RATHINAM COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

Rathinam Tech Zone, Eachanari, Coimbatore – 641021.

DEPARTMENT OF COMPUTER SCIENCE

Syllabus for

B.Sc. Digital & Cyber Forensics

(I, II, III, IV, V, VI Semester)

2024 – 2025 Batch onwards

Vision and Mission of the Institution

Vision

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

Mission

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

Motto

Transform the youth into National Asset

Vision and Mission of the Department

Vision

To become a globally recognized department which is deeply connected with tech industry, fostering, transfer of knowledge and skills, instilling a research culture 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

Industry – Ready Education

Program Educational Objectives (PEO)

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

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

Program Outcomes (PO):

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

PO8 (Professionalism)	:	Understand the professional roles and responsibilities in society, especially the primary role of protection of the public and the public interest.
PO9 (Environment and Sustainability)	:	Analyze social and environmental aspects of the activities. Such ability includes an understanding of the interactions that has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.
PO10 (Moral and Ethical Awareness)	:	Embrace moral/ ethical values; formulate a position/ argument about an ethical issue from multiple perspectives and apply professional ethics, accountability and equity.
PO11 (Economics and Project Management)	:	Appropriately incorporate economics and business practices including project, risk, and change management into the practice of the system and to understand their limitations.
PO12 (Life- long Learning)	:	Identify and address their own educational needs in a changing World in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.

Program Specific Outcomes (PSO):

PSO1	:	Connecting theory with practice for societal impact in cybercrime prevention.
PSO2	:	Fostering entrepreneurship for success in the digital forensics industry.
PSO3	:	Building expertise for future leadership and innovation in advanced investigation techniques.

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
PSO5	1	2	3	2	2	2	3	2	3

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

RATHINAM COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

B.Sc. Digital & Cyber Forensics Degree Programme

B. Sc. (DCFS) 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: Programming in C	4	5	50	50	100
4	1	3	Core		Core Course – II Practical: Programming Lab – 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: Data Communication and Computer Network	4	5	50	50	100
4	2	3	Core		Core Course – IV Practical: Computer Networks Lab	4	4	50	50	100
5	2	3	Elective		Elective - I Entrepreneurship Development	4	4	50	50	100
6	2	3	Allied		Allied-II: Fundamentals of Statistics	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: Digital Forensics	4	6	50	50	100

4	3	3	Core		Core Course – VI Practical: Digital Forensics Lab	4	4	50	50	100
5	3	3	Allied		Allied-III: Cyber security and Applied Mathematics	4	5	50	50	100
6	3	4	SEC		Skill Enhancement Courses – II Practical / Training: Python for Networking and Penetration Testing	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 : Linux System Administration	4	6	50	50	100
4	4	3	Core		Core Course – VIII Practical: Linux System Administration Lab	4	4	50	50	100
5	4	3	Allied		Allied-IV : Discrete Mathematics	4	5	50	50	100
8	4	3	Elective		Elective - II i) Fundamentals of Cyber Crime ii) Cyber Policing iii) Web Application Security	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 : Ethical hacking	4	6	50	50	100
2	5	3	Core		Core Course – X Practical: Ethical hacking Lab	4	6	50	50	100

3	5	3	Elective		Elective - III i) AI in Cloud Computing ii) Deep Learning iii) Crypotography	4	6	50	50	100
	5	3	PRJ		Project	0	6	0	0	0
4	5	4	SEC		Skill Enhancement Courses – III Practical / Training : Java programming	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 : Cryptography and Network Security	4	6	50	50	100
2	6	3	Core		Core Course – XII Practical: Cryptography and Network Security Lab	4	4	50	50	100
3	6	3	Elective		Elective – IV i) Internet of Things ii) Operating system iii) Cyber Law	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: Blockchain and the Internet of Things	4	6	50	50	100
						24	**30**	**300**	**300**	**600**
					Total credit	**144**	**180**	**2100**	**1700**	**3800**

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

Certificate on Minor Discipline

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

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
11T	Part I Tamil	**3**	**6**	**1**	**0**	**Theory**

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

Course Outcome:

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

அலகு I : [12 **பாட வகுப்புகள்**]

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

அலகு II : [12 **பாட வகுப்புகள்**]

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

அலகு III : [12 **பாட வகுப்புகள்**]

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

அலகு IV : [12 **பாட வகுப்புகள்**]

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.

அலகு V : [12 **பாட வகுப்புகள்**]

இலக்கியவரலாறு பற்றியச் செய்திகள் மற்றும் புதுக்கவிதைகளின் தோற்றங்கள், வளர்ச்சிகள் அறிவும்

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

பாடநூல்கள்:

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

பார்வை நூல்கள் :

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	General English					

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

Course Outcome:

CO1	:	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.

12 Hours

Unit I:

1.1 A Patch of Land -Subramania Bharathi. - 1.2 JRD-Harish Bhat - 1.3 The Faltering Pendulum-Bhabani Bhattacharya - 1.4 Listening for General and Specific Information - 1.5 Vocabulary: Synonyms, Antonyms, Word Formation

12 Hours

Unit II:

2.1 The Sparrow-Paul Lawrence Dunbar - 2.2 Us and Them-David Sedaris (From Dress your Family in Corduroy and Denium} - 2.3 How I taught my grandmother to read-Sudha Murthy - 2.4 Appropriate use of /articles and Parts of Speech - 2.5 Listening to Giving Instructions/Directions

12 Hours

Unit III:

3.1 A Nation's Strength- Ralph Waldo Emerson - 3.2 Uncle Podger Hangs a Picture-Jerome K.Jerome 3.3 Self-Introduction, Greeting, Introducing Others. - 3.4 Error Detection

12 Hours

Unit IV:

4.1 Love Cycle - 4.2 The Gold Frame-R.K Laxman - 4.3 Communication and its types - 4.4 Close Reading - 4.5 Paragraph Writing

12 Hours

Unit V:

5.1 Translation - 5.2 Conversation - 5.3 Free Writing - 5.4 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.

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 - Types of Operators.

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: 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 IV: 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 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.
2. E. Balagurusamy, "Programming in ANSI C", Seventh Edition, McGraw Hill, 2017

Reference Books :

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

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
	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 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.
2. E.Balagurusamy, "Programming in ANSI C", Seventh Edition McGraw Hill, 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

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
CO2	3	3	3	1	1	3	2	1	2	1	1	1
CO3	3	3	3	1	2	2	1	3	2	1	3	1
CO4	2	1	3	2	1	3	2	3	1	2	2	2
CO5	3	1	3	1	2	2	2	3	2	2	2	1

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

List of Practical Programs:

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

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

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

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

Introduction:

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

Course Outcome:

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

அலகு I : [12 **பாட வகுப்புகள்**]

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

அலகு II : [12 **பாட வகுப்புகள்**]

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

அலகு III: [12 **பாட வகுப்புகள்**]

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

அலகு IV: [12 **பாட வகுப்புகள்**]

சிறுகதைகள் : தேர்ந்தெடுக்கப்பட்ட 4-சிறுகதைகள் - மாணவர்களின் தனித்திறனை வளர்க்கும் பொருட்டு எடுக்கப்படும். சமுதாய செய்திகள் மற்றும் சமுதாய நோக்குப் பற்றி விளக்கம் தருதல்.

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
22E	**General English**					

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

Course Outcome:

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

12 Hours

Unit I:

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

12 Hours

Unit II:

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

12 Hours

Unit III:

3.1 Alchemist-Paulo Coelho

12 Hours

Unit IV:

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

12 Hours

Unit V:

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

5.4 Precis Writing.

Text books:

1. The Alchemist - Paulo Coelho Harper - 2005

Reference Books :

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Core : Data Communication and Computer Network	**4**	**6**	**0**	**0**	**Theory**

Introduction:

This course covers communication protocols, layered network architectures, computer system interfacing standards, peer-to-peer data link communication protocols, and the design of basic network systems. Students will analyze various data communication technologies.

Course Outcome:

CO1	:	Understand the fundamentals of logic circuits and their applications in digital systems.
CO2	:	Introduce fundamental types of computer networks.
CO3	:	Demonstrate understanding of the TCP/IP and OSI models, including their advantages and disadvantages.
CO4	:	Explore the layers of the OSI Model in detail.
CO5	:	Introduce the UDP and TCP models.

Unit I : **[12 periods]**

Data Communications: Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, Example Networks such as ATM, Frame Relay, ISDN Physical layer: Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

Unit II: **[12 periods]**

Data link layer: Introduction, Framing, and Error – Detection and Correction – Parity – LRC – CRC Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols. 111 Medium Access sub layer: ALOHA, CSMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization.

Unit III: **[12 periods]**

Network layer: Logical Addressing, Internetworking, Tunneling, Address mapping, ICMP,IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols.

Unit IV: **[12 periods]**

Transport Layer: Process to Process Delivery, UDP and TCP protocols, Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks.

Unit V: **[12 periods]**

Application Layer: Domain name space, DNS in internet, electronic mail, SMTP, FTP,WWW, HTTP, SNMP.

Text books:

1. Data Communications and Networking, Behrouz A. Forouzan , Fourth Edition TMH,2006.
2. Computer Networks, Andrew S Tanenbaum, 4th Edition. Pearson Education, PHI.

Reference Books :

1. Computer Networking: A Top-Down Approach Featuring the Internet. James F.Kurose &Keith W. Ross, 3rd Edition, Pearson Education

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
	Core LAB: Data Communication and Computer Network Lab	**4**	**6**	**0**	**0**	**LAB**

Introduction: The Data Communication and Computer Network Lab offers practical training in network analysis, cybersecurity, and digital forensics. Students will gain hands-on experience with tools like Wireshark, Scapy, and OpenVPN, learning essential skills for understanding network traffic, securing communications, and investigating security incidents.

Course Outcome:

CO1	:	Gain proficiency in network analysis tools like Wireshark and Scapy.
CO2	:	Understand network security fundamentals and detection techniques.
CO3	:	Configure and test firewall and intrusion detection systems (IDS).
CO4	:	Learn digital forensics methods for data recovery and analysis.
CO5	:	Master secure communication protocols, including VPN configuration.

List of Experiments:

1. Network Traffic Analysis: Install Wireshark to capture and study network traffic patterns for detecting anomalies.
2. Packet Sniffing and Spoofing: Use Wireshark to passively capture packets and Scapy to actively manipulate and send forged packets on a network.
3. Malware Analysis: Use IDA Pro to analyze malware code statically and OllyDbg to observe its behavior dynamically, complemented by Wireshark for network activity analysis.
4. Firewall Configuration and Testing: Set up pfSense to define firewall rules, test network connectivity, and document configurations for security management.
5. Intrusion Detection Systems (IDS): Install and configure Snort to monitor network traffic, create detection rules, and analyze alerts for identifying potential threats.
6. Digital Forensics: Data Recovery: Create forensic images with FTK Imager, analyze with Autopsy for recovering deleted files, and document findings for forensic investigations.
7. Secure Communication: VPN Configuration: Install and configure OpenVPN to establish secure connections, verify functionality, and document setup procedures for secure remote access.

Text books:

1. Data Communications and Networking, Behrouz A. Forouzan , Fourth Edition TMH,2006.
2. Computer Networks, Andrew S Tanenbaum, 4th Edition. Pearson Education, PHI.

Reference Books :

1. Computer Networking: A Top-Down Approach Featuring the Internet. James F. Kurose & Keith W. Ross, 3rd Edition, Pearson Education.

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
	Entrepreneurial Development Program	**4**	**6**	**0**	**0**	**LAB**

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

Course Outcome:

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

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 : **[12 periods]**

The innovation process – the diagnosis – the consultation of group – selecting a strategy preparing the organization setting up the investment. Women entrepreneur – problems faces 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.

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
	Allied – Fundamentals of Statistics	**4**	**4**	**-**	**-**	**Theory**

Introduction: To encourage students to explore and unshackle their creative abilities in statistics.

Course Outcome:

CO1	:	To understand the basic concepts of statistics
CO2	:	To understand the description of data using statistical techniques.
CO3	:	To understand the statistical methods involved in hypothesis testing.
CO4	:	To understand the difference between parametric and non-parametric tests.
CO5	:	To understand the random variables, statistical expectation and its statistical and mathematical properties and concepts of regression and correlation analysis.

12 Hours

Unit I: Introduction to Statistics:

Methods of collection – Complete enumeration – Sample Survey - Primary data - Secondary data sources - Types of variables. Nominal, ordinal and scale data. Presentation of Data: Presentation of data by tables - construction of tables (Univariate and Bivariate) – frequency table and contingency table

12 Hours

Unit II: Summarizing data using Statistical Techniques

Diagrammatic presentation – Line diagram, Bar diagrams: Simple, multiple, subdivided and Percentage-Pie chart, comparative pie chart - Graphical representation of a frequency distribution by histogram and frequency polygon and Ogives

12 Hours

Unit III: Statistical Measure: Central Tendency

Analysis of Data (Univariate) – Measures of central tendency: Arithmetic mean- Median and Mode choice of an average-characteristic of a good average

12 Hours

Unit IV: Statistical Measure: Dispersion

Measures of dispersion – Range-Quartile deviation-mean deviation - standarddeviation - relative measures of dispersion - Coefficient of Variance

12 Hours

Unit V: Theory of Random variables and Expectations:

Analysis of Data (Bivariate) – Correlation- Scatter plot-coefficient of correlation- Pearson's Correlation Coefficient, Spearmen's rank correlation coefficient- correlation coefficient for bivariate frequency table- Association of attributes: Chi- square test of independence of attributes

Text books:

1. Fundamentals of mathematical statistics – SC Gupta and VK Kapoor, Sultan Chand & Sons Publication, New Delhi.
2. Goon A.M., Gupta M.K. and Dasgupta B. (2002): *Fundamentals of Statistics*, Vol. I& II, 8th Edn. The World Press, Kolkata

Reference Books :

1. Irwin Miller, Marylees Miller (2006): *John E. Freund's Mathematical Statistics with Applications*, (7th Edn.), Prentice Hall International INC.
2. Mood, A.M. Graybill, F.A. and Boes, D.C. (2007): *Introduction to the Theory ofStatistics*, 3rd Edn., (Reprint), Tata McGraw-Hill Pub. Co. Ltd

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

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

Course Outcome:

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

அலகு I : [12 **பாட வகுப்புகள்**]

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

அலகு II : [12 **பாட வகுப்புகள்**]

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

அலகு III: [12 **பாட வகுப்புகள்**]

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

அலகு IV: [12 **பாட வகுப்புகள்**]

கணிப்பொறி வரலாறு- கணிப்பொறி வகைகள், கணிப்பொறி பயன்பாடுகள், மாத.

நாட்காட்டி தயாரித்தல் விளம்பரம் உருவாக்கம், மதிப்பெண் பட்டியல் தயாரித்தல், கணினி கலைச்சொல்லாக்கம் விளக்கம் கொடுத்து கற்பிக்கப்படும்.

அலகு V : [12 **பாட வகுப்புகள்**]

மொழிப்பெயர்ப்பு வரலாறு, இயல்புகள் பயன் ஆகியவைகள் அறிந்து கொள்ள பயிற்சிகள் கொடுத்து கற்பிக்கப்படும்.

பாடநூல்கள்:

1. எழுதுவது எப்படி- மகரம் வாசகர் வட்டம், 2. தமிழ் இணைய இதழ்கள் - அண்ணா கண்ணன்

3. .மொழிபெயர்ப்புக்கலை : மு.வளர்மதி, 4. மொழிபெயர்ப்பியல் : சு.சண்முக வேலாயுதம்,

5. மொழி பெயர்ப்பும், சொல்லாக்கமும் தென்புலோலியூர், மு.கணபதிப்பிள்ளை

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
32E	**General English**					

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

Course Outcome:

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

12 Hours

Unit I:

1.1 The Voice of the Mountains -Mamang Dai - 1.2 Romeo & Juliet- The Balcony Scene - 1.3 Writing Letters and Emails - 1.4 Data Interpretation and Reporting

12 Hours

Unit II:

2.1 Sita- Toru Dutt - 2.2 Macbeth-Banquet Scene - 2.3 Writing and messaging on Social Media Platforms (blogs, Twitter, Instagram, Facebook)

12 Hours

Unit III:

3.1 A Song of Hope- Oodgeroo Noonuccal - 3.2 Julius Caesar- Murder Scene - 3.3 Tryst with Destiny- Jawaharlal Nehru - 3.4 Learning netiquette, email etiquette

12 Hours

Unit IV:

4.1 In an Artist's Studio- Christina Rossetti - 4.2 Yes, We Can Barack Obama - 4.3 Meeting Etiquettes- Language, dress code, voice modulation. - 4.4 Online Meetings- Terms and expressions used - 4.5 Framing Questions

12 Hours

Unit V:

5.1 You've Got to Find What You Love- Steve Jobs - 5.2 Group Discussion - 5.3 Conducting and participating in meetings - 5.4.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. Famous Speeches by Mahatma Gandhi, Creatingspace Independent Publishing Platform,2016
3. How to Build a Professional Digital Profile Kindle Edition
4. by Jeanne Kelly Bernish, Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
5. Keys to Teaching Grammar to English Language Learners, Second Ed.: A Practical Handbook by Keith S Folse, Michigan Teacher Training, 2016
6. 5. Role Play-Theory and Practice. Krysia M Yardley-Matwiejczuk, SAGE Publications Ltd, 1997

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
	Core Course – V Theory: Digital Forensics	**4**				**Core Theory**

Introduction: Digital forensics involves recovering and investigating material from digital devices, often related to computer crime. This course covers the basics, technical foundations, lab setup, evidence acquisition, and analysis techniques in digital forensics. Students will be prepared to apply these skills in law enforcement, civil litigation, and intelligence.

Course Outcome:

CO1	:	Understand basic concepts and applications of digital forensics.
CO2	:	Master technical concepts like data representation and memory types.
CO3	:	Learn to set up a forensics lab and ensure validation.
CO4	:	Acquire and understand challenges in digital evidence collection.
CO5	:	Analyze digital evidence and create comprehensive reports using various tools.

12 Hours

Unit 1: Introduction to Digital Forensics: Understanding Digital Forensics - What Is Digital Forensics? - Goals and Categories of Digital Forensics - Users and Applications in Different Sectors (Law Enforcement, Civil Litigation, Intelligence) - Introduction to Digital Forensics Investigation Types

12 Hours

Unit 2: Technical Foundations: Essential Technical Concepts - Data Representation (Decimal, Binary, And Hexadecimal) - File Structures and Metadata - Memory Types (Volatile and Nonvolatile) - File Systems and Computing Environments

12 Hours

Unit 3: Forensics Lab Setup and Initial Response: Computer Forensics Lab Requirements - Physical Facility Requirements - Hardware and Software Tools - Validation, Verification, and Accreditation - Initial Response and First Responder Tasks - Search and Seizure Procedures - First Responder Toolkit - Documentation and Evidence Handling

12 Hours

Unit 4: Digital Evidence Acquisition: Acquiring Digital Evidence - Forensic Image File Formats - Live and Static Acquisition Techniques - Challenges and Limitations in Acquisition.

12 Hours

Unit 5: Analysis and Reporting: Analyzing Digital Evidence - Analyzing Hard Drive and RAM Forensic Images - Tools and Techniques (Arsenal Image Mounter, Autopsy, and Volatility) - Digital Forensics Report Elements of a Digital Forensics Report - Auto generated Reports and Presentation of Findings

Text books:

3. Hassan, Nihad A. Digital forensics basics: A practical guide using Windows OS. Apress, 2019.
4. Warren G. Kruse II and Jay G. Heiser, "Computer Forensics: Incident Response Essentials", Addison Wesley, 2002.

Reference Books :

1. Vacca, J, Computer Forensics, Computer Crime Scene Investigation, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.

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
	Core Course – V Theory: Digital Forensics LAB	**4**				**Core LAB**

Introduction: Digital forensics involves the identification, preservation, extraction, and documentation of digital evidence for legal purposes. This course covers the methodologies, tools, and practical skills necessary for conducting effective digital forensic investigations.

Course Outcome:

CO1	:	Understand the principles and methodologies of digital forensics.
CO2	:	Use essential digital forensic tools like Autopsy and FTK Imager.
CO3	:	Convert data representations and analyze memory types.
CO4	:	Set up a forensics lab and handle evidence properly.
CO5	:	Acquire, analyze, and report digital evidence.

List of Experiments

1. **Introduction to Digital Forensics Tools**
   - Familiarization with Autopsy and FTK Imager.
2. **Data Representation and Memory Types**
   - Conversion between decimal, binary, and hexadecimal.
   - Analysis of volatile and non-volatile memory.
3. **Forensics Lab Setup and Evidence Handling**
   - Setting up a digital forensics lab environment.
   - Best practices for evidence handling and documentation.
4. **Digital Evidence Acquisition**
   - Live acquisition of digital evidence.
   - Static acquisition of digital evidence.
   - Addressing challenges and limitations in acquisition.
5. **Analysis and Reporting**
   - Analyzing hard drive forensic images using Autopsy.
   - Analyzing RAM forensic images using Volatility.
   - Generating comprehensive digital forensic reports.

Text books:

1. Hassan, Nihad A. Digital forensics basics: A practical guide using Windows OS. Apress, 2019.
2. Warren G. Kruse II and Jay G. Heiser, "Computer Forensics: Incident Response Essentials", Addison Wesley, 2002.

Reference Books :

1. Vacca, J, Computer Forensics, Computer Crime Scene Investigation, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.

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
	Allied – Cyber Security With Applied Mathematics					

Introduction: This paper enables the students to relate the concept of cyber security with applied mathematics.

Course Outcome:

CO1	:	To understand various types of cyber-attacks and cyber-crimes
CO2	:	To learn threats and risks within context of the cyber security.
CO3	:	To demonstrate the concepts of Numbers, Quantification, sets, logical reasoning, probability and calculus
CO4	:	To apply the different cryptographic operations of symmetric cryptographic algorithms
CO5	:	To apply the different cryptographic operations of public key cryptography

12 Hours

Unit I: Basic Cyber Security Concepts, layers of security, Security trends – Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies – Model of network security – Security attacks, services and mechanisms.

12 Hours

Unit II: Classical encryption techniques: substitution techniques, transposition techniques, steganography) – Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

12 Hours

Unit III: Numbers, Quantification and Numerical Applications – Prime Numbers, Encryptions using Prime Numbers – Binary Numbers – Indices, Logarithm and Antilogarithm – Laws and properties of logarithms – Simple applications of logarithm and antilogarithm

12 Hours

Unit IV: Mathematics of Symmetric Key Cryptography: Algebraic structures - Modular arithmetic-Euclid's algorithm Congruence and matrices - Groups, Rings, Fields – Finite fields Symmetric Key Ciphers: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation.

12 Hours

Unit V: Mathematics of Asymmetric Key Cryptography: Primes – Primality Testing – Fermat's and Euler's Theorem - Chinese Remainder Theorem – Exponentiation and logarithm – Asymmetric Key Ciphers: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange – ElGamal cryptosystem – Elliptic curve arithmetic – Elliptic curve cryptography.

Text 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.
3. Applied Mathematics – Dan Simpson, Burning Eyebooks.

Reference Books :

1. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt. Ltd.
2. B.B. Gupta, D.P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm,

Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.
3. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
4. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&FGroup.

	Practical / Training: Python for Networking and Penetration Testing	**4**				**Skill Enhancement Courses**

Introduction: This course equips students with essential Python skills for networking and penetration testing. Students will learn Python scripting, network traffic analysis, attack script development, fuzzing, brute-forcing techniques, cryptographic algorithms, and keylogging methods. By the end, students will proficiently automate security tasks and conduct comprehensive penetration testing using Python.

Course Outcome:

CO1	:	Master Python scripting for networking tasks.
CO2	:	Analyze network traffic with Scapy using Python.
CO3	:	Automate penetration testing with Python scripts.
CO4	:	Apply Python for fuzzing and brute-forcing techniques.
CO5	:	Use Python for cryptographic functions, keylogging, and screen grabbing in security assessments.

12 Hours

Unit 1: Python Scripting Essentials: Setting up the scripting environment -Installing third-party libraries - Python language essentials - Variables and types - Strings - Lists - Dictionaries - Networking -Handling exceptions

12 Hours

Unit 2: Analyzing Network Traffic with Scapy : Sockets modules - Raw socket programming - Investigate network traffic with Scapy; Application Fingerprinting with Python: Web scraping - Parsing HTML with lxml-OS fingerprinting - Get the EXIF data of an image - Web application fingerprinting

12 Hours

Unit 3: Attack Scripting with Python: Injections - Broken authentication - Cross-site scripting (XSS) - Insecure direct object references - Security misconfiguration - Sensitive data exposure - Missing function level access control - CSRF attacks - Using components with known vulnerabilities - Unvalidated redirects and forwards

12 Hours

Unit 4: Fuzzing and Brute-Forcing: Fuzzing - Classification of fuzzers - Fuzzing and brute-forcing passwords - Dictionary attack - SSH brute-forcing - SMTP brute-forcing - Brute-forcing directories and file locations - Debugging and Reverse Engineering - Reverse engineering - Portable executable analysis - Listing all imported and exported symbols - Disassembling with Capstone - PEfile with Capstone – Debugging

12 Hours

Unit 5: Crypto, Hash, and Conversion Functions: Cryptographic algorithms - Hash functions; Keylogging and Screen Grabbing : Keyloggers - Keyloggers with pyhook - Screen grabbing; Attack Automation: Paramiko-python-nmap - W3af REST API - Metasploit scripting with MSGRPC - ClamAV antivirus with Python - OWASP ZAP from Python - Accessing Nessus 6 API with Python

Text books:

1. Rehim, Rejah. Effective python penetration testing. Packt Publishing Ltd, 2016.

Reference Books :

1. Duffy, Christopher. Learning penetration testing with Python. Packt Publishing Ltd, 2015.

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
41T	**Part I Tamil**	**3**	**6**	**1**	**0**	**Theory**

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

Course Outcome:

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

அலகு I **:** **[12 பாட வகுப்புகள்**]

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

அலகு II : **[12 பாட வகுப்புகள்]**

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

அலகு III: **[12 பாட வகுப்புகள்**]

ஓரங்க நாடகம் வரலாறு, நடகத்தின் தோற்றமும், வளர்ச்சியும். - ஓரங்க நாடகம் எழுதுதல், கதை அமைப்பு, அடிப்படைக்கூறுகள் - வானொலி அல்லது தொலைக்காட்சி மற்றும் திரைப்படத்துக்கு - ஓரங்க நாடகம் எழுதுதல்.

அலகு IV**:** **[12 பாட வகுப்புகள்**]

இதழியல் விளக்கம் - பத்திரிக்கை நிர்வாக அமைப்பு மற்றும் ஆசிரியர்கள் - 3.இன்றைய தமிழ் நாளிதழ்கள் பற்றிய செய்கள் (தினமணி, தினமலர், தினத்தந்தி, தினகரன்).

அலகு V **:** **[12 பாட வகுப்புகள்]**

நூல் மதிப்புரை - திறனாய்வு செய்தல் - 2.கடிதம் மற்றும் விண்ணப்பம் எழுதுதல் - கட்டுரை திறனை வளர்த்தல்- கட்டுரை தலைப்பு, கட்டுரை அமைப்பு முறைகள்

பாடநூல்கள்:

1.புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும் வல்லிக்கண்ணன்
2.மக்கள் தகவல் தொடர்பியல்- முனைவர் கி.இராசா
3.கலைச்சொல்லாக்கம் இராதா செல்லப்பன்
4 இதழியல் கலை டாக்டர் மா.பா.குருசாமி

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
42E	**General English**					

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

Course Outcome:

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

12 Hours

Unit I:

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

12 Hours

Unit II:

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

12 Hours

Unit III:

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

12 Hours

Unit IV:

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

12 Hours

Unit V:

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

Text books:

1 Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban by Malala Yousafzai, Christina Lamb, Little Brown, 2013
2. My Inventions by Nikola Tesla, Ingram Short title, 2011 Edition

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Core Course – VII: Linux System Administration	**4**	**4**	**-**	**-**	**Theory**

Introduction:

Course Outcome:

CO1	:	Understanding the basic set of commands and utilities in Linux/UNIX systems.
CO2	:	To learn to develop software for Linux/UNIX systems.
CO3	:	To learn the important Linux/UNIX library functions and system calls.
CO4	:	To obtain a foundation for an advanced file system manipulation.
CO5	:	To understand the Pattern, URL and E-mail for web content.

Unit II: Introduction to Linux System Administration [12 periods]

Introduction-Printing in the terminal-Playing with variables and environment variables-Function to prepend to environment variables-Math with the shell-Playing with file descriptors and redirection-Arrays and associative arrays-Visiting aliases-Grabbing information about the terminal-Getting and setting dates and delays.

Unit II: Shell Scripting Fundamentals [12 periods]

Concatenating with cat-Recording and playing back of terminal sessions-Finding files and file listing-Playing with xargs-Translating with tr-Checksum and verification-Cryptographic tools and hashes-Sorting unique and duplicates-Temporary file naming and random numbers-Splitting files and data.

Unit III: File System Management [12 periods]

Generating files of any size-The intersection and set difference (A-B) on text files-Finding and deleting duplicate files-Working with file permissions, ownership, and the sticky bit-Making files immutable-Generating blank files in bulk-Finding symbolic links and their targets-Enumerating file type statistics-Using loopback files-Creating ISO files and hybrid ISO-Finding the difference between files, patching.

Unit IV: Text Processing and Scripting [12 periods]

Using regular expressions-Searching and mining a text inside a file with grep-Cutting a file column-wise with cut-Using sed to perform text replacement-Using awk for advanced text processing-Finding the frequency of words used in a given file-Compressing or decompressing JavaScript-Merging multiple files as columns-Printing the nth word or column in a file or line.

Unit V: Web Content Management **[12 periods]**

Parsing e-mail addresses and URLs from a text-Removing a sentence in a file containing a word-Replacing a pattern with text in all the files in a directory-Text slicing and parameter operations - Downloading from a web page - Downloading a web page as plain text -A primer on cURL - Accessing Gmail e-mails from the command line - Parsing data from a website - Image crawler and downloader - Web photo album generator - Twitter command-line client - Creating a "define" utility by using the Web backend - Finding broken links in a website - Tracking changes to a website - Posting to a web page and reading the response

Text books:

1. "Linux Shell Scripting Cookbook", by Shantanu Tushar & Sarath Lakshman,Published by Packt Publishing Ltd., Second Edition.

Reference Books :

1. Eric Foster Johnson, John C. Welch and Micah Anderson, " Beginning Shell Scripting",Wiley, 2005.
2. Carl Albing, JP Vossen and Cameron Newham,"Bash Cookbook", O'Reilly Media, 2007.
3. Richard Blum, "Linux Command Line and Shell Scripting Bible", Wiley, 2008.

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
	Core LAB – VII: Linux System Administration LAB	**4**	**4**	**-**	**-**	**Theory**

Introduction: This course on Linux System Administration LAB focuses on practical aspects of shell scripting and system administration tasks on Linux environments.

Course Outcome:

CO1	:	Understand and identify different types of shells and their usage in Linux.
CO2	:	Develop proficiency in shell scripting techniques for automation and system management.
CO3	:	Apply regular expressions and file manipulation commands effectively in Linux.
CO4	:	Demonstrate proficiency in handling file operations, including sorting, searching, and duplicating files.
CO5	:	Utilize advanced shell scripting techniques for text processing and system administration tasks.

List of Experiments:

1. Write a Shell program to identify the Current Shell and length of the String.
2. Write a Shell program to Count backwards for 100 to 0 Using Loops.
3. Write a Shell program to Search File name using regular Expression.
4. Write a Shell program for sorting unique and duplicate Text Files.
5. Write a Shell program to perform operation using intersection, difference and set difference.
6. Write a Shell program to find and duplicate File in a directory of files.
7. Write a Shell program to perform Silent output for grep.
8. Write a Shell program to Printing lines before and after text matches.
9. Write a Shell program for printing text between line numbers or patterns.
10. Write a Shell program for Parsing e-mail addresses and URLs from text.

Text books:

2. "Linux Shell Scripting Cookbook", by Shantanu Tushar & Sarath Lakshman,Published by Packt Publishing Ltd., Second Edition.

Reference Books :

4. Eric Foster Johnson, John C. Welch and Micah Anderson, "Beginning Shell Scripting",Wiley, 2005.
5. Carl Albing, JP Vossen and Cameron Newham,"Bash Cookbook", O'Reilly Media, 2007.
6. Richard Blum, "Linux Command Line and Shell Scripting Bible", Wiley, 2008.

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
	Allied – DISCRETE MATHEMATICS	4	4	-	-	Theory

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

Course Outcome:

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

12 Hours

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

12 Hours

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

12 Hours

Unit III: 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

12 Hours

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

12 Hours

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

Text books:

1. Discrete mathematics – T. Veerarajan – McGraw Hill Education 2017
2. Ralph P. Grimaldi, "Discrete and Combinatoral Mathematics – An applied introduction", Third Edition, Addison Wesley Publishing Company, 1994.

Reference Books :

1. Discrete Mathematical Structures with application to Computer Science, Tremblay and Manohar – (Tata McGraw Hill, New Delhi) 1997.
2. Discrete mathematics, Venkataraman .M.K. and others –2000 The National Publishing Company.

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Fundamentals of Cyber Crime	**4**	**4**	**-**	**-**	**Elective**

Introduction: This course provides an in-depth understanding of cybercrime, including types of attacks, their impact on individuals and organizations, and global perspectives. Students will learn about security policy violations, cybercrimes on social media, and threats in cloud computing.

Course Outcome:

CO1	:	Understand the fundamentals and types of cybercrimes.
CO2	:	Analyze cybercrimes targeting organizations.
CO3	:	Identify security policy violations and related crimes.
CO4	:	Explore global perspectives on cybercrimes.
CO5	:	Understand cybercrimes in the context of cloud computing and emerging threats.

Unit I : Cyber Crime - Overview **[12 periods]**

Cyber Crime- Overview, Internal and External Attacks, Attack Vectors. Cybercrimes against Individuals – E-mail spoofing and online frauds, Phishing and its forms, Spamming, Cyber-defamation, Cyber stalking, Cyber Bullying and harassment, Computer Sabotage, Pornographic offenses, Password Sniffing. Key loggers and Screen loggers. Cyber Crimes against Women and Children.

Unit II: Cybercrime against organization **[12 periods]**

Cybercrime against organization – Unauthorized access of computer, Password Sniffing, Denial-of-service (DOS) attack, Backdoors and Malwares and its types, E-mail Bombing, Salami Attack, Software Piracy, Industrial Espionage, Intruder attacks

Unit III: Security policies violations **[12 periods]**

Security policies violations, Crimes related to Social Media, ATM, Online and Banking Frauds. Intellectual Property Frauds. Cyber Crimes against Women and Children.

Unit IV: Global perspective on cybercrimes **[12 periods]**

A global perspective on cybercrimes, Phases of cyber-attack – Reconnaissance, Passive Attacks, Active Attacks, Scanning, Gaining Access, Maintaining Access, Lateral movement and Covering Tracks. Detection Avoidance, Types of Attack vectors, Zero-day attack, Overview of Network based attacks.

Unit V: Cybercrime and cloud computing **[12 periods]**

Cybercrime and cloud computing, Different types of tools used in cybercrime, Password Cracking – Online attacks, Offline attacks, Remote attacks, Random Passwords, Strong and weak passwords. Viruses and its types. Ransomware and Crypto currencies. DoS and DDoS attacks and their types. Cybercriminal syndicates and nation state groups.

Text books:

1. Nina Godbole and SunitBelapore; “Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, Wiley Publications, 2011.
2. Bill Nelson, Amelia Phillips and Christopher Steuart; “Guide to Computer Forensics and Investigations” – 3rd Edition, Cengage, 2010, BBS.
3. Shon Harris, “All in One CISSP, Exam Guide Sixth Edition”, McGraw Hill, 2013.

Reference Books :

1. William Stallings; "Cryptography and Network Security: Principles and Practices", Fifth Edition, Prentice Hall Publication Inc., 2007.
2. Atul Jain; "Cyber Crime: Issues, Threats and Management", 2004.
3. Majid Yar; "Cybercrime and Society", Sage Publications, 2006.
4. Michael E Whiteman and Herbert J Mattord; "Principles of Information Security",Vikas Publishing House, New Delhi, 2003.
5. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002

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
	Cyber Policing	**4**	**4**	**-**	**-**	**Core Theory**

Introduction:

The Cyber Policing course provides an overview of the history, organization, and operations of the Indian police. It covers crime prevention, modern policing challenges, and strategies to improve police-community relations.

Course Outcome:

CO1	:	Understand the historical development of Indian police.
CO2	:	Analyse the structure and functions of state and central police organizations.
CO3	:	Evaluate crime prevention techniques and investigation methods.
CO4	:	Learn routine police station activities and record-keeping.
CO5	:	Assess and improve public perception and police-community relations.

Unit I : History of Indian Police **[12 periods]**

History of Indian Police: Ancient period, Medieval period and British period- Modern policing- Community policing- Police Act, 1861- Police Commission Reforms and Recommendations- National Police Commission recommendations (NPC), 1979

Unit II: Police organization and structure **[12 periods]**

State police organization and structure - Urban and rural policing- Hierarchy in city police, district police and police battalion- Functioning of State Police: Law and Order, Intelligence and Special Unit- Central police organizations: RAW, 18, NIA, CBI, CISF, CRPF, RPF- Police research and Crime Statistics Organizations: BPR&D, NCRB.

Unit III: Crime prevention **[12 periods]**

Crime prevention: Patrolling, beat, surveillance, traffic regulation and maintenance of law & order- Collection of intelligence and its use- Use of scientific methods to tackle crime- Examination of crime scene and investigation- Methods of Investigation: Information, Modus Operandi and Interrogation, Recording of FIR, Case Diary, NC register, Collection of Evidence, Examination of Witnesses and Suspects, Confession of the accused and filing of charge Sheet.

Unit IV: Police Station Routine **[12 periods]**

Police Station Routine: Roll Call, Duties of Prevention of Crime, Station Guards, Weekly routine duties of police men in cities and villages- Records maintained in police stations: General Diary, KO register, Prisoners Search Register, Duty Roaster, Sentry Relief Book, Duty Roster, Gun license register, Tapal register, arrest card and bail bond- New challenges faced by police: Cybercrime, financial frauds, terrorists, coastline security and organized

Unit V: Public perception of police **[12 periods]**

Public perception of police - Measures to improve police image in urban and rural areas- Measurements to improve police-public relationship through community policing- Measures to

tackle corruption - Treatment of victims and offender by the police- Camoalun to prevent drug abuse and to ensure safety of women in cities.

Text books:

1. Krishna Mohan Mathur. (1994). lndianPolice: Roles and Challenges. Gyan Publishing House, New Delhi
2. Barker, M., &Petley, J. (2001). Ill effects: The media/violence (2nd Ed.). London: RoutledgeBelson.
3. Fisher, Barry A. J. (2000). Techniques of crime scene investigation (6th Ed .). New York: CRC Press.

Reference Books :

6. Diaz, S. M. (1976). New dimensions to the police role and functions in India. Hyderabad: National Police Academy.
7. Gautam, D. N. (1993). The Indian police: A study in fundamentals. New Delhi: Mittal Publications.
8. Krishna Mohan Mathur. (1989). Internal Security Challenges and Police in a Developing Society. RBSA Publishers.

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
	Web Application Security	**4**	**4**	**-**	**-**	**Elective II**

Introduction: The "Web Application Security" course provides an in-depth understanding of web application security principles and practices. It covers web technologies, scripting languages, server-side programming, HTML5, CSS3, and the evolution from Web 2.0 to Web 3.0, equipping students with the skills to secure robust web applications

Course Outcome:

CO1	:	CO1: Understand web application fundamentals, including HTML, DHTML, and CGI.
CO2	:	CO2: Gain proficiency in scripting languages for dynamic web pages.
CO3	:	CO3: Develop server-side programming skills with ASP, JSP, and Servlets.
CO4	:	CO4: Explore HTML5 and CSS3 features for modern web development.
CO5	:	CO5: Comprehend Web 2.0 and Web 3.0 evolution and applications.

Unit I : introduction to web applications [12 periods]

Data with URL- HTML - DHTML: Cascading Style Sheets, Common Gateway Interface: Programming CG! Scripts - HTML Forms-:- Custom Database Query Scripts - Server Side Includes - Server Security issues.

Unit II: Introduction to Scripting Languages [12 periods]

XHTML: Introduction, CSS- Scripting languages- Java Script: Control statements, Functions, Arrays, Objects - DOM- Ajax enable rich internet applications.

Unit III: Server Side Programming [12 periods]

Server side Programming - Active server pages - Java server pages - Java Servlets: Servlet container- Exceptions - Sessions and Session Tracking_ - Using Servlet context - Dynamic Content Generation - Servlet Chaining and Communications.

Unit IV: HTML 5 & CSS 3 [12 periods]

HTML review, Feature detection , The HTML5 new Elements, Canvas, Video and audio, Web storage, Geo location, Offline Web pages , Micro data, HTML5 APLS, Migrating from HTML4 to HTML5, CSS3.

Unit V: Web 2.0 [12 periods]

WEB 2.0- HISTORY, characteristics, technologies, concepts, usage, web2.0 in education, philanthropy, social work. Web 3.0- Theory-and history understanding. Basic web artifacts and applications, implementation. MS share point - Share point 2013 overview ,share (Put social to work ,Share your stuff, Take share point on the go), Discover (find experts, discover answers, find what you are looking for), Manage (cost, risk, time)

Text books:

1. Deitel, Deitel and Neita, -Internet and World Wide _Web- How to programll, Pearson Educatio4th Edition, 2009.
2. Elliotte Rusty Herold, -Java Network Programming II, O'Reilly Publications, 3rd Edition,2004.

Reference Books :

1. Jeffy Dwight, Michael Erwin and Robert Nikes -USING CGIII, PH.I Publications, 1997
2. Jason Hunter, William Crawford -Java Servlet Programming O'Reilly Publications, 2nd Edition, 2001.
3. Eric Ladd and Jim O'Donnell, etal, -USING HTML4, XML, and JAVA1.2, Prentice Hall,2003
4. Jeremy Keith, -Html5 for web designers

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
	Ethical Hacking Lab	**4**	**6**	**-**	**-**	**Core Theory**

Introduction:

To help students understand how ethical hacking is used as a method to prevent hacking. To facilitate students, appreciate the need for understanding non-technology aspects of ethical hacking such as legal frameworks, documentation and report writing.

Course Outcome:

CO1	:	Explain the importance of numerous methods of real-world information intelligence.
CO2	:	Differentiate the processes of vulnerability assessment and ethical hacking from penetration testing.
CO3	:	Comprehend the importance of appropriate countermeasures for managing vulnerabilities.
CO4	:	To familiarize with the methodologies that can be used to hack into a target.
CO5	:	To appreciate the wide variety of attacks that can be performed against a wireless network.

Unit I : Introduction To Ethical Hacking [12 periods]

Introduction To Hacking: Terminologies, Categories of Penetration Test, Writing Reports, Structure of a Penetration Testing Report, Vulnerability Assessment Summary, Risk Assessment, Methodology, Linux Basics: File Structure, Cron Job, Users, Common Applications , BackTrack, Services.

Unit II: Ethical Hacking Tools and Techniques:
[12 periods]

Active, Passive and Sources of information gathering, Copying Websites Locally, NeoTrace, Cheops-ng, Intercepting a Response, What Web, Net craft, Basic Parameters, Code Exploit Scanner, Interacting with DNS Servers, Fierce, Zone Transfer with Host Command and Automation, DNS Cache Snooping-Attack Scenario, Automating Attacks, SNMP - Problem, Sniffing Passwords, SolarWinds Toolset, sweep, Brute Force and Dictionary- Tools , Attack, Enumeration, Intelligence Gathering Using Shodan, Target enumeration and Port Scanning Techniques.

Unit III: Vulnerability Assessment & Network Sniffing
[12 periods]

Introduction to Vulnerability Assessment - Pros and Cons, NMap, Updation of database, Testing SCADA Environments with Nmap, Nessus, Sniffing: Types, Hubs versus Switches, Modes, MITM Attacks, ARP Protocol Basics- working, Attacks, DoS Attacks, Dsniff tool, Using ARP Spoof to Perform MITM Attacks, Sniffing the Traffic with Dsniff, Sniffing Pictures with Drifnet, Urlsnarf and Webspy, Sniffing with Wireshark, Ettercap- ARP Poisoning, Hijacking Session with MITM Attack, ARP Poisoning with Cain and Abel, Sniffing Session Cookies with Wireshark, Hijacking the Session, SSL Strip: Stripping HTTPS Traffic, Requirements, Automating Man in the Middle Attacks, DNS Spoofing, DHCP Spoofing.

Unit IV: Remote Exploitation

[12 periods]

Understanding Network Protocols, Attacking Network Remote Services, Common Target Protocols, tools for cracking network remote services, Attacking SMTP, Attacking SQL Servers, Client Side Exploitation Methods: E-Mails Leading to Malicious Attachments & Malicious Links, Compromising Client Side Update, Malware Loaded on USB Sticks, Post exploitation: Acquiring Situation Awareness, Privilege Escalation, Maintaining Access, Data Mining, Identifying and Exploiting Further Targets, Windows Exploit Development Basics.

Unit V: Wireless Hacking

[12 periods]

Wireless Hacking : Requirements , Aircracking , Hidden SSIDs , Monitor Mode , Monitoring Tool-Beacon Frames on Wireshark ,Airodump-ng , Wireless Adapter in Monitor Mode , Determining the Target , Cracking a WPA/WPA2 Wireless Network Using Aircrack-ng , Capturing Packets and Four-Way Handshake , Web Hacking : Attacking the Authentication , Brute Force and Dictionary Attacks , Types of Authentication , Crawling Restricted Links , Testing for the Vulnerability , Authentication Bypass with Insecure Cookie Handling , SQL injection, XSS – DOM based,BeEF,CSRF, Bypassing CSRF and BeEF with XSS, Vulnerability in FCKeditor, efront.

Text books:

1. Rafay Baloch ,-Ethical Hacking and Penetration Testing Guide, CRC Press, 2015.

Reference Books :

3. 1. Patrick Engebretson, —The Basics of Hacking and Penetration Testing : Ethical Hacking and Penetration Testing Made Easy, Syngress Media, Second Revised Edition, 2013.
4. 2. Michael T. Simpson, Kent Backman, James E. Corley, —Hands On Ethical Hacking and Network Defense, Cengage Learning, 2012.

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
	Core - I – Ethical Hacking Lab	**4**	**6**	**-**	**-**	**Core Practical**

Introduction:

Ethical hacking is the practice of testing and evaluating the security of information systems by deliberately probing them to identify vulnerabilities. This process involves a variety of techniques and tools to simulate potential cyber attacks and understand how malicious hackers might exploit system weaknesses. The aim is to strengthen the security of these systems by addressing any discovered vulnerabilities.

Course Outcome:

CO1	:	Understand and Execute Basic System Administration Tasks in Linux
CO2	:	Identify and Enumerate System Services and Open Ports
CO3	:	Perform Network Scanning and Vulnerability Assessment
CO4	:	Capture and Analyze Network Traffic
CO5	:	Execute and Mitigate Web Application and Network Attacks

List of Experiments:

1. Write a Python script that demonstrates basic file and user management operations in Linux.
2. Write a Python script that uses the os module to list all running services on a Linux machine and saves the list to a file. The script should also provide details such as service status and ports in use.
3. Write a Python program that performs a simple port scan on a given IP address.
4. Write a Python script that interacts with DNS servers to perform a zone transfer and gather DNS records.
5. Write a Python script that automates Nmap scans and parses the output.
6. Write a Python program using the Scapy library to create a simple packet sniffer.
7. Write a Ruby script that automates a basic exploitation using the Metasploit Framework.
8. Write a Python script that performs a brute-force attack on a web login form.
9. Write a Bash script that uses aircrack-ng tools to capture WPA/WPA2 handshakes.
10. Write a Python script to detect SQL injection vulnerabilities in web applications

Text books:

1. "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws" by Dafydd Stuttard and Marcus Pinto

Reference Books :

5. "Hacking: The Art of Exploitation" by Jon Erickson
6. "Metasploit: The Penetration Tester's Guide" by David Kennedy, Jim O'Gorman, Devon Kearns, and Mati Aharoni

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
	AI in Cloud Computing	**4**	**6**	**-**	**-**	**Elective**

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

Course Outcome:

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

Unit I : Introduction to AI and Intelligent Agents **[12 periods]**

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

Unit II : Heuristic Search and Optimization **[12 periods]**

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

Unit III : Virtualization Technologies **[12 periods]**

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

Unit IV : Cloud Platforms and Services **[12 periods]**

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

Unit V : Cloud Security and Management **[12 periods]**

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

Text books:

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

Reference Books :

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

3. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
4. James Turnbull, "The Docker Book", O'Reilly Publishers, 2014

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Deep Learning	**4**	**6**	**-**	**-**	**Elective**

Introduction: This course on Deep Learning explores advanced techniques in machine learning that enable computers to learn from and make decisions or predictions based on data. It covers foundational concepts such as neural networks, convolutional networks, recurrent networks, and reinforcement learning, using TensorFlow as a primary tool for implementation and experimentation.

Course Outcome:

CO1	:	Understand the basic principles and mechanics of neural networks and their applications.
CO2	:	Demonstrate proficiency in using TensorFlow for creating and manipulating neural network models.
CO3	:	Analyze and implement convolutional neural networks for tasks such as image recognition.
CO4	:	Apply recurrent neural networks and LSTM units to model sequences and time-series data.
CO5	:	Explore advanced topics in deep reinforcement learning and its applications in decision-making processes.

Unit I : Introduction to Neural Networks **[12 periods]**

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

Unit II : TensorFlow Essentials **[12 periods]**

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

Unit III : Convolutional Neural Networks **[12 periods]**

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

Unit IV : Recurrent Neural Networks **[12 periods]**

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

Unit V : Reinforcement Learning Networks **[12 periods]**

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

Text books:

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

Reference Books :

1. IanGoodfellow, YoshuaBengio, AaronCourville, Deep Learning (Adaptive Computation and Machine Learning series, MITPress, 2017.
2. Pattern Classification- Richard O. Duda, Peter E. Hart, David G. Stork, John Wiley & Sons Inc.

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
	Software Security	**4**	**6**	**-**	**-**	**Elective**

Introduction: This course delves into essential concepts of Software Security, addressing vulnerabilities, risk management, secure design principles, comprehensive testing strategies, and advanced penetration techniques.

Course Outcome:

CO1	:	Explain the various types of security attacks and its implications
CO2	:	Illustrate the concepts of security risk management and security testing
CO3	:	Apply the various testing methodologies to evaluate the risks associated.
CO4	:	Compare and contrast the implications of good and bad software design
CO5	:	Classify the various tools for penetration testing

Unit I : Low Level Attacks **[12 periods]**

Need for Software Security – Memory Based Attacks – Low Level Attacks Against Heap and Stack - Stack Smashing – Format String Attacks – Stale Memory Access Attacks – ROP (Return Oriented Programming) – Malicious Computation Without Code Injection. Defense against Memory Based Attacks – Stack Canaries – Non-Executable Data - Address Space Layout Randomization (ASLR), Memory-Safety Enforcement, Control-Flow Integrity (CFI) –Randomization

Unit II : Secure Design **[12 periods]**

Isolating the Effects of Untrusted Executable Content - Stack Inspection – Policy Specification Languages – Vulnerability Trends – Buffer Overflow – Code Injection - Generic Network Fault Injection – Local Fault Injection - SQL Injection - Session Hijacking. Secure Design – Threat Modeling and Security Design Principles - Good and Bad Software Design - Web Security Browser Security: Cross-Site Scripting (XSS), Cross-Site Forgery (CSRF) – Database Security –File Security

Unit III : Security Risk Management **[12 periods]**

Risk Management Life Cycle – Risk Profiling – Risk Exposure Factors – Risk Evaluation and Mitigation – Risk Assessment Techniques – Threat and Vulnerability Management.

Unit IV : Security Testing **[12 periods]**

Traditional Software Testing – Comparison - Secure Software Development Life Cycle – Risk Based Security Testing – Prioritizing Security Testing with Threat Modeling – Shades of Analysis: White, Grey and Black Box Testing.

Unit V : Penetration Testing **[12 periods]**

Advanced Penetration Testing – Planning And Scoping – DNS Groper – DIG (Domain Information Graph) – Enumeration – Remote Exploitation – Web Application Exploitation - Exploits And Clients ide Attacks – Post Exploitation – Bypassing Firewalls and Avoiding Detection - Tools for Penetration Testing

Text books:

1. Robert C. Seacord, "Secure Coding in C and C++ (SEI Series in Software Engineering)",Addison-Wesley Professional, 2005.
2. Jon Erickson , "Hacking: The Art of Exploitation", 2nd Edition, No Starch Press, 2008.
3. Mike Shema, "Hacking Web Apps: Detecting and Preventing Web Application

SecurityProblems", First edition, Syngress Publishing, 2012

Reference Books :

1. Bryan Sullivan and Vincent Liu, "Web Application Security, A Beginner's Guide", KindleEdition, McGraw Hill, 2012
2. Evan Wheeler, "Security Risk Management: Building an Information Security RiskManagement Program from the Ground Up", First edition, Syngress Publishing, 2011
3. Chris Wysopal, Lucas Nelson, Dino Dai Zovi, and Elfriede Dustin, "The Art of SoftwareSecurity Testing: Identifying Software Security Flaws (Symantec Press)", Addison- Wesley Professional, 2006
4. Lee Allen, "Advanced Penetration Testing for Highly-Secured Environments: The UltimateSecurity Guide (Open Source: Community Experience Distilled)", Kindle Edition, PacktPublishing, 2012

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 : Java Programming 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:

3. 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.

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
	Core : Cryptography and network security	**4**	**6**	**0**	**0**	**Theory**

Introduction: To understand the various concepts and technical issues related to security, it is essential to know what we are trying to protect. These principles help us identify the various areas which are crucial while determining the security threats and possible solutions to tackle them.

Course Outcome:

CO1	:	To demystify all the complicated terms related to this technology
CO2	:	To deal with passive attacks is to think about prevention.
CO3	:	To resuse the existing message digest algorithm
CO4	:	To allow the addition of new algorithms and implementation in an effort
CO5	:	To know the mathematical background behind the various cryptography techniques

Unit I : **[12 periods]**

Attacks on Computers and Computer Security: Introduction – The need for Security – Security Approaches – Principles of Security – Types of Attacks – Cryptography: Concepts and techniques – Plain Text and Cipher Text – Substitution Techniques – Ttransposition Techniques – Encryption and Decryption – Symmetric and Asymmetric key Cryptography – Steganography – Key Range and Key size – Possible Types of Attacks.

Unit II: **[12 periods]**

Symmetric Key Algorithms and AES – Algorithm Types and Modes – An overview of Symmetric Key Cryptography – Data Encryption Standard – IDEA – RC4 – RC5 – Blowfish – AES - ASymmetric Key Algorithms – the RSA Algorithm – Symmetric and Asymmetric key cryptography together – Digital Signatures – Knapsack Algorithm – Some other Algorithms.

Unit III: **[12 periods]**

Digital Certificate and Public key infrastructure – Introduction – Digital Certificates – Private Key Management – PKIX Model – PKCS – XML,PKI and Security – Creating Digital Certificates using Java – Internet Security Protocols – SSL – TLS – SHTTP – TSP – SET – 3-D Secure Protocol – Electronic money – Email Security – WAP Security – Security in GSM – Security in 3G.

Unit IV: **[12 periods]**

User Authentication and Kerberos – Authentication basics – Passwords – Authentication Tokens – Certificate-based Authentication – Biometric Authentication – Kerberos – KDC – Security Handshake Pitfalls – Single sign on Approaches – Cryptography in java, .NET and Operating system – Cryptographic toolkits – Security and Operating system – Database Security.

Unit V: **[12 periods]**

Network Security, Firewalls and Virtual Private Networks – Brief introduction to TCP/IP – Firewalls – IP Security – VPN – Intrusion – Case Studies on Cryptography and Security – Cryptography Solutions – SSO – Secure Inter-branch payment Transaction – DOS – IP Spoofing Attacks –CSSV – Contract Signing – Secret Splitting – Virtual Electrons – Creating VPN.

Text books:

5. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, Second Edition, 2008.

Reference Books :

1. Network Security: Private Communication in a Public World by Charlie Kaufman, Radia Perlman, Mike Speciner, Pearson Education; Second edition (15 September 2016)
2. Network Security and Administration by Adesh K. Pandey, S.K. Kataria& Sons; Reprint 2013 edition (2013)
3. Network Security: A Beginners Guide by Eric Maiwald, McGraw Hill Education; Third edition (1 November 2012)

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
	Cryptography and Network Security Lab					**LAB**

Introduction: To provide students with hands-on experience and practical skills in the field of securing information and communications over networks.

Course Outcome:

CO1	:	To Able to Implement classical and modern cryptographic algorithms such as AES, RSA, DES, and Diffie-Hellman.
CO2	:	To Demonstrate and Study network security protocols including SSL/TLS, IPsec, and SSH
CO3	:	To Demonstrate an ability to Use security tools and software for network scanning, vulnerability assessment, and penetration testing.
CO4	:	To implement Students will write code to implement encryption and decryption algorithms
CO5	:	To Understand and configuring network security protocols, using security tools effectively, and analysing network vulnerabilities and threats..

List of Experiments:

1. Write a C program that contains a string (char pointer) with a value \Hello World'. The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string (char pointer) with a value \Hello World'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms:
   a) Ceaser Cipher , b) Substitution Cipher , C)Hill Cipher
4. Write a Java program to implement the DES algorithm logic
5. Write a C/JAVA program to implement the BlowFish algorithm logic
6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Using Java Cryptography, encrypt the text "Hello world" using BlowFish. Create your own key using Java keytool.
8. Write a Java program to implement RSA Algorithm
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as one of the parties (Alice) and the JavaScript application as other party (bob)
10. Calculate the message digest of a text using the MD5 algorithm in JAVA.
11. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.

Text books:

3. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, Second Edition, 2008.

Reference Books :

1. Network Security: Private Communication in a Public World by Charlie Kaufman, Radia Perlman, Mike Speciner, Pearson Education; Second edition (15 September 2016)
2. Network Security and Administration by Adesh K. Pandey, S.K. Kataria& Sons; Reprint 2013 edition (2013)

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

Introduction:

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

Course Outcome:

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

12 Hours

Unit I: 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.

12 Hours

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

12 Hours

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

12 Hours

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

12 Hours

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

Text books:

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

Reference Books :

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

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

Subject Code	Subject Title	Credit	Lecture	Tutorial	Practical	Type
	Operating System	**4**	**6**	**-**	**-**	**Theory**

Introduction:

The operating system is the most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs. Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers. This course covers the concept of operating system and its applications

Course Outcome:

CO1	:	After learning the fundamental concepts in Operating system including how OS has evolved over the years and different components of OS
CO2	:	students will continue to more significant functions of OS like Process management, storage and memory management etc.
CO3	:	This will provide the necessary information for students to extract maximum benefits out of the OS while developing programs, working with applications
CO4	:	To implement the Memory Management and File Management Systems
CO5	:	To understand the Basic Concepts of Unix System

12 Hours

Unit I:

Introduction to Operating System: Introduction- Objectives and Functions of OS- Evolution of OS- OS Structures- OS Components- OS Services- System calls- System programs- Virtual Machines.History of UNIX- Features & Benefits- Versions of UNIX- Features of UNIX File System- Commonly Used Commands and getting Started (Login/Logout) . Creating and viewing files using cat- file comparisons- View files- disk related commands- checking disk free spaces.

12 Hours

Unit II: Process Management – Processes and Threads: Processes: Process concept- Process scheduling- Co-operating processes- Inter process Communication Threads: Introduction to Threads- Single and Multi-threaded processes- CPU Scheduling: Basic concepts- Scheduling criteria- Scheduling Algorithms- Multiple Processor Scheduling- Real-time Scheduling.

12 Hours

Unit III: Process Synchronization: Mutual Exclusion, Critical – section problem- Synchronization Hardware-Semaphores- Classic problems of synchronization- Critical Regions- Monitors- OS Synchronization- Atomic Transactions. Deadlocks: System Model- Deadlock characterization- Methods for handling Deadlocks- Deadlock prevention- Deadlock Avoidance- Deadlock Detection- Recovery from Deadlock

12 Hours

Unit IV: Storage Management: Memory Management- Logical and physical Address Space- Swapping- Contiguous Memory Allocation- Paging- Segmentation with Paging. Virtual Memory Management: Demand paging- Process creation- Page Replacement Algorithms- Allocation of Frames- Thrashing- File-System Interface: File concept- Access Methods- Directory structure- File-system Mounting- File sharing- Protection and consistency semantics. File-System Implementation: File-System structure. Directory Implementation- Allocation Methods- Free-space Management- Efficiency and Performance- Recovery. Disk Management: Disk Structure- Disk Scheduling- Disk Management- Swap-Space Management- Disk Attachment- stable-storage Implementation.

12 Hours

Unit V: The Unix File System

Inodes - Structure of a regular file – Directories - Conversion of a path name to an inode - Super block - Inode assignment to a new file - Allocation of disk blocks. System calls for the file System: Open – Read - Write - Lseek – Close - File creation - Creation of special files - Changing directory and root - changing owner and mode – stat and fstat - pipes - Dup - Mounting and Un mounting file systems - Link and Un link

Textbook:

1. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.

Reference Books :

1. Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
2. Silberschatz / Galvin / Gagne, Operating System,6thEdition,WSE (WILEY Publication)
3. William Stallings,Operating System, 4th Edition, Pearson Education.
4. H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education

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
	Cyber Law	**4**	**6**	**-**	**-**	**Theory**

Introduction: Cyber Law known as Internet Law or Digital Law, refers to the legal issues related to the use of information technology. It encompasses a wide range of topics, including internet access and usage, freedom of expression, and online privacy. Cyber Law addresses the legal aspects of internet-related activities and covers both civil and criminal aspects.

Course Outcome:

CO1	:	Identify nexus between e-commerce and cyber laws
CO2	:	Examine the legal framework of e-governance mechanism in India.
CO3	:	Evaluate the importance of judicial system in smooth functioning of e-commerce.
CO4	:	Analyze legal liabilities towards changing environment of cyber space.
CO5	:	Formulate implications of cyber offences

12 Hours

Unit I:Fundamentals of Cyber Law : Basics of Law, Soucres of Laws, Types of Laws - Constitutional System in India, Role of Court system -Fundamental Rights & IT Laws in India - Landmark cases - Conceptual and theoretical perspective of cyber law. -Cyber Jurisdiction - Development of Cyber Law – National and International Perspective.

12 Hours

Unit II: Cyber Law: **E-Governance**: Definitions, objectives of Information Technology Act, 2000 - Data Protection, Cyber Security- Legal recognition of Digital Evidence -Recognition of liability in the digital world - E-Contract, E-Auditing, Digital Signatures & Authentication under IT Act, 2000 -E-Governance - Appointment of Controller - Legal Aspects of Certifying Authorities, Subscribers - Procedure for obtaining license and DSC.

12 Hours

Unit III: Cyber Law – Judicial System: Adjudicating officer, Adjudication of Cyber cases -Cyber Appellate Tribunal - Landmark Cases.

12 Hours

Unit IV: Cyber Law – Contemporary Trends: Impact of cyber warfare on privacy, identity theft. - online privacy, copyright piracy, Cyber Bullying. - Trademark Related Issues in the Context of Cyber Law, Cyber Squatting, Landmark Cases-Online Intermediaries in the governance of Internet, Libaility of Intermediaries under IT Act, 2000. Crypto currency and Cyber Laws -Dark Web and Legal Challenges -Social Networking Sites & Cyber Security Challenges.

12 Hours

Unit V: Cyber Law – Offences under Information Technology Act, 2000 : Personating, data theft, Cyber Stalking, Pohibition of Obscenity -Violation of Privacy -DDOS Attack -Penalty, Damages & Compensation under IT Act, 2000 -Computer Related Offences - Cyber Terrorism & Sedition -Other Offences-Cyber Espionage-Cyber Offences and Fundamental rights.

Textbook:

1.Justice Yatindra Singh **Cyber Laws** published by Lexis Nexis 6th edition,2016.

Reference Books :

1.Ajit Narayanan and Mervyn**,Law, Computer Science, and Artificial Intelligence,** Intellect Publication 1998

2.Linda Brennan and Victoria Johnson,"Social, Ethical and Policy Implications of Information Technology," published by IGI Global in 2004.

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
	Elective – IV **i) Blockchain Technology**	**4**	**6**			**Skill**

Introduction: Blockchain technology is revolutionizing digital transactions and data verification. This course covers blockchain fundamentals, design principles, and its transformative effects across various sectors, including finance, government, and society. Students will explore blockchain's potential benefits and challenges.

Course Outcome:

CO1	:	Understand the fundamental principles of blockchain technology.
CO2	:	Analyze blockchain's impact on financial services and new business models.
CO3	:	Evaluate blockchain's potential in various sectors and economic systems.
CO4	:	Assess blockchain's role in transforming government services and democracy.
CO5	:	Identify and address challenges and regulatory considerations in blockchain implementation.

Unit I: Introduction to Blockchain [**12 Periods**]

Say you want a Revolution: The Trust Protocol – How this Worldwide Ledger works – A Rational Exuberance for the Blockchain – Achieving Trust and the Black box of Identity – A Plan for Prosperity - Promise and Peril of the New Platform – Bootstapping the future: Seven Design Principles of Blockchain Economy – The Seven Design Principles – Designing the Future.

UnitI II: Transformations: [**12 Periods**]

Transformations: Reinventing Financial Services – The Golden Eight – The Bank App – Reputation – The Blockchain IPO – Re-architecting the Firm: The Core and the Edges – New Business Models: Making it Rain on the Blockchain – bAirbub versus Airbub – Global Computing: The Rise of Distributed Applications – The DApp Kings – The Big Seven – Hacking Your Future.

Unit III: The Ledger of Things [**12 Periods**]

The Ledger of Things: Animating the Physical world – The Evolution of Computing – From Mainframes to Smart Pills – The Twelve Disruptions – Animating Things – The Economic Payoff – The Future: From Uber to Suber – Solving the Prosperity Paradox: Economic Inclusion and Entrepreneurship – Road Map to prosperity – Remittances – The story of Analie Domingo.

Unit IV: Blockchain in Government and Democracy [**12 Periods**]

Rebuilding Government and Democracy – High-Performance Government Services and Operations – Empoering People to serve selves and others – Blockchain Voting – Alternative Models of Politics and Justice – Wielding Tools of Twent-first-century Democracy – Freeing Culture on the Blockchain – Music to Era – Fair Trade Music – Getting the Word Out.

Unit V: Promise and Peril: **[12 Periods]**

Promise and Peril: Overcoming Showstoppers – Ten Implementation Challenges – Reasons Blockchain will Fail or Implementation Challenges – Leadership for the Next Era – The Blockchain

Ecosystem – A Cautionary Tale of Blockchain Regulation – The Senator Who would change the world – Central Banks in a Decentralized economy – Regulation Versus Governance.

Text books:

1. Dan Tapscott and Alex Tapscott, "Blockchain Revolution", portfolio / Penguin trade paperback edition, (2018).

Reference Books :

2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, (2016).
3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger," Yellow paper, (2014).
4. Josh Thompsons, "Blockchain for beginners guide to Blockchain technology and leveraging Blockchain Programming", Copyright, (2017).
5. Daniel Drescher, "Blockchain basics: A Non-Technical Introduction in 25 steps", Apress, (2017).

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