours]**

Weight and Soil Moisture Sensors - Interfacing with weight sensors - Interfacing with soil moisture sensors -Interfacing Water Pumps: Controlling water pumps.

Unit 5: Data Collection, Cloud Integration, and Security: **[5 Hours]**

Data Logging and Cloud Integration - Storing sensor data locally and remotely. - Introduction to cloud services for IoT - Security in IoT - Basics of IoT security.

Text books:

1. Bahga, Arshdeep, and Vijay Madisetti. Internet of Things: A hands-on approach. Vpt, 2014.

Reference Books :

1. Buyya, Rajkumar, and Amir Vahid Dastjerdi, eds. Internet of Things: Principles and paradigms. Elsevier, 2016.

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, நிகழ்ச்சிதயாரிக்கும் முறை- நிகழ்ச்சி ஒருங்கிணைப்புகள், நிகழ்;ச்சி நடத்துதல்.
CO4	:	கணிப்பொறி வரலாறு- கணிப்பொறி வகைகள்,. கணிப்பொறி பயன்பாடுகள்ஆகியவைகள் மாணவர்களுக்கு பயனுள்ளது.
CO5	:	மொழிப்பெயர்ப்;பு வரலாறு, மொழிபெயர்ப்பு இயல்புகள் மற்றும் முக்கியத்துவம்பற்றித் தெளிவாக புரிந்து கொள்ள முடியும்.

அலகு I : [12 **பாடவகுப்புகள்**]

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 **பாடவகுப்புகள்**]

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 **பாடவகுப்புகள்**]

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

அலகு IV: [12 **பாடவகுப்புகள்**]

கணிப்பொறி வரலாறு- கணிப்பொறி வகைகள், கணிப்பொறி பயன்பாடுகள், மாத. நாட்காட்டி தயாரித்தல் விளம்பரம் உருவாக்கம், மதிப்பெண் பட்டியல் தயாரித்தல், கணினி கலைச்சொல்லாக்கம் விளக்கம் கொடுத்து கற்பிக்கப்படும்.

அலகு V : [12 **பாடவகுப்புகள்**]

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 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	:	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 periods]**

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

Unit II: **[12 periods]**

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

Unit III: **[12 periods]**

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

Unit IV: **[12 periods]**

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 periods]**

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

Text books:

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

Reference Books :

1. The Shakespeare Book. Big Ideas Simply Explained, Stanley Wells et al. DK Publishing, 2015
2. 2 Famous Speeches by Mahatma Gandhi, Creatingspace Independent Publishing Platform,2016 How to Build a Professional Digital Profile Kindle Edition
3. 3 by Jeanne Kelly Bernish, Bernish Communications Associates, LLC; 1st edition (May 29, 2012)

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

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
CO2	2	3				3	3	2	2			2
CO3	3			2	3	3	3	2	3			2
CO4	3	3	3	3				2	2			2
CO5	3	2	3	3	3	3				3	3	2

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**

	Allied – PROBABILITY AND INFERENTIAL STATISTICS	**4**	**4**	**-**	**-**	**Theory**

Goal: To encourage students to explore and unshackle their creative abilities in probability and inferential statistics.

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	**:**	Understand the importance of probability in different areas
CO2	**:**	Understand the basic terms and concepts of statistics.
CO3	**:**	Understand the suitable statistical measures to test the data
CO4	**:**	Understand the application of statistical tests to appropriate environment
CO5	**:**	Understand the basic concepts of the tests of significance

Unit I:

History of probability theory, definition of various terms related to probability – trial, events, exhaustive events, mutually exclusive events, equally likely events, independent events, introduction to prior probability, limitations of classical probability, statistical or empirical probability, theory of sets, elements of sets, and operations on sets.

Unit II:

Random variables- discrete and continuous random variables, statistical properties of random variables, Expectation of a random variables, expectation of random variable in terms of variance and covariance, jointly distributed random variables, moment generating function, characteristic function, limit theorems related to random variables.

Unit III:

Testing of Statistical hypothesis: Statistical hypothesis -simple and composite hypothesis, null and alternative hypotheses-sample and parameter space –two types of errors – critical region-power a test – Neyman- Pearson Lemma –simple applications

Unit IV:

Most powerful tests-uniformly most powerful and unbiased tests based on Normal, t, and and F distributions - likelihood ratio criterion –definition and simple applications

Unit V:

Test of significance – Asympotic and exact tests based on Normal, t, and and F distributions with regard to mean, proportion, variance, Standard deviation, coefficient of correlation, regression coefficients, partial and multiple correlation coefficients-Concept of observed significance level.

Textbook:

1. Fundamentals of mathematical statistics – SC Gupta and VK Kapoor, Sultan Chand & Sons Publication, New Delhi.
2. Introduction to Mathematical statistics by Hogg, R.V and Craig, AG (Amrend)
3. Introduction to Mathematical statistics by Hoel, P.G (Wiley International)

References:

1. Introduction to probability Models, Ninth Edition – Sheldon M. Ross, Elsevier Publication, Academic Press, UK.
2. Introduction to Probability and Statistics for Engineers and Scientists, Third Edition - Sheldon M. Ross, Elsevier Publication, Academic Press, UK.
3. An introduction to Probability and Statistical Inference – George Roussas, Academic Press.

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	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	:	alyze basic protocols in wireless sensornetwork
CO3	:	dents can develop their knowledge of applications related with IOT.
CO4	:	Design IoT applications in different domain and be able to analyze theirperformance
CO5	:	plement basic IoT applications on embeddedplatform.

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-OnApproach” VPT Publication 2014

2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals ofWireless Sensor Networks: Theory andPractice.

Reference Books :

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type

	Value Added Course - Understanding Blockchain Technology	**2**	**3**	**-**	**-**	**Theory & Practical**

Introduction:

This course is intended to study the basics of Understanding Blockchain technology. During this course the learner will explore various aspects of Blockchain technology like application in various domains. By implementing, learners will have idea about private and public Blockchain, and smart contract.

Course Outcome:

CO1	:	Understand the history and fundamental concepts of blockchain technology, including digital money, distributed ledgers, and the basic crypto primitives such as hash functions and digital signatures.
CO2	:	Analyze and evaluate various consensus mechanisms used in blockchain, with a focus on proof of work and scalability in both permissioned and permission less blockchains.
CO3	:	Understand and implement the components and chain code in Hyperledger Fabric, including the use of SDK and front-end tools like Hyperledger Composer.
CO4	:	Apply blockchain technology in financial software and systems, including settlements, KYC, capital markets, insurance, and trade/supply chain management.
CO5	:	Explore the use of blockchain in government applications, focusing on digital identity, land records, record-keeping, and public distribution systems, with an emphasis on privacy and security.

Unit I: **[5 periods]**

History:DigitalMoneytoDistributedLedgers-DesignPrimitives:Protocols,Security,Consensus,Permissions, Privacy-: Block chain Architecture and Design-Basic crypto primitives: Hash, Signature-HashchaintoBlockChain-Basic consensusmechanisms.

Unit II: **[5 periods]**

Requirementsforthe consensusprotocols-ProofofWork(PoW)-ScalabilityaspectsofBlockchainconsensusprotocols**:** Permissioned Block Chains-Design Goals-Consensusprotocols forPermissionedBlockchains.

Unit III: **[5 periods]**

Decomposingtheconsensusprocess-Hyperledgerfabriccomponents-ChaincodeDesignandImplementation: Hyper ledger Fabric II: -Beyond Chain code: fabric SDK and Front End-Hyper ledgercomposertool.

Unit IV: **[5 periods]**

Block chain in Financial Software and Systems (FSS): -Settlements, -KYC, -Capital Markets-Insurance-Block chain in trade/supply chain: Provenance of goods, visibility, trade/supply chain finance, invoicemanagement/discounting.

Unit V:[5 periods]

Block chain for Government: Digital identity, land records and other kinds of record keeping betweengovernmententities,publicdistribution system / social welfare systems: Block chain Cryptography:PrivacyandSecurityonBlockchain.

Text books:

1. Mark Gates, "*Block chain: Ultimate guide to understanding block chain, bit coin, cryptocurrencies,smartcontractsandthefuture ofmoney*",WiseFoxPublishingandMarkGates2017.
2. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, VenkatramanRamakrishna, "*Hands-On Block chain with Hyper ledger: Building decentralized applicationswithHyperledgerFabric andComposer*",2018.
3. Bahga, VijayMadisetti,"*BlockchainApplications:AHands-OnApproach*",ArshdeepBahga,VijayMadisettipublishers2017.

Reference Books :

1. 1. AndreasAntonopoulos,"*MasteringBitcoin:UnlockingDigitalCryptocurrencies*",O'ReillyMedia,Inc.2014.
2. MelanieSwa,"*Blockchain*",O'ReillyMedia2014.

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

Introduction:

Course Outcome:

CO1	:	□
CO2	:	த
CO3	:	□
CO4	:	க
CO5	:	□

□
□
□
□

அ
வ

அ
த

அ
ஓ

அ
இ

அ
ல □ □

1. நூல்மதிப்புரை - திறனாய்வுசெய்தல் - 2.கடிதம்மற்றும்விண்ணப்பம்எழுதுதல் - கட்டுரைதிறனைவளர்த்தல்- கட்டுரைதலைப்பு, கட்டுரைஅமைப்புமுறைகள்

□
□
ம
3
4

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
23BGE4E	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	:	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	:	Develop the linguistic competence that enables them, in the future, to present the culture and civilization of their nation.

Unit I : **[12 periods]** I am Malala -Malala Yousafzai- Chapter1-Nelson Mandela's Interview with Larry King-Job Applications: Cover Letters, CV/Resume-Refuting, Discussion & Debating
Unit II: **[12 periods]** The Zoo Story- Edward Albee-Rakesh Sharma's Interview with Indira Gandhi from Space-Making Suggestions& Responding to Suggestions, Asking for and Giving Advice or Help- Creating a digital profile-LinkedIn
Unit III: **[12 periods]** My Inventions-Nikola Tesla- Chapter 2-Lionel Messi with Sid Love-(Print)-Body Language-Practical Skills for Interviews-Interviews (face-to-face, telephone, and video conferencing)
Unit IV: **[12 periods]** The Proposal- Anton Chekhov-Filling forms(Online & Manual) creation of account, railway reservation, ATM, Credit/ Debit card- Speaking in a Formal situation (welcome address, Vote of the thanks
Unit V: **[12 periods]** Public Speaking-Chicago Address-Swami Vivekananda-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

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

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
CO2	2	3				3	3	2	2			2
CO3	3			2	3	3	3	2	3			2
CO4	3	3	3	3				2	2			2
CO5	3	2	3	3	3	3				3	3	2

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Core Course – Theory Machine Learning	**4**				**Core Theory**

Introduction: This course introduces fundamental concepts and practical applications of machine learning (ML). Starting with essential Python libraries, it covers supervised and unsupervised learning, feature engineering, model evaluation, and advanced topics like text data processing and deployment.

Course Outcome:

CO1	:	Understand ML basics, data preprocessing, and model evaluation.
CO2	:	Apply supervised learning with algorithms like k-NN and decision trees.
CO3	:	Use unsupervised learning for clustering and dimensionality reduction.
CO4	:	Perform feature engineering and model evaluation with relevant metrics.
CO5	:	Use Python libraries (NumPy, SciPy, pandas, scikit-learn) for ML tasks and visualization.

12 Hours

Unit I: Introduction to Machine Learning and Python Basics: Why Machine Learning? - Problems Machine Learning Can Solve - Essential Python Libraries: NumPy, SciPy, matplotlib, pandas - Setting up the environment and installing scikit-learn - A First Application: Classifying Iris Species - Exploring the Iris dataset - Training and testing data - Building a k-Nearest Neighbors model - Evaluating the model

12 Hours

Unit 2: Supervised Learning: Classification and Regression - Generalization, Overfitting, and Underfitting - Supervised Machine Learning Algorithms: k-Nearest Neighbors - Linear Models - Decision Trees - Ensemble Methods (Random Forests, Gradient Boosting) - Neural Networks (Introduction) - Uncertainty Estimates from Classifiers - Evaluating Model Performance

12 Hours

Unit 3: Unsupervised Learning and Preprocessing: Types of Unsupervised Learning - Challenges in Unsupervised Learning - Preprocessing and Scaling Data - Dimensionality Reduction Techniques: - Principal Component Analysis (PCA) - Manifold Learning (t-SNE) - Clustering Algorithms: k-Means Clustering - Agglomerative Clustering – DBSCAN - Evaluating Clustering Algorithms

12 Hours

Unit 4: Feature Engineering and Model Evaluation: - Representing Data and Engineering Features: Categorical Variables - One-Hot-Encoding - Feature Scaling and Transformation - Feature Selection Techniques - Cross-Validation Techniques - Grid Search for Hyperparameter Tuning - Evaluation Metrics for Classification and Regression - Building Algorithm Chains and Pipelines

12 Hours

Unit 5: Advanced Topics and Application: Working with Text Data - Representing Text Data (Bag-of-Words, tf-idf) - Text Preprocessing Techniques (Tokenization, Stemming, Lemmatization) - Topic Modeling (Latent Dirichlet Allocation): - Wrapping Up and Practical Considerations: Approaching Machine Learning Problems - From Prototype to Production - Testing and Deploying ML Systems - Future Directions and Continuing Education in Machine Learning

Text books:

1. Müller, A. C., & Guido, S. (2016). Introduction to machine learning with Python: a guide for data scientists. " O'Reilly Media, Inc.".

Reference Books :

1. James, D. (2018). Introduction to Machine Learning with Python: A Guide for Beginners in Data Science. CreateSpace Independent Publishing Platform.
2. Lee, W. M. (2019). Python machine learning. John Wiley & Sons.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Core Course –Theory / Practical Machine Learning Lab	**4**				**LAB**

Introduction:

Machine Learning Lab focuses on practical Python-based machine learning skills. Students learn setup, data exploration, and algorithm implementation.

Course Outcome:

CO1	:	Set up Python environments and install necessary libraries for machine learning.
CO2	:	Use pandas for data exploration and analysis.
CO3	:	Implement various machine learning algorithms and evaluate their performance
CO4	:	Assess model performance using metrics like accuracy, precision, recall, and silhouette score.
CO5	:	Apply advanced techniques such as PCA for dimensionality reduction and process text data for sentiment analysis.

List of Experiments:

1. Setting up Python environment with Anaconda and installing necessary libraries (NumPy, SciPy, matplotlib, pandas).
2. Explore the Iris dataset using pandas.
3. Implementing a k-Nearest Neighbors classifier for Iris species classification and evaluating its performance using metrics such as accuracy, precision, and recall.
4. Exploring overfitting and underfitting using a decision tree classifier on a synthetic dataset.
5. Training a linear regression model to predict housing prices and evaluating its performance.
6. Implementing a Random Forest classifier for a classification problem and comparing it with a single decision tree.
7. Introduction to neural networks using a simple feedforward network for digit recognition.
8. Applying PCA to reduce the dimensionality of the Iris dataset and visualizing the results.
9. Implementing k-means clustering on a dataset and evaluating clustering quality using metrics like silhouette score.
10. Processing text data for sentiment analysis using techniques like tokenization, stemming, and tf-idf representation.

Text books:

1. Müller, A. C., & Guido, S. (2016). Introduction to machine learning with Python: a guide for data scientists. " O'Reilly Media, Inc.".

Reference Books :

1. James, D. (2018). Introduction to Machine Learning with Python: A Guide for Beginners in Data Science. CreateSpace Independent Publishing Platform.
2. Lee, W. M. (2019). Python machine learning. John Wiley & Sons.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

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

CO2	2	3	2	3	3	3	3	2	3	3	3	2
CO3	3	2	3	3	2	3	2	3	2	2	2	3
CO4	3	3	3	2	3	2	3	3	3	3	2	3
CO5	2	2	3	2	3	3	3	3	2	3	3	3

	Allied – INDUSTRIAL STATISTICS	**4**	**4**	**-**	**-**	**Theory**

Goal: To bridge the gap between industry-academia interface, to apply the theory learnt to industrial applications

Course Outcomes:

CO1	:	Define Combinatorial Methods and few examples.
CO2	:	Define Sample spaces and The Probability of event
CO3	:	Describe Independent Events and problems
CO4	:	Define Probability Distributions, Continuous Random variables
CO5	:	Describe Conditional Distributions and Mathematical Expectations

UNIT 1: **[12 Periods]**

Introduction – Combinatorial Methods – Binomial coefficients.

UNIT 2: **[12 Periods]**

Probability – Introduction – Sample spaces – Events – Probability of event – Some Rules of Probability.

UNIT 3: **[12 Periods]**

Conditional Probability – Independent Events – Baye's Theorem (Only problems).

UNIT 4: **[12 Periods]**

Probability Distribution and Probability Density Functions – Continuous Random variables – Multivariate Distributions.

UNIT 5: **[12 Periods]**

Marginal Distributions – Conditional Distributions – Mathematical Expectations – The Expected value of a Random variable – Moments.

TextBook:

1. Fruend John E, *Mathematical Statistics*, Prentice Hall of India, New Delhi.

ReferenceBooks:

1. Papoulis A. Probability, Random Variables and Stochastic process, Tata McGraw Hill Education Pvt. Ltd., New Delhi
2. Baisnab A., Jas M., Elements of Probability and Statistics, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 1993.

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[12 periods] 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: Protocols [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

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

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
	R Programming	5	5	0	0	Theory

Introduction:

To Provides an introduction to fundamental concepts of R programming language and software environment for statistical analysis, graphics representation and reporting

Course Outcome:

CO1	:	To understand and explore the basics of R Programming language.
CO2	:	Understand the basics of operators for calculations on arrays, lists, vectors and matrices.
CO3	:	To learn the integrated collection of tools for data analysis.
CO4	:	Understand the working of various applications with lists and arrays.
CO5	:	To familiarize the graphical facilities for data analysis.

Unit I:

R OVERVIEW and Evolution of R - Features of R and ENVIRONMENT SETUP - Local Environment Setup - R BASIC SYNTAX R Command Prompt - R Script File and Comments in R - R DATA TYPES - R Vectors , Lists - R Matrices - Arrays , Factors - Data Frames - R VARIABLES ,Variable Assignment - Data Type of a Variable ,Finding Variables , Deleting Variables.

Unit II:

R OPERATORS: Types of Operators - Arithmetic Operators , Relational Operators , Logical Operators - Assignment Operators, Miscellaneous Operators - R DECISION MAKING : R If Statement - R If...Else Statement, The if...else if...else Statement - R Switch Statement - R LOOPS: R Repeat Loop - R While Loop ,R For Loop - Loop Control Statements, R Break Statement, R Next Statement.

Unit III:

R FUNCTION: Function Definition Function Components - Built in Function , User defined Function , Calling a Function - Lazy Evaluation of Function. R STRINGS: Rules Applied in String Construction - String Manipulation - R VECTORS: Vector Creation Accessing Vector Elements - Vector Manipulation.

Unit IV:

R LISTS: Creating a List , Naming List Elements - Accessing List Elements - Manipulating List Elements - Merging Lists - Converting List to Vector - R MATRICES: Accessing Elements of a Matrix - Matrix Computations. R ARRAYS: Naming Columns and Rows , Accessing Array Elements - Manipulating Array Elements - Calculations Across Array Elements - R FACTORS: Factors in Data Frame - Changing the Order of Levels - Generating Factor Levels.

Unit V:

R DATA FRAMES: Extract Data from Data Frame - Expand Data Frame - R PACKAGES: R DATA RESHAPING - Joining Columns and Rows in a Data Frame - Merging Data Frames - Melting and Casting , Melt the Data , Cast the Molten Data. R CSV FILES - R EXCEL FILE - R PIE CHARTS - R HISTOGRAMS - R Regressions - R DATABASES : RMySQL Package - Connecting R to MySql , Inserting Data into the Tables - Creating Tables in MySql - Dropping Tables in MySql.
Text Books : 1. Tilman M. Davies, "The Book of R – A first Course in Programming and Statistics", 2016.
Reference Books : 1.Roger D Peng, "R Programming for Data Science", 2015. 2.Chambers, "Software for Data Analysis: Programming with R", Springer, 2010.

Mapping of Course Outcomes with Program Outcomes:

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	ROBOTIC PROCESS AUTOMATION	**4**	**6**	**-**	**-**	**Elective**

Introduction:

This subject covers the Robotic Process Automation (RPA) represents a transformative approach to streamline and automate business processes. By employing software robots or "bots," RPA technology can mimic human actions to execute repetitive and mundane tasks, significantly enhancing operational efficiency, accuracy, and productivity.

Course Outcome:

CO1	:	Describe RPA, where it can be applied and how it's implemented
CO2	:	Describe the different types of variables, Control Flow and data manipulation techniques
CO3	:	Identify and understand Image, Text and Data Tables Automation
CO4	:	Describe how to handle the User Events and various types of Exceptions and strategies.
CO5	:	Understand the Deployment of the Robot and to maintain the connection.

Unit I : INTRODUCTION TO ROBOTIC PROCESS AUTOMATION [12 periods]

Scope and techniques of automation, Robotic process automation - What can RPA do?, Benefits of RPA, Components of RPA, RPA platforms, The future of automation. RPA BASICS: History of Automation - What is RPA - RPA vs Automation - Processes & Flowcharts - Programming Constructs in RPA - What Processes can be Automated - Types of Bots - Workloads which can be automated - RPA Advanced Concepts - Standardization of processes - RPA Development methodologies - Difference from SDLC - Robotic control flow architecture - RPA business case - RPA Team - Process Design Document/Solution Design Document - Industries best suited for RPA - Risks & Challenges with RPA - RPA and emerging ecosystem.

Unit II: RPA TOOL INTRODUCTION AND BASICS: [12 periods]

Introduction to RPA Tool - The User Interface - Variables - Managing Variables - Naming Best Practices - The Variables Panel - Generic Value Variables - Text Variables - True or False Variables - Number Variables - Array Variables - Date and Time Variables - Data Table Variables - Managing Arguments - Naming Best Practices - The Arguments Panel - Using Arguments - About Imported Namespaces - Importing New Namespaces- Control Flow - Control Flow Introduction - If Else Statements - Loops - Advanced Control Flow - Sequences - Flowcharts - About Control Flow - Control Flow Activities - The Assign Activity - The Delay Activity - The Do While Activity - The If Activity - The Switch Activity - The While Activity - The For Each Activity - The Break Activity - Data Manipulation - Data Manipulation Introduction - Scalar variables, collections and Tables - Text Manipulation - Data Manipulation - Gathering and Assembling Data

Unit III: ADVANCED AUTOMATION CONCEPTS & TECHNIQUES [12 periods]

Recording Introduction - Basic and Desktop Recording - Web Recording - Input/Output Methods - Screen Scraping - Data Scraping - Scraping advanced techniques - Selectors - Defining and Assessing Selectors - Customization - Debugging - Dynamic Selectors - Partial Selectors - RPA Challenge - Image, Text & Advanced Citrix Automation - Introduction to Image & Text Automation - Image based automation - Keyboard based automation - Information Retrieval - Advanced Citrix Automation challenges - Best Practices - Using tab for Images - Starting Apps - Excel Data Tables & PDF - Data Tables in RPA - Excel and Data Table basics - Data Manipulation in excel - Extracting

Unit IV:HANDLING USER EVENTS & ASSISTANT BOTS, EXCEPTION HANDLING [12 periods]

What are assistant bots? - Monitoring system event triggers - Hotkey trigger - Mouse trigger - System trigger - Monitoring image and element triggers - An example of monitoring email - Example of monitoring a copying event and blocking it - Launching an assistant bot on a keyboard event. EXCEPTION HANDLING: Debugging and Exception Handling - Debugging Tools - Strategies for solving issues - Catching errors.

Unit V: DEPLOYING AND MAINTAINING THE BOT **[12 periods]**

Publishing using publish utility - Creation of Server - Using Server to control the bots - Creating a provision Robot from the Server - Connecting a Robot to Server - Deploy the Robot to Server - Publishing and managing updates - Managing packages - Uploading packages - Deleting packages

Text books:

1. Alok Mani Tripathi, "Learning Robotic Process Automation", Packt Publishing, 2018.

Reference Books :

1. Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive .Tasks & Become An RPA Consultant", Independently Published, 1st Edition 2018.
2. Srikanth Merianda,"Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA and Intelligent Automation", Consulting Opportunity Holdings LLC, 1st Edition 2018.
3. Lim Mei Ying, "Robotic Process Automation with Blue Prism Quick Start Guide: Create software robots and automate business processes", Packt Publishing, 1st Edition 2018.

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
	Value Added Course: Software Engineering Principles	**2**	**3**	**-**	**-**	**Theory & Practical**

UNIT I: Introduction to Software Engineering:[5 hours]

Overview of Software Engineering: Definition and importance of software engineering. Software Development Life Cycle (SDLC): Phases of SDLC, including planning, analysis, design, implementation, testing, deployment, and maintenance. Software Process Models: Waterfall, Agile, Spiral, V-Model, etc.

UNIT II: Requirements Engineering:[5 hours]

Introduction to Requirements Engineering: Importance of requirement gathering. Requirements Elicitation Techniques: Interviews, questionnaires, observation, document analysis.

Functional vs. Non-functional Requirements: Definitions and differences. Requirements Specification and Documentation: Creating and maintaining requirements documents. Requirements Validation and Management: Ensuring accuracy and managing changes.

UNIT III: Software Design: **[5 hours]**

Introduction to Software Design: Design principles and concepts. Architectural Design: Software architecture and design patterns. UML Diagrams: Use case diagrams, class diagrams, sequence diagrams, activity diagrams. Design Patterns: Singleton, Factory, Observer, Strategy, and other design patterns. Design Best Practices: Modularity, cohesion, coupling, and encapsulation.

UNIT IV: Software Implementation and Coding:[5 hours]

Coding Standards and Best Practices: Writing clean, maintainable code. Code Refactoring and Optimization: Improving code quality and performance. Source Code Version Control: Using Git and GitHub for version control. Introduction to Clean Code Principles: Writing code that is easy to understand and maintain. Collaborative Development: Techniques for effective team-based coding.

UNIT V: Software Testing and Maintenance: **[5 hours]**

Types of Software Testing: Unit testing, integration testing, system testing, acceptance testing. Test-Driven Development (TDD): Writing tests before code to ensure functionality. Debugging Techniques: Identifying and fixing bugs. Maintenance and Evolution: Managing changes and updates to software over time. Software Quality Assurance: Ensuring software meets quality standards.

Text books:

1. Sommerville, Ian. Software Engineering (10th Edition). Pearson, 2015.
2. Pressman, Roger S. Software Engineering: A Practitioner's Approach (9th Edition). McGraw-Hill Education, 2019.

Reference Books :

1. Martin, Robert C. Clean Code: A Handbook of Agile Software Craftsmanship. Prentice Hall, 2008.

Subject Code	Subject Title	Credit	Tutorial	Practical	Lecture	Type
	Relational Database Management System	**4**	**0**	**0**	**4**	**Core**

Introduction :

This paper will help an entry-level programmer learn the foundational concepts of Relational Database Management Systems and to apply these in practice and learn how to use the Structured Query Language to work with databases.

Course Outcome:

CO1	:	Demonstrate an understanding of the elementary & advanced features of DBMS & RDBMS
CO2	:	Attain a good practical understanding of the SQL. Develop clear concepts about Relational Model.
CO3	:	Prepare various database tables and joins them using SQL commands
CO4	:	Able to design and documents data structures incorporating integrity constraints to satisfy business rules by applying the relational model
CO5	:	Able to develop structured query language (SQL) queries to create, read, update, and delete relational database data

12 Lectures

Unit - I: Introduction – Database system applications – purpose of Database systems – View of Data – Database languages – Relational Databases – Database Design – Data storage and Querying – Transaction Management – Database Architecture. Relational Model – Structure of Relational Databases – Database Schema – Keys – Schema Diagrams – Relational Query Language – Relational Operations.

12 Lectures

Unit – II : Introduction to SQL – SQL Query Language – SQL Data Definition – Basic Structure – Additional Basic Operations – Set Operations – Null Values – Aggregate Functions – Nested Sub queries – Modification of Database – Join Expressions – Views – Integrity Constraints – SQL Data types and Schemas – Accessing SQL from a Programming Language – Functions and Procedures – Triggers.

12 Lectures

Unit – III: Database Design – Design Process – ER Model – Constraints – ER Diagrams – Reduction to relational Schemas – ER design Issues – Extended ER Features – Alternative Notations for Modelling data.

12 Lectures

Unit – IV: Relational Database Design – Atomic Domains and First Normal Form – Decomposition using Functional Dependencies – Functional Dependency Theory – Algorithms for Decomposition – Decomposition using Multi valued Dependencies.

12 Lectures

Unit – V: Storage and File Structure – Overview of Physical Storage Media – Magnetic disk and Flash Storage – RAID – Tertiary Storage – File Organization – Organization of Records in Files – Data-Dictionary Storage – Database Buffer.

Text Book :

Abraham Silberschatz, Henry F Korth, S. Sudarshan, "Database System Concepts", 6th Edition, McGraw Hill, 2011.

Reference:

1. Bipin C. Desai "An Introduction to Database Systems", Galgotia Publication, 2010.

2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Pearson Education. 2016.

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

Subject Code	Subject Title	Credit	Tutorial	Practical	Lecture	Type
	Core Course – Theory / Practical RDBMS Lab	**4**	**0**	**0**	**4**	**Core**

Introduction :

The RDBMS Lab course provides hands-on experience with relational database management systems (RDBMS). It covers essential aspects of database design, implementation, and management

using SQL. This course aims to equip students with practical skills to handle database operations effectively.

Course Outcome:

CO1	:	Understand and apply data definition language (DDL) and data manipulation language (DML) commands.
CO2	:	Execute database control language (DCL) and transaction control language (TCL) commands.
CO3	:	Use SQL functions and operators to perform complex queries.
CO4	:	Develop and manage database objects such as views, indexes, and triggers.
CO5	:	Construct and execute various types of SQL joins and subqueries.

LIST OF PRACTICALS

1. Create a table Employees with columns ID, Name, Age, Department, and Salary. Insert five records into the table.
2. Update the salary of the employee with ID = 3 to 58000 and delete the employee with ID = 5.
3. Grant SELECT permission on the Employees table to user User1 and then revoke it.
4. Select all employees from the IT department, sorted by Salary in descending order.
5. Find the average salary of employees in the IT department.
6. Create two tables ProjectA and ProjectB and find employees who are in both projects.
7. Perform an inner join on Employees and Departments tables based on Department.
8. Find the names of employees who earn more than the average salary.
9. Create a view IT_Employees to show only ID, Name, and Salary of employees in the IT department.
10. Generate a report showing Department wise total salary expenditure.
11. List employees with their salary, and if the salary is more than 60000, label them as 'High', otherwise 'Low'.
12. Create a stored procedure to update the salary of an employee given their ID and new Salary.
13. Create a transaction that transfers 5000 from one employee's salary to another, ensuring both operations succeed or fail together.
14. Create an index on the Salary column of the Employees table to improve query performance.
15. Create a new role manager and grant it SELECT and UPDATE permissions on the Employees table.

Text Book :

Abraham Silberschatz, Henry F Korth, S. Sudarshan, "Database System Concepts", 6th Edition, McGraw Hill, 2011.

Reference:

1. Bipin C. Desai "An Introduction to Database Systems", Galgotia Publication, 2010.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Pearson Education. 2016.

Course Outcomes	Program Outcomes											
	P01	**PO2**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**P10**	**P11**	**P12**

CO1	**3**		**2**			**3**	**3**			**3**		**3**
CO2	**3**	**1**		**1**	**3**	**2**		**2**			**2**	
CO3	**3**		**3**	**3**				**1**	**3**	**2**		**1**
CO4		**3**	**3**		**2**	**3**	**3**	**3**			**3**	
CO5			**3**	**1**			**3**		**3**	**1**		**3**

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Deep Learning	**2**	**4**	**0**	**0**	**Theory**

Introduction: To introduce students to the basic concepts and techniques of deep Learning.

CO1	:	Understand the basic concepts and techniques of Deep Learning.
CO2	:	To understand and apply the Machine learning principles
CO3	:	To study the deep learning architectures
CO4	:	Explore and create deep learning applications with tensor flow

Unit-1: Introduction to Learning **[12 Hrs]**
The Neural Network – Limits of Traditional Computing – Machine Learning – Neuron – FF Neural Networks – Types of Neurons – Softmax output layers

Unit -2: Deep Learning Models **[12 Hrs]**
Tensor flow – Variables – Operations – Placeholders – Sessions – Sharing Variables – Graphs – Visualization.

Unit – 3: CNN **[12 Hrs]**
Convolution Neural Network – Feature Selection – Max Pooling – Filters and Feature Maps – Convolution Layer –Applications.

Unit -4: RNN **[12 Hrs]**
Recurrent Neural Network – Memory cells – sequence analysis – word2vec- LSTM — Memory augmented Neural Networks – NTM—Application.

Unit -5: Reinforcement Learning **[12 Hrs]**
Reinforcement Learning – MDP – Q Learning – Applications

Text Books:

1. Nikhil Buduma, Nicholas Locascio, ―Fundamentals of Deep Learning: Designing NextGeneration Machine Intelligence Algorithms||, O'ReillyMedia, 2017.

Reference Books:

1. Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning (Adaptive computation and Machine Learning series, MITPress, 2017.

Mapping of Course Outcomes with Program Outcomes:

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

H - High ; M- Medium ; L- Low

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	AI and Expert System	**3**	**3**	**0**	**0**	**Theory**

COURSE OBJECTIVES

1. To understand Basic Concepts of Artificial Intelligence and Expert Systems.

2.To provide knowledge on Various Techniques and Tools involved in Artificial Intelligence.

Course Outcomes:

On completion of the course, student will be able to

CO1 - Understand the Basics about Artificial Intelligence and Expert Systems.

CO2 - Understand the Programming Logics in Artificial Intelligence.

CO3 - Understand Various search methods in Artificial Intelligence.

CO4 - Understand the Knowledge about the Expert Systems.

CO5 - Understand The Image processing and analysis.

CO6 - Understand the latest developments in Knowledge systems and Tools.

UNIT 1 INTRODUCTION

Introduction: History, Definition of AI, Emulation of human cognitive process, knowledge search trade off, stored knowledge, semantic nets. An abstract view of modelling, elementary knowledge. Computational logic, analysis of compound statements using simple logic connectives, predicate logic, knowledge organization and manipulation, knowledge acquisition.

UNIT 2 PROGRAMMING AND LOGICS IN ARTIFICIAL INTELLIGENCE

LISP and other programming languages- introduction to LISP, syntax and numerical function, LISP and PROLOG distinction, input output and local variables, Interaction and recursion, property list and arrays alternative languages, formalized symbolic logicsproperties of WFRS, non-deductive inference methods. Inconsistencies and uncertaintiesTruth maintenance systems, default reasoning and closed world assumption, Model and temporary logic.

UNIT 3 SEARCH METHODS AND KNOWLEDGE REPRESENTATION

Fuzzy logic - concepts, Introduction to Fuzzy logic with examples, probabilistic reasoning, Bayesian probabilistic inference, Dempstor Shafer theory, possible world representation, AdHoc methods. Structure knowledge: Graph, frames and related structures, Object oriented representation- object classes, message and methods, simulation examples using OOPS programs, OOP languages. Search and control strategies - Concepts, search problems, uniformed or Blined search, searching AND – OR graphs.

UNIT 4 KNOWLEDGE ORGANISATION AND COMMUNICATION IN EXPERT

SYSTEMS Matching techniques- Need for matching, matching problem, partial matching, Fuzzy matching, RETE matching algorithm. Knowledge organization- Indexing and retrieval techniques, integration of knowledge in memory organization systems, Perception, communication and Expert systems. Overview of Linguistics, Basic passim techniques, semantic analysis and representation structures, natural language generation and system.

UNIT 5 PATTERN RECOGNITION AND LEARNING TECHNIQUES

Pattern recognition system- understanding speech recognition, Image transformation, low level processing, medium and high level processing, vision system architecture, Rule based

system architecture, knowledge acquisition and validation, knowledge system building tools, use of AI and ES in manufacturing and design, types of learning- general learning model, performance measures, learning automate genetic algorithm, learning by induction - LEX,ID3,INDUCE systems
TEXT / 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 International Edition, 1990

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

Subject Code	**Subject Title**	**Credit**	**Lecture**	**Tutorial**	**Practical**	**Type**
	Elective Neural Networks	**4**	**6**	**0**	**2**	**Theory**

Introduction :

- To introduce the concepts of artificial neural networks and fuzzy systems
- To explain the basic mathematical elements of the theory of fuzzy sets.

Course Outcome:

CO1	:	Explain the concepts of neural networks and , fuzzy logic
CO2	:	Understanding of the basic mathematical elements of the theory of fuzzy sets.
CO3	:	Understanding the differences and similarities between fuzzy sets and classical sets theories
CO4	:	Solve problems that are appropriately solved by neural networks and fuzzy logic

Unit I: Introduction [12 Periods]

Basic concepts-single layer perceptron-Multi layer perceptron-Adaline-Madaline- Learning rules Supervised learning-Back propagation networks-Training algorithm, Advanced algorithms-Adaptive network- Radial basis network modular network-Applications.

Unit II: Learning [12 Periods]

Introduction- unsupervised learning -Competitive learning networks-Kohonen self organising networks-Learning vector quantisation - Hebbian learning – Hopfield network-Content addressable nature, Binary Hopfield network, Continuous Hopfield network Travelling Salesperson problem - Adaptive resonance theory –Bidirectional Associative Memory-Principle component Analysis.

Unit III: Fuzzy Sets [12 Periods]

Introduction – crisp sets an overview – the notion of fuzzy sets – Basic concepts of fuzzy sets – classical logic an overview – Fuzzy logic. Operations on fuzzy sets - fuzzy complement – fuzzy union – fuzzy intersection – combinations of operations – general aggregation operations .

Unit IV: Relations [12 Periods]

Crisp and fuzzy relations – binary relations – binary relations on a single set– equivalence and similarity relations – Compatibility or tolerance relations– orderings – Membership functions – methods of generation – defuzzification methods .

Unit V: **Tree Learning [12 Periods]**

Adaptive Neuro Fuzzy based inference systems – classification and regression trees: decision tress, Cart algorithm – Data clustering algorithms: K means clustering, Fuzzy C means clustering, Mountain clustering, Subtractive clustering – rule base structure identification – Neuro fuzzy control: Feedback Control Systems, Expert Control, Inverse Learning, Specialized Learning, Back propagation through Real –Time Recurrent Learning.

Text Books :

1. Neuro Fuzzy and Soft computing, Jang J.S.R.,Sun C.T and Mizutani E – Pearson education, 2004
2. Bradshaw, —Software Agents||, MIT Press, 2012.
2.Fundamentals of Neural Networks, Laurene Fauseett, Prentice Hall India, New Delhi,1994.

Reference Books :

1. Fuzzy Logic Engineering Applications, Timothy J.Ross, McGrawHill,NewYork,1997.
2. Neural networks, Fuzzy logics, and Genetic algorithms, S.Rajasekaran and G.A.VijayalakshmiPai Prentice Hall of India,2003.
3. Fuzzy Sets and Fuzzy Logic, George J.Klir and Bo Yuan, Prentice Hall Inc., New Jersey,1995.
4. Principles of Soft Computing S.N.Sivanandam, S.N.Deepa Wiley India Pvt Ltd.

Mapping of Course Outcomes with Program Outcomes:

Course Outcomes	Program Outcomes							
	P01	PO2	P03	P04	P05	P06	P07	P08

CO1	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L
CO3	H	M	L	L	L	L	L	L
CO4	H	M	M	L	L	L	L	L

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Data Visualization	4	4	0	0	Theory

Course Objectives: Data Visualization

To understand the importance of data visualization in the business and engineering, application and role of visualization tools in creating the advanced techniques., importance of vector visualization in multivariate data analysis and the impact of visualization techniques in ease the analytics decision-making process

Course Outcomes:

On successful completion of the module students will be able to:

CO 1 : Explain the application of different visualization techniques for different business representation.
CO 2 : Apply and use the static graphical technique for the better understanding about the business problem.
CO 3 : Apply and use multivariate statistical graphical technique for testing the assumptions of multivariate data.
CO 4 : Apply and use graphical validation techniques for better model fit.
CO 5 : Use the customization in graphical representation for user friendly graphics.

Unit -1 **12 Hrs.** **Introduction to Data Visualization:** Brief history of data visualization, scientific design choices in data visualization- choice of graphical form, grammar of graphical techniques of large amount of data, crucial need of visualization techniques, challenges in visualization techniques, classification of visualization techniques for qualitative and quantitative data, power of visualization techniques, introduction to different visualization techniques.
Unit -2 **12 Hrs.** **Static Graphical Techniques:** Introduction to bar graph, basic understanding of making basic bar graph, grouping bars together, bar graphs on counts, customization of bar graphs by changing colour, size, title, axis units, changing width and spacing of the bar chart, adding labels to bar graph, application of bar graph in business.
Unit – 3 **12 Hrs.** **Multivariate Graphical Techniques:** Introduction to correlation matrix, application of correlation matrix in the multivariate analysis, network graph, basics of heat map, difference between heat map and tree map, introduction to higher dimensional scatter plot, axis adjustment in the higher dimensional scatter plot, addition of prediction surface of higher dimensional scatter plot.
Unit-4 **12 Hrs.** **Graphical Validation:** Basics of multivariate statistical visual representations and its results, dendrogram, importance of dendrogram in grouping (cluster analysis), Scree Plot, importance of Scree Plot, application of Scree Plot in determining number of clusters and factors, QQ plot, importance of

QQ plot in distribution of data for the further quantitative analysis, PP plot, applications and usage of PP Plot for distribution detection.

Unit-5 **12 Hrs.**

Customization: Introduction to annotations – adding : text, mathematical expression , lines, arrows, shaded shapes, highlighting the texts and items, adding error bars, swapping x and y axis, changing the scaling, positioning of axis and arranging tick marks and labels, appearance of axis labels, circular graphs, using themes, theme elements, creating the own themes, legends : removing the legends, position of legends, legend title, labels in legends.

Text Books:

1. DATA VISUALIZATION PRINCIPLES AND PRACTICE, SECOND EDITION - AlexandruTelea, CRC Press.
2. Hand book of Data Visualization – Chun-houh Chen, Wolfgang Härdle, Antony Unwin, Springer Publication.

Reference Books:

1. R Graphics Cook Book, Winston Chang, First Edition, O'Reilly Publication.
2. ggplot2 Elegant Graphics for Data Analysis – Hadley Wickham, Springer Publication

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Value Added Course: Fundamentals of Data Science and Machine Learning	**2**	**3**	**-**	**-**	**Theory & Practical**

UNIT I: Introduction to Data Science **[5 hours]** Overview of Data Science - Data Science Life Cycle - Data Science Tools and Technologies - Data Collection and Data Cleaning - Exploratory Data Analysis
UNIT II: Introduction to Machine Learning **[5 hours]** What is Machine Learning - Types of Machine Learning: Supervised, Unsupervised, and Reinforcement Learning - Key Terminologies in Machine Learning - Overview of Machine Learning Algorithms - Model Evaluation and Validation
UNIT III: Supervised Learning: **[5 hours]** Regression Analysis: Linear and Logistic Regression - Decision Trees and Random Forests - Support Vector Machines - Neural Networks and Deep Learning Basics - Model Evaluation Techniques: Cross-Validation, Confusion Matrix, ROC Curve
UNIT IV: Unsupervised Learning **[5 hours]** Clustering Techniques: K-means, Hierarchical Clustering - Dimensionality Reduction: PCA, LDA, t-SNE - Association Rule Learning: Apriori, Eclat - Anomaly Detection - Applications of Unsupervised Learning
UNIT V: Practical Applications and Case Studies **[5 hours]** Real-world Applications of Data Science and Machine Learning - Case Studies in Healthcare, Finance, and Marketing - Ethics and Bias in Data Science and Machine Learning - Future Trends in Data Science and Machine Learning - Capstone Project: End-to-End Machine Learning Project
Text books: 1. "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost and Tom Fawcett
Reference Books : 1) "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron 2) "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython" by Wes McKinney

Subject Code	Subject Title	Credit	Tutorial	Practical	Lecture	Type
	WEB PROGRAMMING	**4**	**0**	**0**	**4**	**Core**

Introduction :

The basic full stack web development course is designed to provide students with a solid foundation in the front-end and back-end web development fundamentals. By the end of the course, students will have a strong understanding of the core concepts and tools required to develop and deploy web applications.

Course Outcome:

CO1	:	To Understand Internet Fundamentals and HTML
CO2	:	To Understand CSS & JAVASCRIPT
CO3	:	To Server Side Scripting – PHP
CO4	:	Understand Advanced PHP & MySql
CO5	:	To Understand Database Handling, Content Management System

Unit - I: Internet Fundamentals and HTML **12 Hours**

Internet - Internet Protocol Address - Domain Names - World Wide Web - Web Browsers - Web Servers – URL – MIME – HTTP HTML- tags- attributes - table – form – frame - format tags- image tags - embedding multimedia

Unit – II : CSS & JAVASCRIPT **12 Hours**

CSS - Java script – programming - event handling - data validation - dynamic documents – positioning elements, moving elements, element visibility, font and colour changing, dynamic content

Unit – III:PHP **12 Hours**

Why PHP and MySQL? Server-side scripting, PHP syntax and variables, comments, types, control structures, branching, looping, termination, functions, passing information with PHP, GET, POST, formatting form variables, super global arrays, strings and string functions, regular expressions, arrays, number handling, basic PHP errors/problems

Unit – IV: Advanced PHP and MySQL **12 Hours**

PHP/MySQL Functions, integrating web forms and databases, displaying queries in tables, Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, E-Mail

Unit – V: Database Handling and Content Management System **12 Hours**

PHP Database Interface - Web Hosting - Content Management System - Case Study of CMS : Joomla - The content structure – Templates - Menu links – Components - Modules -Text editors – Permissions

Text Book :

Programming the World Wide Web -Robert W.Sebesta (Pearson Education) (Second Edition)

Reference:

1. Thomas Powell “Web Design The Complete Reference”, Tata McGraw Hill, 2010.

2. Steve Suehring, Tim Converse, Joyce Park, "PHP 6 and MySQL Bible", Wiley. 2009.

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

Subject Code	Subject Title	Credit	Tutorial	Practical	Lecture	Type

	Core Course – Practical Web Programming Lab	**4**	**0**	**4**	**0**	**Core**

Introduction:

This course provides an introduction to web development and client-side scripting. After providing a review of HTML5 and CSS, the course provides exposer to the concepts of web programming using client side scripting. The course covers basic construction of web page, cascading style sheet, and java script. The course provides a foundation in computer programming in Javascript: syntax and data structures, PHP & MySql libraries.

Course Outcome:

CO1	:	Develop web pages using HTML, DHTML and Cascading Styles Sheets
CO2	:	Develop a dynamic web pages using JavaScript (client side programming)
CO3	:	Develop web pages using PHP
CO4	:	Build and consume web services
CO5	:	Construct and execute various types of SQL Queries.

LIST OF PRACTICALS

Practical No	**Details**
1	**Use of Basic Tags**
a	Design a web page using different text formatting tags.
b	Design a web page with links to different pages and allow navigation between web pages.
c	Design a web page demonstrating all Style sheet types
2	**Image maps, Tables, Forms and Media**
a	Design a web page with Imagemaps.
b	Design a web page with a form that uses all types of controls.
c	Design a web page demonstrating different semantics
d	Design a web page with different tables. Design a webpages using table so that the content appears well placed.
e	Design a web page embedding with multimedia features.
3	**Java Script**
a	. Using JavaScript design, a web page that prints factorial/Fibonacci series/any given series.

b	Design a form and validate all the controls placed on the form using Java Script
c	Write a JavaScript program to display all the prime numbers between 1 and 100.
d	Write a JavaScript program to accept a number from the user and display the sum of its digits.
e	Write a program in JavaScript to accept a sentence from the user and display the number of words in it. (Do not use split () function).
f	Write a java script program to design simple calculator.
4	**Control and looping statements and Java Script references**
a	Design a web page demonstrating different conditional statements.
b	Design a web page demonstrating different looping statements
c	Design a web page demonstrating different Core JavaScript references (Array, Boolean, Date, Function, Math, Number, Object, String, regExp).
5	**Basic PHP I**
a	Write a PHP Program to accept a number from the user and print it factorial.
b	. Write a PHP program to accept a number from the user and print whether it is prime or not.
6	**Basic PHP II**
a	Write a PHP code to find the greater of 2 numbers. Accept the no. from the user.
b	Write a PHP program to display the following Binary Pyramid: 1 0 1 1 0 1 1 0 1 0
7	**String Functions and arrays**
a	Write a PHP program to demonstrate different string functions.
b	Write a PHP program to create one dimensional array.

8	**PHP and Database**
a	Write a PHP code to create: Create a database College Create a table Department (Dname, Dno, Number_Of_faculty)
b	Write a PHP program to create a database named "College". Create a table named "Student" with following fields (sno, sname, percentage). Insert 3 records of your choice. Display the names of the students whose percentage is between 35 to 75 in a tabular format.
c	Design a PHP page for authenticating a user
9	**Email**
a	Write a program to send email with attachment.
10	**Sessions and Cookies**
a	Write a program to demonstrate use of sessions and cookies.

Text Book :

1. Thomas Powell "Web Design The Complete Reference", Tata McGraw Hill, 2010.
2. Thomas Powell and Fritz Schneider, "JavaScript 2.0: The Complete Reference", Tata McGraw Hill.
3. Steve Suehring, Tim Converse, Joyce Park, "PHP 6 and MySQL Bible", Wiley. 2009.

Reference:

1. Beginning Web Programming with HTML, XHTML, CSS & JavaScript – John Duckett (Wiley DreamTech)-Second Edition
2. PHP and MySQL Web Development - Welling – (Pearson Education)-Fourth Edition

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Mobile Computing	**4**	**6**	**0**	**0**	**Elective**

Introduction

This course aims to provide foundational knowledge of mobile device architecture, operating systems, and software development for mobile platforms. Students will explore various mobile communication protocols, network architectures, and the intricacies of wireless transmission. Emphasis is placed on the design and development of mobile applications, including user interface considerations, performance optimization, and security issues. By the end of the course, students should be proficient in developing robust, efficient, and secure mobile applications, understanding the constraints and opportunities presented by mobile environments, and staying informed about the latest trends and innovations in mobile technology.

Course Focuses:Skill Development/Entrepreneurship/Employability/**Research**

Course Outcome

CO1	:	Understand the history of mobile computing, applications, standards and mobile computing architecture.
CO2	:	Understand the mobile computing techniques related to telephone, access procedures, IVR applications and Voice XML.
CO3	:	Understand and analyse the emerging technologies Bluetooth, RFID, WiMAX, etc. also GSM.
CO4	:	Knowledge on GPRS, GPRS network architecture, Data services, applications for GPRS and limitations.
CO5	:	Knowledge on CDMA and 3G, CDMA Vs GSM, applications of 3G wireless LAN, Architecture, Adhoc and sensor networks and security features.

Unit:1 INTRODUCTION **12 hours**

Introduction: Mobility of Bits and Bytes –Wireless The Beginning – Mobile Computing – Dialogue Control – Networks – Middleware and Gateways – Application and services- Developing Mobile computer Applications – security in mobile computing – Standards _ Why is it necessary – Standard bodies. MOBILE COMPUTTING ARCHITECTURE: History of computers and Internet – Architecture for mobile computing – Three-tier architecture – Design considerations for mobile computing – Mobile computing through Internet – Making exiting applications mobile enabled

Unit:2 MOBILE COMPUTING THROUGH TELEPHONY **12 hours**

UNIT II: MOBILE COMPUTING THROUGH TELEPHONY: Evaluation of telephony – Multiple access procedures – Mobile computing through telephone – IVR Application –Voice XML – TAPI

Unit:3 EMERGING TECHNOLOGIES **12 hours**

EMERGING TECHNOLOGIES: Blue Tooth – RFID – WiMAX – Mobile IP – IPv6 – Java Card. GSM : Global System for mobile communications – GSM Architecture – GSM Entities – Call routing in GSM – PLMN Interfaces – GSM Addresses and Identifiers – Network Aspects in GSM – GSM Frequency allocations – Authentications and Security. SMS

Unit:4 GPRS **12 hours**

GPRS – GPRS and packet data network – GPRS network architecture – GPRS network operations – Data services in GPRS – Application for GPRS- Limitations – Billing and Charging. WAP : MMS – GPRS Applications

Unit:5 CDMA and 3G **12 hours**

CDMA and 3G: Spread spectrum technology – Is 95 – CDMA vs GSM – Wireless Data – Third generation networks – Applications on 3G WIRELESS LAN: Wireless LAN advantages – IEEE 802.11 standards – Architecture – Mobile in Wireless LAN – Deploying wireless LAN – Mobile adhoc networks and sensor networks – Wireless LAN Security – WiFi vs 3G

Text Books

1. MOBILE COMPUTING, Asoke K Talukder , Roopa R Yavagal, TMH, 2005

Reference Books

1. Jochen H. Schller, “Mobile Communications”, Second Edition, Pearson Education, New Delhi, 2007.

2 Dharma Prakash Agarval, Qing and An Zeng, “Introduction to Wireless and Mobile systems”, Thomson Asia Pvt Ltd, 2005.

3 Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.

Mapping of Course Outcomes with Program Outcomes:

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
	Data Mining and Data Warehousing	**4**	**6**	**0**	**0**	**Elective**

Introduction

This course aims to teach students how to efficiently organize, store, and retrieve large datasets using data warehousing techniques, while also imparting the skills needed to analyze and extract valuable insights from these datasets through data mining processes. Students will learn about the architecture and design of data warehouses, data modeling, ETL (Extract, Transform, Load) processes, and the various data mining techniques such as classification, clustering, association rules, and anomaly detection. Additionally, the course will cover the practical applications of these techniques in real-world scenarios, preparing students to apply their knowledge to solve complex data-driven problems across various industries. Through hands-on projects and case studies, students will gain practical experience and develop the ability to critically evaluate and implement data mining and warehousing solutions.

Course Focuses: Skill Development/Entrepreneurship/Employability/**Research**

Course Outcome

CO1	:	Understand the functionality of the various data mining and data warehousing component
CO2	:	Describe different methodologies used in data mining and data ware housing.
CO3	:	Explain the analyzing techniques and Online Analytical Processing
CO4	:	Explain about the association rule mining and classification
CO5	:	Compare different approaches of data ware housing and data mining with various technologies

UNIT I Basic data mining tasks: 12 Hours

Data mining versus knowledge discovery in databases - Data mining issues - data mining metrices - social implications of data mining - data mining from a database perspective. Data mining techniques: Introduction - a statistical perspective on data mining - similarity measures - decision trees - neural networks - genetic algorithms.

UNIT II Classification: 12 Hours

Introduction - statistical - based algorithms - distance - based algorithms - decision tree- based algorithms- neural network - based algorithms - rule-based algorithms - combining techniques.

UNIT III Clustering: 12 Hours

Introduction - Similarity and distance Measures - Outliers - Hierarchical Algorithms - Partitional Algorithms. Association rules: Introduction-large item sets - basic algorithms - parallel &

distributed algorithms - comparing approaches - incremental rules - advanced association rules techniques - measuring the quality of rules.

UNIT IV Data warehousing: 12 Hours

An introduction - characteristic of a data warehouse - data mats - other aspects of data mart. Online analytical processing: introduction - OLTP & OLAP systems - data modeling - star schema for multidimensional view - data modeling – multi fact star schema or snow flake schema - OLAP TOOLS - state of the market - OLAP TOOLS and the internet.

UNIT V Developing a data WAREHOUSE: 12 Hours

Why and how to build a data warehouse architectural strategies and organization issues-design consideration- data content metadata distribution of data - tools for data warehousing - performance consideration-crucial decision in designing a data warehouse. Applications of data warehousing and data mining in government: Introduction - National data warehouses- other areas for data warehousing and data mining.

Text Books

1. Margaret H. Dunham, "Data mining introductory and advanced topics", Pearson education, 2003.
2. C.S.R. Prabhu, "Data warehousing concepts, techniques, products and a applications", PHI, Second Edition. 3. Arun K.Pujari, " Techniques", Universities Press (India) Pvt. Ltd., 2003.
4. Alex Berson, Stephen J. Smith, "data warehousing, data mining, & OLAP, TMCH, 2001.
5. Jiawei Han & Micheline Kamber, " Data mining Concepts & Techniques", 2001, Academic press

Mapping of Course Outcomes with Program Outcomes:

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
	Artificial Neural Networks Lab	**4**	**6**	**-**	**-**	**Practical**

Introduction:

Understand the basic operations and creations of various applications using Matlab.

Course Outcome:

CO1	:	Understand the basic concepts of Matlab programs.
CO2	:	Implement Mat lab programs with basic operations.
CO3	:	Apply the basic operation of Neuron Experiment
CO4	:	Use the Matlab Linear Separable Problem
CO5	:	Implement the Lab Program for Multiple Curves

List of Experiments:

To study about MATLAB.

2. Write a program to perform the basics matrix operations.
3. WAP to plot the Straight line.
4. WAP to plot the Sine curve.
5. How the weight & bias value effects the output of neurons.
6. How the choice of activation function effect the output of neuron experiment with the following function purelin(n), bimary threshold(hardlim(n) haradlims(n)), Tansig(n) logsig(n)
7. How the weight and biased value are able to represent a decision boundary in the feature space.
8. How the Perceptron Learning rule works for Linearly Separable Problem.
9. How the Perceptron Learning rule works for Non-Linearly Separable Problem.
10. Write a program to draw a graph with multiple curve.

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Value Added Course - Problem Solving and Algorithm Development	**2**	**3**	**-**	**-**	**Theory & Practical**

UNIT I: Problem Solving and Algorithmic Thinking **[5 Hours]**

Problem Solving and Algorithmic Thinking Overview – problem definition, logical reasoning; Algorithm – definition, practical examples, properties, representation, algorithms vs programs.

UNIT II: Problem Understanding and Analysis **[5 Hours]**

Algorithmic thinking – Constituents of algorithms – Sequence, Selection and Repetition, input-output; Computation – expressions, logic; Problem Understanding and Analysis – problem definition, input-output, variables

UNIT III: Introduction to Problem Solving programs **[5Hours]**

Introduction to Problem Solving through programs, Steps to develop a program, Representation of Algorithm, Software development life cycle, Programming approaches, Types of programming languages, Introduction to c, Developing a c program, Console input and output functions, Syntax and Semantic errors.

UNIT IV: Operators and Expressions **[5Hours]**

Identifiers and keywords, Data types, Constants, Variables, Declarations, Expressions, Statements, Arithmetic operators, Unary operators, Relational and logical operators, Assignment operators, Conditional operator.

UNIT V: Algorithm Implementation **[5Hours]**

Branching, Looping, Arrays, Function implementation algorithm for these concepts.

Text books:

1. Riley DD, Hunt KA. Computational Thinking for the Modern Problem Solver. CRC press; 2014 Mar 27
2. Byron Gottfried, “Schaum's Outline of Programming with C”,McGraw Hill Education (India), 4th edition, 2018, ISBN: 978-9353160272

Reference Books :

1. Yashavant Kanetkar, “Let Us C”, Bpb Publications, 15th edition, 2016, ISBN:9788183331630