PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637018
(AUTONOMOUS)
REGULATIONS 2023
CHOICE BASED CREDIT SYSTEM
B.E. CYBER SECURITY
CURRICULUM
(Applicable to the candidates admitted during the academic year 2023-2024 onwards)

SEMESTER III

S. No	Category	Course Code	Course Title	L	T	P	C
Theory							
1	BS	MA23303	Discrete Mathematics	3	1	0	4
2	PC	CY23301	Object Oriented Programming	3	0	0	3
3	PC	CY23302	Data Structures and Algorithms	3	0	0	3
4	PC	CY23303	Computer Networks	3	0	0	3
5	MC	MC23301	Environmental Sciences and Sustainability	2	0	0	0
Theory with Practical							
6	ES	EC23307	Digital Principles and Computer Organization	3	0	2	4
Practical							
7	PC	CY23304	Object Oriented Programming Laboratory	0	0	4	2
8	PC	CY23305	Data Structures and Algorithms Laboratory	0	0	4	2
9	EE	GE23301	Professional Development I	0	0	2	1
			Total	**17**	**1**	**12**	**22**

SEMESTER IV

S. No	Category	Course Code	Course Title	L	T	P	C
Theory							
1	BS	MA23403	Probability and Statistics	3	1	0	4
2	PC	CY23401	Database Management Systems and Security	3	0	0	3
3	PC	CY23402	Operating Systems and Security	3	0	0	3
4	PC	CY23403	Cyber Law and Ethics	3	0	0	3
5	MC	MC23402	Human Values and Gender Equality	2	0	0	0
Theory with Practical							
6	PC	CY23404	Cryptography and Network Security	3	0	2	4
Practical							
7	PC	CY23405	Database Management Systems and Security Laboratory	0	0	4	2
8	PC	CY23406	Operating Systems and Security Laboratory	0	0	4	2
9	EE	GE23401	Professional Development II	0	0	2	1
			Total	**17**	**1**	**12**	**22**

PAAVAI ENGINEERING COLLEGE, NAMAKKAL
Approved
BOARD OF STUDIES
CYBER SECURITY
18/5/24
AUTONOMOUS

MA23303	DISCRETE MATHEMATICS	3	1	0	4

(Common to CSE, CSE(IOT), CSE(AI&ML), Cyber, AI&DS, IT)

COURSE OBJECTIVES

To enable the students to

1	interpret the introductory concepts of Logic, which will enable them to model and analyze physical phenomena involving arguments.
2	implement the definitions of relevant vocabulary from quantifiers and inference and be able to perform related calculations.
3	apply the methodologies involved in solving problems related to fundamental principles of sets and implement the mathematical ideas for relations.
4	understand the concepts of functions and its types.
5	acquire knowledge and understand the concepts of graphs and its models.

UNIT I	PROPOSITIONAL CALCULUS	12

Propositions - Logical connectives, Compound propositions, Conditional and bi-conditional propositions, Truth tables; Tautologies and contradictions; Contrapositive; Logical equivalences and implications - DeMorgan's Laws, Normal forms, Principal conjunctive and disjunctive normal forms; Rules of inference; Arguments - Validity of arguments.

UNIT II	PREDICATE CALCULUS	12

Predicates - Statement function, Variables, Free and bound variables; Quantifiers; Universe of discourse; Logical equivalences and implications for quantified statements; Theory of inference - The rules of universal specification and generalization; Validity of arguments.

UNIT III	SET THEORY	12

Basic concepts - Notations, Subset, Algebra of sets, The power set; Ordered pairs and Cartesian product; Relations on sets - Types of relations and their properties, Relational matrix and the graph of relation; Partitions; Equivalence relations. Partial ordering - Posets, Lattices as Posets, Properties of lattices.

UNIT IV	FUNCTIONS	12

Definitions of functions, Classification of functions, Type of functions, Examples, Composition of functions, Inverse functions; Binary and n-ary operations; Characteristic function of a set; Hashing functions; Recursive functions; Permutation functions.

UNIT V	GRAPHS	12

Graphs and graph models; Graph terminology and special types of graphs; Matrix representation of graphs and graph isomorphism; Connectivity - Euler and Hamilton paths.

	TOTAL PERIODS	60

COURSE OUTCOMES		
At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	apply propositional logic to validate the arguments.	Applying (K3)
CO2	apply the rules of inference and methods of proof in predicate calculus to verify the validity of arguments.	Applying (K3)
CO3	explain the knowledge of various set theoretic concepts.	Applying (K3)
CO4	characterize different types of functions and solve recurrence relations.	Understanding(K2)
CO5	apply the concepts of discrete structures such as Euler and Hamilton paths.	Applying (K3)

TEXT BOOKS

1. Trembly, J.P. and Manohar, R., "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-Hill, 35th Reprint, 2008.
2. Veerarajan T., "Discrete Mathematics with Graph Theory and Combinatorics", Reprint Edition, Tata McGraw Hill Publishing Company, New Delhi, 2013.

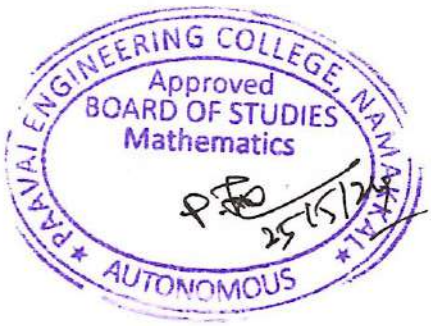
REFERENCES

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 8th Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2012.
2. Tamilarasi, A., and Natarajan, A. M., "Discrete Mathematics and its Applications", 3rd Edition, Khanna Publishers, 2008.
3. Lipschutz. S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.
4. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction ", 4th Edition, Pearson Education, 2002.

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	3	-	-	-	-	-	-	-	3	2	2
CO2	3	2	3	3	-	-	-	-	-	-	-	3	2	2
CO3	2	3	3	2	-	-	-	-	-	-	-	2	2	2
CO4	2	2	2	3	-	-	-	-	-	-	-	2	2	2
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	2



CY23301	OBJECT ORIENTED PROGRAMMING	3	0	0	3

COURSE OBJECTIVES

To enable the students to

1	understand OOP concepts and basics of Java programming language.
2	know the principles of inheritance, packages, and interfaces.
3	develop a java application with threads and generics classes.
4	define exceptions and use I/O streams.
5	understand Graphical User Interface Application using JavaFX.

UNIT I	INTRODUCTION TO OOP AND JAVA	9

Overview of OOP – Object oriented programming paradigms – Features of Object-Oriented Programming – Java Buzzwords – Overview of Java – Data Types, Variables and Arrays – Operators – Control Statements – Programming Structures in Java – Defining classes in Java – Constructors-Methods - Access specifiers - Static members- Java Doc comments.

UNIT II	INHERITANCE, PACKAGES AND INTERFACES	9

Overloading Methods – Objects as Parameters – Returning Objects –Static, Nested and Inner Classes. Inheritance: Basics– Types of Inheritance -Super keyword -Method Overriding – Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces: Packages – Packages and Member Access –Importing Packages – Interfaces.

UNIT III	EXCEPTION HANDLING AND MULTITHREADING	9

Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java's Built-in Exceptions – User defined Exception. Multithreaded Programming: Java Thread Model–Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication Suspending –Resuming, and Stopping Threads –Multithreading. Wrappers – Auto boxing.

UNIT IV	I/O, GENERICS, STRING HANDLING	9

I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. – Streams – Generics: Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class, methods and String Buffer Class.

UNIT V	JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS	9

JavaFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, Toggle Button – Radio Buttons – List View – Combo Box – Choice Box – Text Controls – Scroll Pane. Layouts – Flow Pane – HBox and VBox – Border Pane – Stack Pane – Grid Pane. Menus – Basics – Menu – Menu bars – Menu Item.

	TOTAL PERIODS	45

COURSE OUTCOMES

At the end of this course, students will be able to		BT Mapped (Highest Level)
CO1	explain the basic OOP and Java concepts.	Understanding (K2)
CO2	demonstrate programs using inheritance, packages and interfaces.	Applying (K3)

CO3	assign exception handling mechanisms and multithreading concepts to solve real-world problems.	Applying (K3)
CO4	customize Java applications with I/O packages, string classes, collections and generics concepts.	Applying (K3)
CO5	apply the concepts of event handling, JavaFX components and controls for developing GUI based applications.	Applying (K3)

TEXT BOOKS

1. Herbert Schildt, "Java: The Complete Reference", 11th Edition, McGraw Hill Education, New Delhi, 2019.
2. Herbert Schildt, "Introducing JavaFX 8 Programming", 1st Edition, McGraw Hill Education, New Delhi, 2015.

REFERENCES

1. Cay S. Horstmann, "Core Java Fundamentals", Volume 1, 11th Edition, Prentice Hall, 2018.
2. Deitel & Deitel, "Java: How to Program", Prentice Hall of India, 2010.
3. Allen B. Downey and Chris Mayfield, "Think Java: How to Think Like a Computer Scientist", O'Reilly, California, First Edition, 2016.
4. Joshua Bloch, "Effective Java: A Programming Language Guide", Addison-Wesley Professional, US, Third Edition, 2018.

CO-PO MAPPING:

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(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

	PO's												PSO's	
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CO3	3	3	2	2	2	-	-	-	-	-	-	2	2	2
CO4	3	2	2	2	2	-	-	-	-	-	-	2	2	2
CO5	2	2	3	2	2	-	-	-	-	-	-	2	2	2

CY23302	DATA STRUCTURES AND ALGORITHMS	3	0	0	3

COURSE OBJECTIVES

To enable the students to

1	understand about problem solving strategies.
2	explain about linear data structures – lists, stacks and queues.
3	analyze tree data structures.
4	understand sorting, searching algorithms.
5	know the concepts of Dynamic Programming and Backtracking.

UNIT I	INTRODUCTION TO ALGORITHMS	9

Fundamentals of Algorithmic Problem Solving - Important problem types –Fundamentals of the Analysis of Algorithm efficiency: Time and space complexity-Asymptotic Notations and Basic efficiency classes, Mathematical Analysis of Recursive Algorithms and non-recursive algorithms, Introduction to P,NP and NP complete problems.

UNIT II	LINEAR STRUCTURES	9

Introduction to Abstract Data Types (ADTs) - List ADT – array-based implementations – linked list implementations – singly linked lists – circularly linked lists – doubly linked lists – Stack ADT - Applications of a Stack – Queue ADT – double ended queues.

UNIT III	TREE STRUCTURES	9

Tree ADT – Binary Trees – tree traversal algorithms- pre order, post order, breadth first and in order traversals – binary search trees, AVL trees – heap trees-Hashing: Open hashing and closed hashing. Huffmann trees and codes- Greedy Technique: Prim's, Kruskal's, Dijkstra's Algorithm.

UNIT IV	SORTING AND SEARCHING	9

Brute force String matching Bubble Sort, selection Sort-Divide and Conquer: Merge sort, Quick sort, Strassen's Multiplication, Closest pair and convex hull problem – linear search and binary search. Solving travelling salesman problem, knapsack problem, Assignment problem by exhaustive approach and branch and bound method.

UNIT V	DYNAMIC PROGRAMMING AND ITERATIVE IMPROVEMENT	9

Dynamic programming: Knapsack problem and memory functions, Optimal binary search Trees, Warshall and Floyd algorithms-Iterative Improvement: Maximum matching in Bipartite Graph, Stable marriage problem, Backtracking: n-Queens problem, subset sum problem, Hamiltonian circuit problem.

	TOTAL PERIODS	45

COURSE OUTCOMES

At the end of this course, students will be able to		BT Mapped (Highest Level)
CO1	solve problems using algorithmic techniques.	Applying (K3)
CO2	solve the computational problems using linear data structures.	Analysing (K4)

CO3	implement the operations of tree data structures.	Analysing (K4)
CO4	apply efficient searching and sorting methods to solve computing problems.	Analysing (K4)
CO5	implement dynamic programming and backtracking algorithms for computational problems .	Analysing (K4)

TEXT BOOKS

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Fourth Edition, Pearson Education, 2014.
2. Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser, "Data Structures & Algorithms in Python", An Indian Adaptation, John Wiley & Sons Inc., 2021.

REFERENCES

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.
2. Lee, Kent D., Hubbard, Steve, "Data Structures and Algorithms with Python" Springer Edition 2015.
3. Rance D. Necaise, "Data Structures and Algorithms Using Python", John Wiley & Sons, 2011.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, "Introduction to Algorithms", Second Edition, McGraw Hill, 2002.

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

CY23303	COMPUTER NETWORKS	3	0	0	3

COURSE OBJECTIVES

To enable the students to

1	understand the function of different layers of OSI model.
2	know about the components required to build different types of networks.
3	study the various routing protocols operation.
4	learn the flow control and congestion control algorithms.
5	acquire knowledge of application layer and its working principles.

UNIT I	FUNDAMENTALS & PHYSICAL LAYER	9

Introduction - Data communications, Networks, Network Types; Protocol Layering - The OSI Model, TCP/IP protocol suit; Physical Layer: Overview of Data and signals; Transmission media; Switching.

UNIT II	DATA LINK LAYER	9

Data link control - Framing, Flow Control, Error Control, HDLC; Media Access Control; Wired LANs - Standard Ethernet, Fast Ethernet, Gigabit Ethernet; Wireless LANs - IEEE 802.11, Bluetooth; Connecting Devices.

UNIT III	NETWORK LAYER	9

Logical addressing - IPv4 Addresses, IPv6Addresses; Internet protocol - Internetworking (IPv4, IPv6), Transitions from IP4 to IP6; ICMP; IGMP; Forwarding; Unicasting routing protocol; Multi casting routing protocol.

UNIT IV	TRANSPORT LAYER	9

Duties of Transport Layer; User datagram protocol (UDP); Transmission control protocol (TCP) - Connection establishment, Connection release; Congestion control; Congestion avoidance (DECbit, RED); Quality of Service - Techniques to Improve QoS.

UNIT V	APPLICATION LAYER	9

Application Layer protocols: DNS – Email protocols (SMTP - POP3 - IMAP - MIME) – FTP – WWW (HTTP, HTTPS) – SNMP

	TOTAL PERIODS	45

COURSE OUTCOMES

At the end of this course, students will be able to		BT Mapped (Highest Level)
CO1	explain the basic layers and its functions in computer networks.	Applying (K3)
CO2	demonstrate the knowledge of flow control algorithms at data link layer.	Analyzing (K4)
CO3	apply the suitable routing algorithms for the given network.	Applying (K3)

CO4	develop a client/server application using TCP/UDP and design algorithms for end-end communication.	Applying (K3)
CO5	implement the various application layer protocols.	Analyzing (K4)

TEXT BOOKS

1. Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, Sixth Edition TMH, 2022.
2. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Eighth Edition, Pearson Education, 2021.

REFERENCES

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Sixth Edition, Morgan Kaufmann Publishers Inc., 2019.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2014.
3. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill, 2012.

CO-PO MAPPING :

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(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
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CO1	1	1	1	2	-	-	-	-	-	-	1	3	2	3
CO2	2	3	3	2	-	-	-	-	-	-	1	3	2	3
CO3	3	3	2	2	-	-	-	-	-	-	1	3	2	3
CO4	3	3	3	2	-	-	-	-	-	-	1	3	2	3
CO5	3	3	3	2	-	-	-	-	-	-	1	3	3	3

MC23301	ENVIRONMENTAL SCIENCES AND SUSTAINABILITY	2	0	0	0

COURSE OBJECTIVES	
To enable the students to	
1	establish the knowledge of precious resources of the environment and their various impacts.
2	create awareness on ecosystem and biodiversity preserve.
3	learn scientific and technological solutions to current day pollution issues.
4	analyze climate changes, concept of carbon credit and the challenges of environmental management.
5	understand green materials, energy cycles and the role of sustainable urbanization.

UNIT I	ENVIRONMENT AND NATURAL RESOURCES	6

Definition, scope and importance of Environment. Forest resources: Use and over-exploitation, deforestation, - mining, dams and their effects on forests and tribal people. Water resources: Use and over- utilization of surface and ground water, dams-benefits and problems. Food resources: effects of modern agriculture, fertilizer-pesticide problems. Role of an individual in conservation of natural resources.

UNIT II	ECOSYSTEMS AND BIODIVERSITY	6

Concept of an ecosystem: Structure and function of an ecosystem - ecological succession - food chains and food webs. Ecosystems- Types of ecosystem: Introduction - forest ecosystem and lake ecosystems. Biodiversity: Introduction - definition (genetic - species - ecosystem). Diversity - Value of biodiversity - Hotspots of biodiversity - Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT III	ENVIRONMENTAL POLLUTION	6

Pollution: Définition - air pollution - water pollution - marine pollution - noise pollution. Solid waste management: Causes - effects - control measures of urban and industrial wastes. Role of an individual in prevention of pollution - Electronic waste -Sources-Causes and its effects- Pollution case studies-Field study of local polluted site – Industrial/Agricultural.

UNIT IV	SUSTAINABILITY AND ENVIRONMENT	6

Sustainability - from unsustainability to sustainability-millennium development goals, and protocols. Sustainable development goals-targets, indicators and intervention areas. Climate change— acid rain - ozone layer depletion. Regional and local environmental issues and possible solutions-case studies. Concept of carbon credit, carbon footprint. Environmental management in industry-A case study.

UNIT V	SUSTAINABILITY PRACTICES	6

Zero waste and R concept, Circular economy, ISO 14000 Series, Environmental Impact Assessment - Sustainable energy: Non-conventional Sources, Green materials, Energy Cycles - carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization- Socio economical and technological change.

	TOTAL PERIODS	30

COURSE OUTCOMES		
At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	find the method of conservation of natural resources	Understanding(K2)
CO2	understand ecosystem and the conservation of biodiversity.	Understanding(K2)
CO3	aware of environmental pollution and interpret its effects.	Understanding(K2)
CO4	apply sustainable development for technological advancement and societal development.	Applying (K3)
CO5	measure the sustainability practices for green energy cycles.	Analyzing (K4)

TEXT BOOKS

1. Benny Joseph, "Environmental Science and Engineering", Tata McGraw Hill, 1st edition, 2017.
2. Gilbert M. Masters, Wendell P. Ela " Introduction to Environmental Engineering and Science", 3rd edition, Pearson, 2022.

REFERENCES

1. William P. Cunningham and Mary Ann Cunningham, "Environmental Science: A Global Concern", McGraw Hill, 16th edition, 2023.
2. C. S. Rao, Environmental Pollution and Control engineering, New Age International (P) ltd Publication, New Delhi, 4th edition, 2021.
3. Erach Bharucha, "Textbook of Environmental Studies", Universities Press Pvt. Ltd., edition, 2020.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 4th Edition, 2015.

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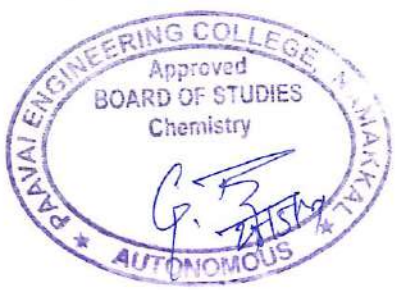
CO2	-	2	-	-	1	1	-	1	-	-	-	-	-	-
CO3	2	-	1	1	-	-	-	2	-	-	-	2	-	-
CO4	-	2	-	-	1	-	3	1	1	-	1	1	-	-
CO5	2	2	-	1	-	-	2	1	-	-	-	1	-	-



EC23307	DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION	3	0	2	4

(Common to CSE (IoT), Cyber Security)

COURSE OBJECTIVES

To enable the students to

1	learn the fundamentals of digital logic circuits.
2	be familiar with concepts in combinational logic circuits.
3	acquire the knowledge in sequential circuits.
4	understand the instruction set and addressing modes in a computer.
5	know the concepts of I/O interfacing and memory systems.

UNIT I	BOOLEAN ALGEBRA AND MINIMIZATION	9

Review of binary number systems; Boolean laws and theorems - Boolean functions; Minimization of Boolean functions - Karnaugh map, Tabulation methods; Implementation of Boolean functions using logic gates, NAND, NOR.

UNIT II	COMBINATIONAL LOGIC CIRCUITS	9

Combinational circuits - Analysis and design procedures - Adders, Subtractors, Carry Look Ahead Adder, Code converters, Encoder, Decoder, Multiplexer, Demultiplexer.

UNIT III	SEQUENTIAL LOGIC CIRCUITS	9

Sequential circuits - Flip flops – SR , D , JK , T; Shift registers - SISO, SIPO, PISO, PIPO; Asynchronous and Synchronous Counters; Design of asynchronous sequential circuits - Reduction of state and flow tables; Race-free state assignment; Hazards.

UNIT IV	MACHINE INSTRUCTIONS AND ADDRESSING MODES	9

Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Basic I/O Operations, Stack and Queues, Subroutines, Additional Instruction.

UNIT V	I/O ORGANIZATION AND MEMORY SYSTEMS	9

Interrupts; Direct Memory Access; Standard I/O Interface; Semiconductor Memories - RAM, ROM, Cache, Virtual; Memory Management Requirements; Secondary Storage; Basic Concepts of Pipelining.

LIST OF EXPERIMENTS

1. Design and implementation of Adders and Subtractors using logic gates.
2. Design and implementation of Binary to Gray code and Gray to Binary code Code converters using logic gates.
3. Design and implementation of Multiplexer, De-multiplexer, Encoder and decoder.
4. Implementation of 4-bit shift registers using Flip flops. (SISO/ SIPO/PISO/PIPO).

Programming using 8086

1. Basic arithmetic and Logical operations.

2. Sorting and searching		
	TOTAL PERIODS	**75**

COURSE OUTCOMES		
At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	apply the fundamentals of digital logic circuits.	Applying (K3)
CO2	design combinational logic circuits.	Applying (K3)
CO3	analyze and design Sequential circuits.	Applying (K3)
CO4	identify the instruction set and addressing modes in a computer.	Analyzing (K4)
CO5	recall the concepts of I/O interfacing and memory systems.	Understanding (K2)

TEXT BOOKS

1. M. Morris Mano and Michael D. Ciletti, "Digital Design", Pearson, 6th Edition, 2018.
2. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", 5th Edition, Elsevier, 2014.

REFERENCES

1. H. Charles Roth Jr, "Digital System Design using VHDL", Thomson/ Brooks cole, 2015.
2. S. Salivahanan and S. Arivazhagan, "Digital Circuits and Design", 4th Edition, Vikas Publishing House Pvt.Ltd, New Delhi, 2012.
3. Carl Hamacher, "Computer Organization", 6th Edition, McGraw Hill, 2023.
4. John P. Hayes, "Computer Architecture and Organization", 3rd Edition, Tata McGraw Hill, 2012.

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	Programme Outcomes PO's												**PSO's**	
CO's	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	1	2	-	1	-	-	-	1	1	-	2	2	2
CO2	3	2	2	-	1	-	-	-	1	1	-	2	2	2
CO3	3	2	2	-	1	-	-	-	1	1	-	2	2	2
CO4	3	2	2	-	1	-	-	-	1	1	-	2	2	2
CO5	3	1	2	-	1	-	-	-	1	1	-	2	2	2

CY23304	OBJECT ORIENTED PROGRAMMING LABORATORY	0	0	4	2

COURSE OBJECTIVES

To enable the students to

1	build software development skills using java programming for real-world applications.
2	understand and apply the concepts of classes, packages, and interfaces.
3	implement exception handling and perform file processing.
4	develop applications using generic programming and event handling.

LIST OF EXPERIMENTS

1. Solve problems by using sequential search, binary search, and quadratic sorting algorithms (selection, insertion).
2. Develop stack and queue data structures using classes and objects.
3. Write a Java program to demonstrate the concept of package.
4. Solve the above problem using an interface.
5. Implement exception handling and creation of user defined exceptions.
6. Write a Java program that implements a multi-thread application.
7. Write a program to perform file operations.
8. Write a Java program to handle all mouse events and key events using Adapter classes.
9. Develop applications to demonstrate the features of generics classes.
10. Develop applications using JavaFX controls, layouts and menus.
11. Create a Java application for Student Information System. It is used to store, administer and manage all aspects of student information such as student details, subjects, semesters, enrollment details, grades of students, etc.
12. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for digits and for the + - * / % operations. Add a text field to display the result.

TOTAL PERIODS	**60**

COURSE OUTCOMES

At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	analyze software development skills for real-world applications.	Analyzing (K4)
CO2	investigate different methodologies to create application using classes, packages, and interfaces.	Analyzing (K4)
CO3	explore exception handling and perform file processing.	Analyzing (K4)
CO4	create applications using generic programming & event handling.	Applying (K3)

CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	1	2	-	-	1	-	-	-	1	2	2
CO2	3	2	1	2	2	-	-	1	-	-	-	1	2	2
CO3	3	3	2	1	2	-	-	1	-	-	-	1	2	3
CO4	3	1	1	1	2	-	-	1	-	-	-	1	3	2

PAVAI ENGINEERING COLLEGE, NAMAKKAL
Approved
BOARD OF STUDIES
CYBER SECURITY
18/5/24
AUTONOMOUS

CY23305	DATA STRUCTURES AND ALGORITHMS LABORATORY	0	0	4	2

COURSE OBJECTIVES

To enable the students to

1	understand the concepts of ADTs.
2	analyze tree data structures and applications
3	understand the recursive ,searching, sorting and hashing algorithms.
4	identify dynamic programming algorithms.

LIST OF EXPERIMENTS

1. Implementation of List, Stack and Queue ADTs.
2. Implement recursive algorithms.
3. Implementation of sorting and searching algorithms.
4. Implementation of Hash tables.
5. Tree representation and graph representation of traversal algorithms.
6. Implementation of Binary Search Trees.
7. Implementation of Heaps.
8. Implementation of Dynamic Programming Algorithms.
9. Implementation of Greedy Algorithms.

TOTAL PERIODS	60

COURSE OUTCOMES

At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	solve problems using linear data structures.	Applying (K3)
CO2	implement tree data structures to solve computational problems.	Applying (K3)
CO3	implement recursive ,searching, sorting and hashing algorithms for real world applications.	Applying (K3)
CO4	design and implement different problems using the dynamic programming and greedy techniques.	Applying (K3)

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	2	2	-	-	-	-	-	-	2	1	1
CO2	3	3	2	2	2	-	-	-	-	-	-	2	1	1
CO3	3	3	2	2	2	-	-	-	-	-	-	2	1	1
CO4	3	3	3	2	2	-	-	-	-	-	-	2	2	2

GE23301	PROFESSIONAL DEVELOPMENT I	0	0	2	1

COURSE OBJECTIVES

To enable the students to

1	enhance and evaluate the student's professional skills and introduce the function of corporate world.
2	enhance and develop the students behavioral, speaking and listening skills to face the interview.
3	solve advance level verbal aptitude tests to get placed in Tier I companies.
4	improve their reasoning skills to get placed in reputed companies.

UNIT I	SELF - UNDERSTANDING AND PERSONALITY ENHANCEMENT SKILLS	7

Introduction self-exploration; SWOT analysis - Types and barriers; Effective communication in workplace; Leadership skills; Decision making - Problem solving; Goal setting - Critical, strategic and lateral thinking; JAM level- I; Basic resume building level- I.

UNIT II	BEHAVIOURAL SKILLS, LISTENING AND SPEAKING SKILLS	7

Behavioural skills; Time management; Emotional intelligence; Analytical thinking- Listening; Listening and hearing; Self-introduction; Group discussion - Types and importance, evaluation criteria, do's and don'ts of GD; GD Level-1.

UNIT III	QUANTITATIVE APTITUDE	8

Number System; LCM and HCF; Simple interest and compound interest; Average; Pipes and cisterns; Area; Profit and loss.

UNIT IV	LOGICAL REASONING	8

Logical sequence; Analogy; Classification; Causes and effect; Making judgment; Directions.

	TOTAL PERIODS	30

COURSE OUTCOMES At the end of this course, the students will be able to		BT MAPPED (Highest Level)
CO1	define and analyze soft skills to improve the leadership skills.	Analyzing (K4)
CO2	demonstrate the behavioral skills through various activities.	Applying (K3)
CO3	develop the problem solving skills through quantitative aptitude.	Applying (K3)
CO4	illustrate the logical reasoning Skills to solve real world problems.	Analyzing (K4)

TEXT BOOKS

1. Agarwal, R.S. "Objective General English", S.Chand & Co.2021.
2. Agarwal, R.S. "Quantitative Aptitude", S.Chand & Co.2021.

REFERENCES

1. Abhijit Guha, "Quantitative Aptitude ", Tata-Mcgraw Hill, 2023.
2. Agarwal, R.S." a modern approach to Verbal & Non Verbal Reasoning", S.Chand & Co Ltd, New Delhi.2021.
3. Word Power Made Easy By Norman Lewis, Wr.Goyal Publications, 2021.

CO PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	PO's												PSO's	
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CO1	-	-	-	-	-	-	3	3	2	3	-	3	1	1
CO2	-	-	-	-	-	-	2	3	2	3	-	3	1	1
CO3	3	2	2	2	-	1	-	-	-	-	2	-	2	2
CO4	2	1	3	2	-	3	3	1	-	1	2	-	2	2

MA23403	PROBABILITY AND STATISTICS	3	1	0	4

(Common to Agri, Biotech, Cyber, CSE, CSE(IOT), CSE(AI&ML), AI&DS, IT, Food, Pharma)

COURSE OBJECTIVES

To enable the students to

1	analyse the concept of random variables and probability distribution in designing processes.
2	differentiate the discrete and continuous two dimensional random variables.
3	determine the concepts of hypotheses testing, its need and applications.
4	equip with statistical techniques for designing experiments, analyzing, interpreting and presenting research data.
5	emphasize the aspects of control charts in quality control.

UNIT I	RANDOM VARIABLES	12

Discrete and continuous random variables – Moments, Moment generating functions; Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions; Functions of random variables.

UNIT II	TWO - DIMENSIONAL RANDOM VARIABLES	12

Joint distributions; Marginal and conditional distributions; Covariance, Correlation and Linear regression; Transformation of random variables; Applications of Central limit theorem (for independent and identically distributed random variables).

UNIT III	TESTING OF HYPOTHESIS	12

Sampling distributions - Estimation of parameters; Statistical hypothesis; Large sample test for single mean and difference of means; Small samples - Tests based on t, Chi-square and F distributions for mean, variance and proportion; Contingency table (test for independent), Goodness of fit.

UNIT IV	DESIGN OF EXPERIMENTS	12

Completely randomized design; Randomized block design; One way and two way classifications- Latin square design - 2^2 factorial design.

UNIT V	STATISTICAL QUALITY CONTROL	12

Control charts for measurements (X and R charts) - Control charts for attributes (P, C and NP charts), Tolerance limits, Acceptance sampling - U-test and Sign test.

	TOTAL PERIODS	60

COURSE OUTCOMES

At the end of this course, students will be able to		BT Mapped (Highest Level)
CO1	assign suitable probability distributions in engineering problems.	Applying (K3)
CO2	apply the concept of discrete and continuous two dimensional random variables.	Applying (K3)

CO3	apply the concept of testing of hypothesis for small and large samples in real life problems	Applying (K3)
CO4	analyse the principles to be adopted for designing the experiments.	Analysing (K4)
CO5	examine statistical data using control chart in quality control	Applying (K3)

TEXT BOOKS

1. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.
2. Johnson. R.A. and Gupta. C.B., Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 7th Edition, 2007.

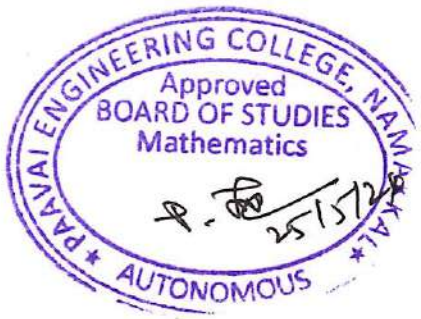
REFERENCES

1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2012.
2. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education Asia, 8th Edition, 2007.
3. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 3rd Edition, Elsevier, 2004.
4. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	2
CO2	3	2	3	3	-	-	-	-	-	-	-	3	2	2
CO3	3	3	3	2	-	-	-	-	-	-	-	2	2	2
CO4	3	3	2	2	-	-	-	-	-	-	-	2	2	2
CO5	3	3	2	3	-	-	-	-	-	-	-	2	2	2



CY23401	DATABASE MANAGEMENT SYSTEMS AND SECURITY	3	0	0	3

COURSE OBJECTIVES	
To enable the students to	
1	learn the fundamentals of data models, conceptualize and depict a database system.
2	study the principles to be followed to create an effective relational database and write SQL queries to store/retrieve data to/from database systems.
3	know the fundamental concepts of transaction processing, concurrency control techniques and recovery procedure.
4	understand the need of security in database management systems.
5	learn how to secure database management systems.

UNIT I	RELATIONAL DATABASES	9
Introduction to Relational databases –Purpose of Database Systems – Views of data – Database System Architecture –Data Models – Relational Data Models–Relational Algebra – Structured Query Language fundamentals –Keys – Integrity Constraints– Advanced SQL features.		

UNIT II	DATABASE DESIGN	9
Entity-Relationship model –ER Diagrams – Enhanced ER model – Functional Dependencies – Non-Loss Decomposition – First Normal Form – Second Normal Form – Third Normal Form – Dependency Preservation – Boyce/Codd Normal Form – Multi-Valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.		

UNIT III	TRANSACTION MANAGEMENT	9
Transaction Concepts – ACID Properties – Serializability – Transaction Isolation Levels – Concurrency Control – Need for Concurrency – Lock-Based Protocols – Deadlock Handling – Recovery System – Failure Classification – Recovery Algorithm.		

UNIT IV	CONNECTIVITY AND DATABASE SECURITY	9
Introduction to ODBC – Components – Database Security – Asset Types and Value – Security Methods.		

UNIT V	ACCESS CONTROL PRINCIPLES	9
Database Access Control – Privileges and Roles- Introduction, Defining and Using Profiles, Designing and Implementing Password Policies; Granting and Revoking User Privileges - Creating, Assigning and Revoking User Roles– Role-based access control.		

	TOTAL PERIODS	45

COURSE OUTCOMES		
At the end of this course, students will be able to		BT Mapped (Highest Level)
CO1	explain relational database and formulate solutions to a broad range of query problems using SQL.	Applying (K3)

CO2	design an ER model and use SQL statements for a real world scenario.	Applying (K3)
CO3	run transactions and estimate the procedures for controlling the consequences of concurrent data access.	Applying (K3)
CO4	recognize database connectivity and handle security issues in database management systems.	Applying (K3)
CO5	examine and handle security issues in database management systems.	Analyzing (K4)

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, Tata McGraw Hill, 2021.
2. Hassan A. Afyouni, " Database Security and Auditing", Third Edition, Cengage Learning, 2009.

REFERENCES

1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2016.
2. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Third Edition, McGraw Hill, 2014.
3. William Stallings, Lawrie Brown, "Computer Security: Principles and Practice", Fourth Edition, Pearson,2019.
4. Narain Gehani and Melliyal Annamalai, "The Database Book: Principles and Practice Using the Oracle Database System", Universities Press, 2012.

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

	PO's												PSO's	
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	1	2	2	-	-	-	-	-	-	2	3	2
CO2	2	2	1	2	2	-	-	-	-	-	-	2	3	2
CO3	2	2	1	2	2	-	-	-	-	-	-	2	3	2
CO4	2	2	1	2	2	-	-	-	-	-	-	2	3	2
CO5	2	2	1	2	2	-	-	1	-	-	-	2	3	2

CY23402	OPERATING SYSTEMS AND SECURITY	3	0	0	3

COURSE OBJECTIVES

To enable the students to

1	understand the basic concepts of Operating Systems.
2	explore the process management concepts including scheduling, synchronization, threads and deadlock.
3	identify the memory, file and I/O management activities of OS.
4	interpret file system interfaces and implementation process.
5	explain how security is implemented in various operating systems.

UNIT I	OPERATING SYSTEM OVERVIEW	9

Computer System Organization – Architecture – Operating System Operations – Resource Management – Security and Protection – Distributed Systems – Kernel Data Structures – Operating System Services – System Calls – System Services – Why Applications Are Operating System Specific – Operating System Design and Implementation – Operating System Structure – Building and Booting an Operating System.

UNIT II	PROCESS MANAGEMENT AND DEAD LOCK	9

Process Concept – Process Scheduling – Operation on Processes, Inter-process Communication – Threads – Overview – Multithreading models – Threading issues; CPU Scheduling – Scheduling criteria, Scheduling algorithms; Process Synchronization – critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Critical regions, Monitors; Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Detection, Recovery.

UNIT III	MEMORY MANAGEMENT	9

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation – Virtual Memory – Demand Paging, Page Replacement, Allocation, Thrashing.

UNIT IV	FILE SYSTEMS	9

File-System Interface-File Concept, Access Methods, Directory Structure, Protection, Memory-Mapped Files; File-System Implementation-File-System Structure, File-System Operations, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery.

UNIT V	SECURITY IN OPERATING SYSTEMS	9

UNIX Security – UNIX Protection System – UNIX Authorization – UNIX Security Analysis – UNIX Vulnerabilities – Windows Security – Windows Protection System – Windows Authorization – Windows Security Analysis – Windows Vulnerabilities – Address Space Layout Randomizations – Retrofitting Security into a Commercial Operating System – Introduction to Security Kernels.

	TOTAL PERIODS	45

COURSE OUTCOMES		
At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	summarize the basic concepts of Operating Systems and the usage of system calls.	Understanding (K2)
CO2	analyze the process management concepts including scheduling, synchronization, threads and deadlock..	Analyzing (K4)
CO3	make use of memory management strategies and apply page replacement policies to address demand paging.	Analyzing (K4)
CO4	correlate file system interfaces and implementation process.	Analyzing (K4)
CO5	examine how security is implemented in various operating systems.	Analyzing (K4)

TEXT BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley & Sons, Inc., 10th Edition, 2021.
2. Trent Jaeger, Operating System Security, Morgan & Claypool Publishers series, 2008.

REFERENCES

1. Morrie Gasser, "Building A Secure Computer System", Van Nostrand Reinhold, New York, 2018.
2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.To have understanding on memory, file and I/O management activities of OS.
3. William Stallings, "Operating Systems – Internals and Design Principles", 9th Edition, Pearson, 2017.
4. Michael Palmer, "Guide to Operating Systems Security", Course Technology – Cengage Learning, New Delhi, 2008.

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	1	1	1	-	-	-	-	-	-	1	3	2
CO2	3	3	2	2	1	-	-	-	-	-	-	1	3	2
CO3	3	3	3	2	1	-	-	-	-	-	-	1	3	2
CO4	3	3	3	2	1	-	-	-	-	-	-	1	3	2
CO5	2	2	2	2	1	-	-	-	-	-	-	1	3	2

CY23403	CYBER LAW AND ETHICS	3	0	0	3

COURSE OBJECTIVES

To enable the students to

1	interpret types of cybercrimes and cybercriminals.
2	analyze the legal perspectives of cyber crimes.
3	understand the various perspectives of cyber act.
4	discover the various security issues related to mobile and wireless devices.
5	infer the intellectual property rights and ethical dimensions of cybercrimes.

UNIT I	INTRODUCTION TO CYBERCRIMES	9

Introduction–Cyber Crime: Definition and origins– Cybercrime and information Security–Cyber criminals– Classification of Cybercrimes.

UNIT II	LEGAL PERSPECTIVES	9

Introduction to the Legal Perspectives of Cybercrimes and Cyber security, Cybercrime and the Legal Landscape around the World, Why Do We Need Cyber laws, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India.

UNIT III	CYBER ACT	9

Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Cybercrime and Punishment, Cyber law, Technology and Students: Indian Scenario.

UNIT IV	MOBILE AND WIRELESS DEVICES	9

Introduction – Proliferation of Mobile and Wireless, Security Challenges Posed by Mobile Devices; Attacks on Mobile/Cell Phones; Security Implications for Organizations, Organization Measures for handling Mobile Devices, Related Security Issues, Polices.

UNIT V	CYBER ETHICS	9

Introduction – Intellectual Property in the Cyberspace, The Ethical Dimension of Cybercrimes – Mindset and Skills of Hackers and Other Cybercriminals – Sociology of Cybercriminals – Information Warfare.

	TOTAL PERIODS	45

COURSE OUTCOMES

At the end of this course, students will be able to		BT Mapped (Highest Level)
CO1	classify the various types of cybercrime and cyber criminals.	Analyzing (K4)
CO2	explore the need of cyber laws for real world scenario.	Analyzing (K4)
CO3	explain the consequences of cybercrime and it's punishment.	Analyzing (K4)
CO4	detect the various types of attacks on mobile and wireless devices.	Analyzing (K4)
CO5	investigate the mindset of hackers and the skills to prevent attacks.	Analyzing (K4)

TEXT BOOKS

1. Sunit Belapure and Nina Godbole, Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley India Pvt. Ltd, 2021.
2. Jonathan Rosenoer, "Cyber Law: The law of the Internet", Springer–Verla.2019.

REFERENCES

1. Mark F Grady, Fransesco Parisi, "The Law and Economics of Cyber Security",Cambridge University Press, 2012.
2. Dr. Farooq Ahmad, Cyber Law in India, Allahbad Law Agency– Faridabad.2018.
3. Cyber Law & Cyber Crimes by Advocate Prashant Mali; Snow White Publications, Mumbai.
4. The Information technology Act,2000; Bare Act-Professional Book Publishers, New Delhi.

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

	PO's												PSO's	
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
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CO3	2	2	2	1	1	1	-	1	-	-	-	1	3	2
CO4	3	2	2	1	1	2	-	1	-	-	-	1	3	2
CO5	2	2	2	1	-	1	-	1	-	-	-	1	3	2

MC23402	HUMAN VALUES AND GENDER EQUALITY	2	0	0	0

COURSE OBJECTIVES

To enable the students to

1	define different types of human values and their impact on individual behaviour and societal norms.
2	apply principles of personal development such as self-confidence, self-discipline, and resilience to navigate modern challenges effectively.
3	evaluate the role of values in shaping professional ethics, civic sense and global citizenship.
4	examine the socio-economic factors influencing gender inequality and explore avenues for empowerment and advocacy.
5	critically analyze prevalent issues and challenges faced by women, including gender-based violence, discrimination, and cultural biases, and propose measures for their eradication.

UNIT I	HUMAN VALUES	6

Value Education - Definition, Types of values; Human values - Acceptance, Consideration. Appreciation, Listening. Empathy, Sympathy, Honesty, Integrity, Wisdom, Decision making, Self- actualization, Character formation towards positive personality, Contentment; - Religious Values - Humility, Compassion, Gratitude. Peace, Justice, Freedom, Equality.

UNIT II	PERSONALITY DEVELOPMENT	6

Personal Development - Introspection, Self-confidence, Self-discipline; Flexibility -Peer pressure - Sensitization towards Gender Equality; Reliability; Unity; Modern Challenges of Adolescent Emotions and behavior - Comparison and Competition, Positive and Negative attitudes; Family values; Self- improvement - Physical exercises, Meditation ,Yoga.

UNIT III	VALUE EDUCATION TOWARDS NATIONAL AND GLOBAL DEVELOPMENT	6

Professional Values -. Integrity, Responsibility, Punctuality, Dedication - Perseverance - Competence; Civic sense and Responsibility; Global Values - Computer Ethics, Moral Leadership, Code of Conduct; Corporate Social Responsibility; Aesthetic values; National Integration and International understanding of Religious Values – Spirituality, thought process.

UNIT IV	GENDER EQUALITY	6

Gender Equality - Definition, Empowerment, Economic Equality; Condition of Women in India- Education, Healthcare, Political Representation, Gender-based Violence; Challenging Stereotypes: Parental and Caregiving Responsibilities; Legal and Policy Reform; Cultural Shifts; Global Perspective; Male Chauvinism; Sustainable Development..

UNIT V	WOMEN ISSUES AND CHALLENGES	6

Women Issues and Challenges - female feticide, violence against women; Domestic violence- dowry related abuse and deaths, Physical violence, Emotional abuse; Sexual assault; Honour killing; Eve-teasing- Stalking, e-stalking (cyber-crime).

	TOTAL PERIODS	30

COURSE OUTCOMES At the end of this course, the students will be able to		BT MAPPED (Highest Level)
CO1	discuss the concept of human values and their significance in personal and societal development.	Understanding (K2)
CO2	demonstrate introspective skills to enhance personal growth and self-awareness.	Applying (K3)
CO3	recognize the importance of gender equality in promoting a just and equitable society.	Understanding (K2)
CO4	cultivate a sense of social responsibility and ethical conduct towards achieving national and global development.	Analyzing (K4)
CO5	analyse the challenges faced by women in various spheres and identify strategies for addressing them.	Analyzing (K4)

TEXT BOOKS

1. A Foundation Course in Human Values and Professional Ethics: Presenting a Universal Approach to Value Education - Through Self-exploration. New Delhi, 2016.
2. Aurther, John. Personality Development. Lotus Press, 2018.

REFERENCES

1. Joshi, Dhananjay. Value Education in Global Perspective. Lotus Press, 2014.
2. Mahrotra, Mamta. Gender Inequality in India: Challenging Social Norms. Prabhat Books, 2015.

CO-PO MAPPING :

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

CY23404	CRYPTOGRAPHY AND NETWORK SECURITY	3	0	2	4

COURSE OBJECTIVES

To enable the students to

1	understand number theory to grasp encryption algorithms effectively.
2	interpret the concepts of Symmetric Ciphers.
3	infer the techniques for Message Authentication and maintaining confidentiality.
4	recognize the network security practices.
5	identify the concepts of system security.

UNIT I	INTRODUCTION AND NUMBER THEORY	9

Computer Security Concepts: The OSI Architecture, Attacks, Services and mechanisms - Classical Encryption techniques - Basic Number Theory: Fermat and Euler's Theorem, Chinese Remainder Theorem, Modular arithmetic, Polynomial arithmetic.

UNIT II	SYMMETRIC CIPHERS	9

Block Ciphers and the Data Encryption Standard - Introduction to Finite Fields - Advanced Encryption Standard - Pseudorandom Number Generators – RC4.

UNIT III	PUBLIC-KEY ENCRYPTION AND HASH FUNCTIONS	9

Public Key Cryptography and RSA Algorithm - Diffie Hellman Key Exchange - Elliptic Curve Cryptography - Message Authentication and Hash Functions - Hash and MAC Algorithms - Digital Signatures and PKI.

UNIT IV	MUTUAL TRUST AND NETWORK SECURITY	9

User Authentication and Kerberos - Key Management and Distribution - Electronic mail Security: Pretty Good privacy - S/MIME - IP Security - Wireless Network Security.

UNIT V	SYSTEM SECURITY	9

Intruders: Intrusion detection, Password Management - Malicious Software: Viruses and Related Threats - Virus Counter measures - Distributed DoS attacks - Firewalls: Firewall Design Principles - Internet Security Protocols: SSL, SET.

LIST OF EXPERIMENTS

1. Perform encryption, decryption using the following substitution techniques.
   a.Ceaser cipher b.Playfair cipher c.Hill Cipher d.Vigenere cipher
2. Perform encryption and decryption using following transposition techniques Rail fence - Row & Column Transformation.
3. Implement DES algorithm for practical applications.
4. Implement AES algorithm for practical applications.
5. Implement RSA Algorithm using HTML and JavaScript.
6. Implement the Diffie-Hellman Key Exchange algorithm for a given problem.
7. Calculate the message digest of a text using the SHA-1 algorithm.

8.	Implement the SIGNATURE SCHEME - Digital Signature Standard.
9.	Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w.
10.	Defeating Malware-Building Trojans,Rootkit Hunter.

TOTAL PERIODS	**75**

COURSE OUTCOMES

At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	apply number theory to grasp encryption algorithms effectively.	Applying (K3)
CO2	calculate symmetric ciphers to solve problems.	Applying (K3)
CO3	demonstrate the techniques for Message Authentication and maintaining Confidentiality.	Applying (K3)
CO4	explore the network security practices for protecting information.	Applying (K3)
CO5	identify the concepts of system security to avoid threats.	Applying (K3)

TEXT BOOKS

1. William Stallings, "Cryptography and Network Security - Principles and Practice",Seventh Edition, Pearson Education, 2017.
2. Atul Kahate, "Cryptography and Network Security", Second Edition, Mc Graw Hill Higher Education, 2017.

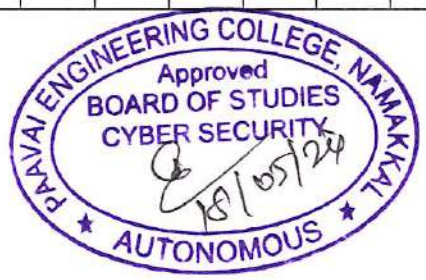
REFERENCES

1. Behrouz A. Ferouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", 3rd Edition, Tata Mc Graw Hill, 2015.
2. William Stallings, "Cryptography and Network Security: Principles and Practice", 3rd edition, 2010.
3. Stephen Mason , "Applications of Cryptography and Network Security" 3rd Edition, Clanrye International, 2017.
4. Jonathan Katz, Yehuda Lindell. "Introduction to Modern Cryptography: Principles and Protocols", 2007.

CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

	Programme Outcomes PO's												PSO's	
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	1	1	2	-	-	-	1	1	-	2	3	2
CO2	3	2	1	1	2	-	-	-	1	1	-	2	3	2
CO3	3	2	1	1	2	-	-	-	1	1	-	2	3	2
CO4	3	2	1	1	2	-	-	1	1	1	-	2	3	2
CO5	3	2	1	1	2	-	-	1	1	1	-	2	3	2



CY23405	DATABASE MANAGEMENT SYSTEMS AND SECURITY LABORATORY	0	0	4	2

COURSE OBJECTIVES

To enable the students to

1	learn and implement significant commands in SQL.
2	know the usage of nested and joint queries.
3	recognize functions, procedures and procedural extensions of databases.
4	understand attacks on databases and to learn to defend against the attacks on databases.

LIST OF EXPERIMENTS

1. Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.
2. Create set of tables, add foreign key constraints and incorporate referential integrity.
3. Query the database tables using different 'where' clause conditions and also implement aggregate functions.
4. Query the database tables and explore nested queries.
5. Query the database tables by implementing different types of join operations.
6. Write user defined functions and stored procedures in SQL.
7. Implementation of TCL commands for transactions and DCL commands for granting and revoking user privileges.
8. Write SQL Triggers for insert, delete, and update operations in database table.
9. Use SQLi to authenticate as administrator, to get unauthorized access over sensitive data and to inject malicious statements into form field.
10. Write a program to protect against SQLi attacks.
11. Write queries to insert encrypted data into the database and to retrieve the data using decryption.

TOTAL PERIODS	**60**

COURSE OUTCOMES

At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	construct databases for given real world problems using SQL Commands.	Applying (K3)
CO2	execute, demonstrate database operations using SQL commands.	Applying (K3)
CO3	implement functions, procedures and triggers on database.	Applying (K3)
CO4	examine SQLi attacks using encryption and decryption.	Applying (K3)

CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
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CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	2	2	-	-	-	-	-	-	2	3	2
CO2	3	3	2	2	2	-	-	-	-	-	-	2	3	2
CO3	3	3	2	2	2	-	-	1	-	1	-	2	3	2
CO4	3	3	2	2	2	-	-	1	-	1	-	2	3	2

CY23406	OPERATING SYSTEMS AND SECURITY LABORATORY	0	0	4	2

COURSE OBJECTIVES

To enable the students to

1	understand shell programming and the use of filters in the UNIX environment.
2	study the system calls and to process creation and inter process communication.
3	learn to use the file system related system calls.
4	know about the various CPU Scheduling algorithms, page replacement algorithms and deadlock avoidance.

LIST OF EXPERIMENTS

1. Basics of UNIX commands, Understand and practice Linux permissions, special permissions and authentication (various options of chmod, setuid, setgid).
2. Write programs using the following system calls of UNIX operating system a. fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
3. Write C programs to implement the various CPU Scheduling Algorithms.
4. Implementation of Semaphores.
5. Implementation of Shared memory.
6. Bankers Algorithm for Deadlock Detection &Avoidance.
7. Implementation of the following Memory Allocation Methods for fixed partition -a) First Fit b) Worst Fit c) Best Fit.
8. Implementation of the following Page Replacement Algorithms a) FIFO b) LRU c) LFU.
9. Program to demonstrate the working of Bell LaPadula Model and Biba Integrity Model.
10. Setting up access control lists of files and directories and testing the lists in Linux.
11. Learn to enable and disable address space layout randomization.

TOTAL PERIODS	**60**

COURSE OUTCOMES

At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	identify and apply Linux and Unix commands.	Applying (K3)
CO2	illustrate system calls, process creation and inter process communication.	Applying (K3)
CO3	illustrate the various CPU Scheduling algorithms, page replacement algorithms and Deadlock avoidance.	Applying (K3)
CO4	implement security models for real world problems.	Applying (K3)

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
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CO2	3	3	2	2	2	-	-	-	-	-	-	2	3	2
CO3	3	3	2	2	2	-	-	-	-	-	-	2	3	2
CO4	3	3	2	2	2	-	-	-	-	-	-	2	3	2

GE23401	PROFESSIONAL DEVELOPMENT II	0	0	2	1

COURSE OBJECTIVES	
To enable the students to	
1	enhance their own behavioural skills to survive in corporate world.
2	evaluate their listening and speaking skills to face the interviews in a successful way.
3	solve advance level verbal aptitude tests to get placed in Tier I companies.
4	improve their reasoning skills to get placed in reputed companies.

UNIT I	WRITING SKILLS	7
Email writing; Fixing and cancelling appointments; Paper submission for seminars and conferences; Business communication; Stress management; Body language; Dress code; Self-introduction II; Update resume building II; JAM level -3.		

UNIT II	PRESENTATION SKILLS	7
Presentation skills - Types and methods of delivering presentation, ways and methods to improve presentation skills; Mini presentation in smaller groups; Situational role play; Face to face interview; Group discussion level IL; JAM Level-4.		

UNIT III	QUANTITATIVE APTITUDE - I	8
Simplification; Time, speed and distance; Trains; Boats and streams; Ratio and proportion; Partnership; Percentage.		

UNIT IV	LOGICAL REASONING	8
Seating arrangement; Arithmetic reasoning; Character puzzle; Syllogisms; Matching definitions; Statements and arguments.		

	TOTAL PERIODS	30

COURSE OUTCOMES At the end of this course, the students will be able to		BT MAPPED (Highest Level)
CO1	interpret the personality development through various activities.	Understanding (K2)
CO2	examine speaking and listening skills to excel in their jobs.	Analyzing (K4)
CO3	develop the quantitative skills and analytical skills to face the interview.	Applying (K3)
CO4	extend the reasoning abilities by scoring exceeded percentage to get placed in reputed companies.	Understanding (K2)

TEXT BOOKS

1. Agarwal, R.S. "Objective General English", S.Chand & Co.2021.

2. Agarwal, R.S. "Quantitative Aptitude", S.Chand & Co.2021.

REFERENCES

1. Abhijit Guha, "Quantitative Aptitude ", Tata-Mcgraw Hill, 2023.
2. Agarwal, R.S." a modern approach to Verbal & Non Verbal Reasoning", S.Chand & Co Ltd, New Delhi.2021.
3. Word Power Made Easy By Norman Lewis, Wr.Goyal Publications, 2021.

CO PO MAPPING:

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	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	3	3	2	3	-	3	1	2
CO2	-	-	-	-	-	-	2	3	2	3	-	3	1	2
CO3	3	2	2	-	-	1	-	-	-	-	2	-	2	2
CO4	2	3	3	2	-	3	3	1	-	1	2	-	2	2