

M.Sc. (IT)

SEM	Course Code	Course	Course Title	Ins. Hrs	Credit	Marks		Total
						CIA	ESE	
I	20PIT1CC1	Core- I	ASP.NET	6	5	25	75	100
	20PIT1CC2	Core – II	Data Structures and Algorithms	6	5	25	75	100
	20PIT1CC3	Core- III	Database Systems	6	4	25	75	100
	20PIT1CC4P1	Core- IV A	ASP.NET Lab	3	2	10	40	50
	20PIT1CC4P2	Core- IV B	RDBMS Lab	3	2	10	40	50
	20PIT1DE1	DSE – I #		6	4	25	75	100
		TOTAL			30	22		
II	20PIT2CC5	Core- V	Java Programming	6	5	25	75	100
	20PIT2CC6	Core- VI	Mobile Communication	6	5	25	75	100
	20PIT2CC7	Core- VII	Data Science and R Programming	6	4	25	75	100
	20PIT2CC8P1	Core- VIII A	Java Programming Lab	3	2	10	40	50
	20PIT2CC8P2	Core- VIII B	RProgramming Lab	3	2	10	40	50
	20PIT2DE2	DSE – II#		6	4	25	75	100
		TOTAL			30	22		
III	20PIT3CC9	Core- IX	Software Testing	6	5	25	75	100
	20PIT3CC10	Core- X	Web Services	6	5	25	75	100
	20PIT3CC11	Core- XI	Internet of Things	6	4	25	75	100
	20PIT3CC12P1	Core- XII A	Software Testing Lab	3	2	10	40	50
	20PIT3CC12P2	Core- XII B	Web Services Lab	3	2	10	40	50
	20PIT3DE3	DSE – III#		6	4	25	75	100
	20PIT3EC1	Extra Credit Course-I	Online Course (MOOC)	-	1*	-	-	-
	TOTAL			30	22			500
IV	20PIT4CC13	Core- XIII	Open Source Technology	6	5	25	75	100
	20PIT4CC14P1	Core- XIVA	Open Source Technology Lab	3	3	10	40	50
	20PIT4CC14P2	Core- XIVB	Angular JS Lab	3	2	10	40	50
	20PIT4PW	Project		18	13	-	300	300
	20PCNOC	Online Course (Compulsory)		-	1	-	-	-
	20PIT4EC2	Extra Credit Course - II	Information Technology for Career Examinations	-	5*	-	100	100*
		TOTAL			30	24		
GRAND TOTAL				120	90			2000

*Not considered for grand total and CGPA

Discipline Specific Electives

SEMESTER	COURSE CODE	COURSE TITLE
I	20PIT1DE1A	Artificial Intelligence and Machine Learning
	20PIT1DE1B	Data Communication Networks
II	20PIT2DE2A	Semantic Web
	20PIT2DE2B	Cryptography and Network Security
III	20PIT3DE3A	Soft Computing
	20PIT3DE3B	Cloud Computing

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PIT1CC1	Core – I	ASP.NET	6	5	100	25	75

Course Outcomes (COs):

1. Acquire working knowledge of web applications development
2. Able to display dynamic data from data sources
3. Knowledge on security in web services.
4. Develop Secured web applications
5. Selection of appropriate programming language for the real world problems.

UNITI: ASP.NET Introduction

18 hours

The .NET Framework: .NET Programming Framework – VB.NET, C# and the .NET Languages- CLR – Class Library – ASP.NET. **Learning the .NET Languages:** The .NET Languages – Data Types – Declaring Variables – Scope and Accessibility – Variable Operations – Object-Based Manipulations – Conditional Structures – **# Loop Structures – Functions and Subroutines #.**

UNITII: Developing ASP.NET Applications

18hours

Web From Fundamentals: A simple Page Applet – Improving the Currency Changes – A Deeper Look at HTML Control Classes – The Page Class. **Web Controls:** Stepping Up to Web Controls – Web Control Classes – AutoPostBack and Web Control Events – A simple Web Page Applet – Accessing Web Controls.

UNITIII: Forms

18hours

Validation and Rich Controls: The Calendar Control – Formatting the calendar – The AdRotator – The Advertisements File – The AdRotator Class – Validation – A simple Validation Example – Regular Expressions. **State Management:** Viewstate – Transferring Information – Custom Cookies – Session State – Session State Configuration –**# Application State #.**

UNITIV : Working With Data

18hours

Overview of ADO.NET: Introducing ADO.NET and Data Management – Characteristics of ADO.NET – ADO.NET Object Model.**ADO.NET Data Access:** The SQL Select,Update, Insert and Delete statement – Creating a Connection – Defining a Select Command – Command WithDataReader- Updating Data – Accessing,Modifying, Updating Disconnected Data. **The DataList, DataGrid, and Repeater:** Comparing the Template Controls – Selecting,Editing, Paging and Sorting with the DataGrid.

UNITV

18hours

Web Services Architecture: Internet Programming Then and Now – WSDL – SOAP – Communicating with a Web service – Web Service Discovery and UDDI. **Creating Web Services:** Web Service Basics – The StockQuote, Documenting, Testing your Web Service – Web Service Data Types. **Using Web Services:** Consuming a Web Service – **# Using the Proxy Class #.**

..... # Self-study portion

Text Book:

ASP.Net: The Complete Reference, Matthew MacDonald, McGraw Hill Edition (India) Edition 2002.

UNITI : Part 1:Section 1, 2

UNITII : Part 2: Section 6, 7

UNITIII : Part 2: Section 9, 10

UNITIV : Part 3: Section 12, 13, 15

UNITV : Part 4: Section 18, 19, 20

Books for References:

1. Professional ASP.NET 1.1 Bill Evjen , Devin Rader , Farhan Muhammad , Scott Hanselman, SrivakumarWrox.
2. ASP. NET Black Book DreamTech.

Web Reference:<https://www.w3schools.com/asp/default.ASP><https://www.tutorialspoint.com/asp.net/index.htm>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
I	20PIT1CC1	ASP.NET					6	5			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓		✓		✓		✓	
CO2		✓	✓	✓	✓		✓	✓	✓	✓	
CO3	✓		✓	✓	✓	✓		✓	✓	✓	
CO4	✓	✓	✓	✓	✓		✓	✓	✓	✓	
CO5		✓		✓	✓		✓			✓	
Number of matches (✓) = 37, Relationship: High											

Prepared by:

1. B. Benazir Butto

Checked by:

1. Dr. K. Nafees Ahmed

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PIT1CC2	Core – II	DATA STRUCTURES AND ALGORITHMS	6	5	100	25	75

Course Outcomes (COs):

- CO 1. Selecting appropriate data structures for any specified problem
- CO 2. To implement the various operations (Traverse, Search, Insert, Delete)
- CO 3. To learn mathematical background for analysing algorithm
- CO 4. To apply the proper algorithm design method for problem solving.
- CO 5. Evaluating the algorithms and data structures used in the problem to determine the time and memory consumption.

UNIT I

18 hours

Lists, Stacks and Queues: Abstract Data Types (ADTs) - The Stack ADT - The Queue ADT

UNIT II

18hours

Trees: Introduction - Binary Trees - Representing Binary Trees in Memory - Traversing Binary Trees - Traversal Algorithms using Stacks - Header Nodes: Threads. Binary Search Trees - Searching and Inserting in Binary Search Trees - Deleting in a Binary Search Tree - AVL Search Trees - Insertion in an AVL Search Tree - Deletion in an Search Tree - m-way Search Trees - Searching Insertion and Deletion in an m-way Search Tree - B Trees - Searching Insertion and Deletion in B Trees - Heap: Heapsort. **# Path Lengths: Huffman's Algorithm - General Trees #.**

UNIT III

18hours

DIVIDE AND CONQUER: The General Method – Defective Chessboard – Binary Search – Finding the Maximum and Minimum – Merge Sort – Quick Sort – Selection - **# Strassen's Matrix Multiplication #.**

UNIT IV

18hours

THE GREEDY METHOD: General Method - Container Loading - Knapsack Problem - Tree Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost Spanning Trees - **# Optimal Storage On Tapes – Optimal Merge Patterns #** - Single Source Shortest Paths

UNIT V

18hours

DYNAMIC PROGRAMMING: The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees - String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - **# Flow Shop Scheduling #.** BACKTRACKING: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem

..... # Self-study portion

Text Book:

1. Mark Allen Weiss, "Data Structures an Algorithm Analysis in C", Pearson publishing Company Limited, Second Edition, Reprint, Eleventh Impression 2009

UNIT I : Chapter 3

2. Seymour Lipschutz, Data Structures (Schaum's Outlines), Tata McGraw-Hill Publishing Company Limited, Fourth Reprint, 2006

UNIT II : Chapter 7

3. Ellis Horowitz, SatrajSahni and SanguthevarRajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009

UNIT III : Chapter 3 (3.1 – 3.8)

UNIT IV : Chapter 4

UNIT V : Chapter 5 and 7

Books for References:

Introduction to Algorithms 3rd Edition Sep 2010 Charles E. Leiserson. Ronald L. Rivest. Clifford Stein.

Web Reference:

<https://www.tutorialride.com/data-structures/trees-in-data-structure.htm>

<https://www.javatpoint.com/daa-algorithm-design-techniques>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
I	20PIT1CC2	DATA STRUCTURES AND ALGORITHMS					6	5			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓		✓	✓	✓	✓	✓	✓		
CO2	✓	✓		✓		✓	✓	✓		✓	
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 45, Relationship: Very High											

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Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PIT1CC3	Core – III	DATABASE SYSTEMS	6	4	100	25	75

Course Outcomes (COs):

1. Demonstrate an understanding of the elementary & advanced features of DBMS & RDBMS
2. Attain a good practical understanding of the SQL
3. Develop clear concepts about Relational Model.
4. Examine techniques pertaining to Database design practices
5. Execute various advance SQL queries related to Transaction Processing & Locking using concept of Concurrency control.

UNIT I

18 hours

Introduction: Database System Applications – Purpose of Database Systems – Views of Data – Database Languages – Data Storage and Querying – Database Architecture – Database Users and Administrator – Structure of Relational Database – Keys – **# Schema Diagrams #**– Formal Relational Query Languages: Relational Algebra

UNIT II

18hours

Introduction to SQL: Over View of SQL – SQL Definition – Basic Structure of SQL Queries – Additional Basic Operations – Set Operations – Null Values – Aggregate Functions – Nested Sub-queries – Modification of the database - Intermediate SQL: Join Expression – Views. Entity-Relationship Model – Constraints – Removing Redundant Attributes in Entity Sets – **# Entity- Relationship Diagram #**.

UNIT III

18hours

Normalization: Purpose of Normalization – How Normalization Support Database Design – Data Redundancy and Update Anomalies – Functional Dependencies – First Normal Form – Second Normal Form – Third Normal Form. Advanced Normalization: More on Functional Dependencies – BCNF – 4NF – 5NF.

UNIT IV

18hours

Storage and File Structure: RAID - File Organization – Organization of Records in Files – Data Dictionary storage. Indexing and Hashing: Basic Concepts – Ordered Indices – B⁺-Tree Index Files – Static Hashing – **# Dynamic Hashing #**.

UNIT V

18hours

Transaction: Transaction Concept – A simple Transaction Model – Storage Structure – Transaction Atomicity and Durability – Transaction Isolation – Serializability – Concurrency Control: Lock-Based Protocol – Timestamp-Based Protocol – Validation-Based Protocol – **# Recovery Systems: Failure Classification – Recovery and Atomicity #**.

..... # Self-study portion

Text Book:

1. Abraham Silberschatz, Hendry F. Korth and S. Sudarshan, Database System Concepts, 6th Edition, Mcgraw- Hill International Edition

UNIT I: Chapter (1.1-1.5, 1.9, 1.12, 2.1, 2.3, 2.4, 6.1)

UNIT II: Chapter (3.1 – 3.9, 4.1, 4.2, 7.2, 7.3, 7.5)

UNIT IV: Chapter (10.3, 10.5-10.7, 11.1-11.3, 11.6, 11.7)

UNIT V: Chapter (14.1 – 14.6, 15.1, 15.4, 15.5, 16.1, 16.3)

2. Database Systems A Practical Approach to Design, Implementation, and Management, 4th Edition by Thomas M.Connolly, Carolyn E.Begg, Pearson Education, Fifth Impression, 2012.

UNIT III: Chapter 13(13.1-13.4, 13.6-13.9) Chapter 14(14.1.14.2, 14.4, 14.5)

Books for References:

1. Fundamentals of Database Systems, 5th Edition by RamezElmasri, Shamkant B. Navathe, Pearson Education Ltd.
2. C.J Date, A. Kannan and S.Swaminathan, An Introduction to Database Systems, 8th Edition, PearsonEducation Asia.

Web Reference:

<https://www.db-book.com/db6/slide-dir/>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
I	20PIT1CC3	DATABASE SYSTEMS					6	4			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓			✓	✓	✓		✓	✓		
CO2	✓			✓	✓	✓		✓	✓		
CO3	✓	✓		✓	✓	✓	✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 41, Relationship: High											

Prepared by:

1. S. Syed Ibrahim

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Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PIT1CC4P1	Core – IV A	ASP.NET LAB	3	2	50	10	40

1. **Simple Programs:**

- a) Develop a Program to demonstrate String Object.
- b) Display first N Fibonacci numbers.
- c) Write a program to find the eligibility of admission for a professional course based on the following criteria:

Marks in Maths ≥ 65 , Marks in Phy ≥ 55 , Marks in Chem ≥ 50 , Total in all three subject ≥ 180 , total in Math and Subjects ≥ 140

Test Data :

Input the marks obtained in Physics :65

Input the marks obtained in Chemistry :51

Input the marks obtained in Mathematics :72

2. **Web Forms Programs:**

- a) Making use of Currency Changes.
 - b) Write a program to create a table dynamically.
 - c) Develop a program to generate the Greeting Card Automatically.
3. Making use of AdRotator control.
 4. Create a Bio- data Using Validation Controls.
 5. Write a program to implement state management techniques.
 6. Write a program to implement view state and session state.
 7. Create a program to manipulate student details using DML Commands through connected approach.
 8. Write a program to access the data in DataList and DataGrid.
 9. Develop a project to update and delete few records using Disconnected Access.
 10. Design an ASP.NET to perform basic mathematical operations using web services.
 11. Design an ASP.Net client for web service.

Prepared by:

1. B. Benazir Butto

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1. Dr. K. Nafees Ahmed

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PIT1CC4P2	Core – IV B	RDBMS LAB	3	2	50	10	40

I. Data Definition Languages

1. Create the following relations

Customer (customer-Id (Primary key), customer-name, address)

Account (account-number (Primary key), branch-name, balance)

Loan (loan-number (Primary key), branch-name, amount)

Branch (branch-name, branch-city, assets)

Depositor (customer-name, account-number)

Borrower (customer-name, loan-number)

Supplier (supplier-number, part-number, color, quantity) use candidate key

2. Write DDL query to perform foreign key with on delete cascade - A foreign key with cascade delete means that if a record in the parent table is deleted, then the corresponding records in the child table will automatically be deleted.

3. Write DDL query to change the column and table name.

4. Alter with three options

Add – add columns in the existing table

Modify – modify the data type and size in the existing table

Drop – delete column from existing table

II. Data Manipulation Languages

(1) Insert Operation

(2) Rename Operation

Display the customer-name instead of customer-id

(3) Tuple Variables

Using branch relation, Find the names of all branches that have assets greater than at least one branch located in a city (any city)

(4) String Operations

Find the customer names whose names start with M.

Find the customer names whose names end with R.

Find the customer name whose names contain “ mo” as a substring

Find the customer name whose names exactly six character.

Find the customer name whose names at least five character.

(5) Ordering of Tuples

To list in alphabetic order all customers who have loan at a branch (ex: cantonment)

To list customer names in descending order.

(6) Set Operation – (union, Intersect, minus)

Find all customers having a loan, an account or both at the bank.

Find all customers who have both a loan and account at the bank.

Find all customers who have an account but no loan at the bank.

Find all customers who have a loan but not an account at the bank.

(7) Aggregate functions – (average, minimum, maximum, total, and count)

Find average account balance at a branch. (any branch name like cantonment branch)

Find the minimum balance at a branch.

Find the maximum balance at a branch.

Find the total balance at a branch

Find the number of accounts in a branch.

(8) Aggregate functions with group by and having clause)

Find the average account balance at each branch.

Find branch names those branches where the total balance is more than Rs. 1, 00,000.

Find the branches those branches where the total accounts are more than 3.

(9) Nested sub-queries. Membership (in and notin)

Find all customers who have both a loan and account at the bank.

Find all customers who have an account but no loan at the bank.

Set Comparison (some, all)

Using branch relation, Find the names of all branches that have asset value greater than at least one branch located in a city (any city)

Find the names of all branches that have asset value greater than that of each branch located in a city (any city)

(10) Views

Create the view consisting of customer-names and branch-names who have either loan or an account at the branch.

(11) Deletion

Delete the tuples of all accounts with balances below the average at the bank (sub-query).

Delete all accounts tuples at every branch located in a city(any city)

(12) Updates

All balances are to be increased by 5 percent.

Update with case statements

All accounts with balances over 10000 receives 10 percent interest where as others receive 5 percent

(13) Join Operations

Inner join – Find the customer-names who have loan from a branch (KK nagar)

Left outer join – Show the relation, which loan not buy a single customer.

Right outer join – Show the relation, which customers bought loan, that loan details

not in the loan relation

III. PL/SQL Procedure

1. Reverse the string.
2. Student Mark Sheet Preparation
3. Pay Roll preparation
4. Find factorial number using recursive function.
5. Find Fibonacci series using recursive function.

IV. SQL FORMS

1. Student Mark System
2. Pay Roll Preparation
3. Income Tax Calculation

Prepared by:

1. S. Syed Ibrahim

Checked by:

1. Dr. K. Nafees Ahmed

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PIT1DE1A	DSE - I	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	6	4	100	25	75

Course Outcomes (COs):

1. Recognize appropriate search algorithms for any Artificial Intelligence problems
2. Represent a problem using formal and non-formal knowledge representation
3. Develop a machine learning system for association rule learning algorithm
4. Implement and apply reinforcement and statistical learning algorithms for solving a real-world problem
5. Apply the machine learning technique for solving a real-world problem

UNIT I

18 hours

INTRODUCTION- Definitions of Artificial Intelligence- Topics of Artificial Intelligence – Production Systems- State Space Representation- Branches of Artificial Intelligence – Applications of Artificial Intelligence-HEURISTIC SEARCHTECHNIQUES:Generate –and-test – Hill climbing-Search Techniques –Problem Reduction- Constraint Satisfaction – Means-ends Analysis – # **GAME PLAYING: MINIMAX Procedure- Alpha-Beta Pruning- Combined Approach#.**

UNIT II

18hours

KNOWLEDGE REPRESENTATION: Knowledge Management- Types of Knowledge- Knowledge Representation – Approaches to Knowledge Representation- Issues in Knowledge Representation- Knowledge base- KNOWLWDGE REPRESENTATION STRUCTURES: First Order Logic – Frames-Conceptual Dependency- Scripts-Semantic Network- REASONING: # **Types of Reasoning#** -Non-monotonic Inference Methods-Non-monotonic Reasoning-Truth Maintenance System – Reasoning with Fuzzy Logic- Rule-based Reasoning- Diagnosis Reasoning

UNIT III

18hours

LEARNING: Types of Learning- Machine Learning – Intelligent Agents-ASSOCIATION LEARNING: Basis of Association- APRIORI Algorithm – Éclat Algorithm –FP Growth Algorithm – TERTIUS Algorithm-SCADA Application by FP Growth Algorithm-CLUSTERING- # **Means Clustering- Fuzzy Clustering #**-Hierarchical Clustering-Cluster Similarity

UNIT IV

18hours

REINFORMENT LEARNING: Markov Decision Problem-Q-learning- Temporal Difference Learning – Learning Automata-STATISTCAL LEARNING: Hidden Markov Models- Linear Classifiers-Quadratic Classifiers- Decision Trees – Bayesian Networks

UNIT V

18hours

ARTIFICIAL NEURAL NETS: ANN Basics-ANN-Learning Process –Perceptron- RBF Networks- ANN summary- SUPERVISED LEARNING: Support Vector Machines-Inductive Logic Programming- Case-based reasoning-Ensemble Classifiers-Nearest Neighbourhood- Fuzzy Network- UNSUPERVISED LEARNING: Expectation Maximization-Self Organizing Maps- Adaptive Resonance Theory

..... # Self-study portion

Text Book:

Vinod Chandra S.S and AnandHareendran S, Artificial Intelligence and Machine learning, PHI Learning Private Limited, 2014

UNIT I : Chapter I, Chapter II, and Chapter III

UNIT II : Chapter IV, Chapter V and Chapter VI

UNIT III : Chapter VII, Chapter VIII and Chapter IX

UNIT IV : Chapter X and Chapter XI

UNIT V : Chapter XII, Chapter XII and Chapter XIII

Books for References:

1. Elaine Rich, Kevin Knight and Shivasankar B Nair, Artificial Intelligence, Third Edition, Tata McGraw Hill Education Private Limited, 2010
2. John Mueller and Luca Massaron , Machine Learning For Dummies, John Wiley & Son, 2016

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
I	20PIT1DE1A	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING					6	4			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓		✓	✓	✓					
CO2	✓	✓		✓	✓	✓					
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓		✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
Number of matches (✓) = 37, Relationship: High											

Prepared by:

1. Dr. G. Ravi

Checked by:

1. Dr. K. Nafees Ahmed

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PIT1DE1B	DSE - I	DATA COMMUNICATION NETWORKS	6	4	100	25	75

Course Outcomes (COs):

1. Basic understanding of Computer networks, OSI Reference Model, TCP Reference Model and Routing algorithms.
2. Explain CSMA/CD, internetworking technologies, Routing and Addressing.
3. Develop current research problems and research methods in advance computer networks.
4. Apply security principles and investigate network security threat to system design.
5. Apply research in network security.

UNIT I

18 hours

INTRODUCTION: Data Communications – Networks. Network Models: The OSI Model – Layers in the OSI Model – TCP/IP Protocol suite – Physical Layer: # **Multiplexing** # – Transmission Media: Guided Media- Telephone Network.

UNIT II

18 hours

Data Link Layer: Error Detection and Correction: Introduction – Block coding – Cyclic Codes – Checksum. Data Link Control: Framing – # **Flow and Error Control** # – Protocols – Noiseless Channels – Noisy Channel – HDLC-PPP.

UNIT III

18 hours

Network Layer Design Issues – Routing Algorithms: The Optimality Principle – Shortest Path Algorithm – Flooding – Distance Vector Routing – Link State Routing – Hierarchical Routing – Broadcasting Routing – Congestion Control Algorithms – Network Layer in the Internet: IP Addresses- The IP Version 6 Protocol.

UNIT IV

18 hours

Transport Layer: Process to Process Delivery – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP)- Stream Control Transport Protocol (SCTP).

UNIT V

18 hours

Application Layer: Name Space – Domain Name Space (DNS) – Distribution of Name Space – DNS in the Internet – Remote Logging – E-Mail – File Transfer-Network Management System (NMS) – # **Simple Network Management Protocol (SNMP)** #.

..... # Self-study portion

Text Book:

1. Behrouz A Forouzan, Data Communications and Networking, Fourth Edition, Tata McGraw-Hill, Special Indian Edition 2006

UNIT I : Chapter 1.1, 1.2, 2.2 – 2.4, 6.1, 7.1, 9.1

UNIT II : Chapter 10.1, 10.2, 10.4, 10.5, 11.1 – 11.7

UNIT IV : Chapter 23.1 – 23.4, 25.1 – 25.4, 26.1 – 26.3 2

UNIT V : Chapter 25.1 – 25.4, 26.1 – 26.3, 28.1, 28.2

2. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, Fifth Edition, Pearson Education, Inc., Publishing as Prentice Hall, 2011

UNIT III : Chapter 5.1.1 – 5.1.5, 5.2.1 – 5.2.7, 5.3.1 – 5.3.5, 5.6.2 – 5.6.3

Books for References:

William Stallings, Data and Computer Communication, PHI, Eighth Edition, 2009

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
I	20PIT1DE1B	DATA COMMUNICATION NETWORKS					6	4			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓			✓	✓	✓		✓	✓		
CO2	✓			✓				✓	✓		
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 40, Relationship: High											

Prepared by:

1. S. Syed Ibrahim

Checked by:

1. Dr. K. Nafees Ahmed

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PIT2CC5	Core – V	JAVA PROGRAMMING	6	5	100	25	75

Course Outcomes (COs):

1. Knowledge of the structure and model of the Java programming language, (knowledge)
2. Use the Java programming language for various programming technologies (understanding)
3. Develop software in the Java programming language, (application)
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)

UNIT I

18 hours

Introducing Classes: Class Fundamentals – Declaring Objects – Introducing Methods – Constructors – The this keyword – Garbage Collection – Overloading Methods – Call by value, Call by reference – Recursion – Understanding static – final. Inheritance: Inheritance Basics – Using super – Method overriding – **#Dynamic Method Dispatch #** – Using Abstract Classes

UNIT II

18hours

Packages and Interfaces: Declaring Packages – Access Protection – Importing Packages – Defining, Implementing, Applying Interfaces - Exception Handling: Exception Types – try, catch – throw – throws – finally – Creating User-defined Exceptions. Multithreaded Programming: The Java Thread Model – Creating a Thread – Thread Priorities - String Handling.

UNIT III

18hours

The Collection Interfaces and Utility Classes: ArrayList, LinkedList, Vector, Stack, and Date classes. Files and IO Streams: File – The Byte Streams: DataInputStream – DataOutputStream-FileInputStream – FileOutputStream – SequenceInputStream – PrintStream. **# The Character Streams: FileReader – FileWriter #**– Serialization.

UNIT IV

18hours

Networking: Introduction-Networks Domain Names and Protocols - Ports-Transmission Control Protocol-UDP Approach. Java Database Connectivity: Establishing a connection – **# Creation of data tables – Entering data into table – Table Updating #** – Use of PreparedStatement – Obtaining metadata.

UNIT V

18hours

Event Handling: Event Model – Event Classes – Event Listeners and Interfaces. Swing Component classes: Icons and JLabels - JText Fields – JButtons -JCheckBoxes – JRadioButtons - JComboBoxes.

..... # Self-study portion

Text Book:

1. Herbert Schildt, The Complete Reference Java 2, Fifth Edition, TMH Education Pvt. Ltd.

UNIT I : Chapter 6, 7, 8

UNIT II : Chapter 9, 10, 11

UNIT III : Chapter 15, 17

UNIT V : Chapter 20, 26

2. C. Muthu, Programming with Java, Vijay Nicole imprints Private Limited, 2004.

UNIT IV : Chapter 15, 18

Books for References:

1. Herbert Schildt with Joe O’ Neil, Java –Programmer’s Reference, TMH.

Web Reference:

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

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

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
II	20PIT2CC5	JAVA PROGRAMMING					6	5			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓		✓	✓			✓	✓	
CO2	✓		✓	✓	✓	✓		✓	✓		
CO3		✓	✓	✓	✓	✓	✓	✓			
CO4		✓		✓	✓		✓	✓	✓	✓	
CO5		✓		✓	✓		✓			✓	
Number of matches (✓) = 33, Relationship: Moderate											

Prepared by:

1. M. Kamal

Checked by:

1. Dr. S. VaaheethaKfatheen

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PIT2CC6	Core – VI	MOBILE COMMUNICATION	6	5	100	25	75

Course Outcomes (COs):

1. Able to recognise about mobile communications and distinguish various medium access protocols.
2. Justify the current requirements for satellite systems.
3. Apply knowledge of wireless LAN systems and utilization of 802.11 systems.
4. Impart the knowledge of mobile networks.
5. Interpolate with TCP over 3G networks and inferred with spectrum technology.

UNIT I

18 hours

Mobile Computing – Dialog Control – Networks – Middleware and Gateways – Application and Services – Developing Mobile Computing Applications – Standard Bodies – Players in Wireless Space. Mobile Computing Architecture: Architecture for Mobile Computing – **# Three Tier Architecture #**– Design Considerations for Mobile Computing

UNIT II

18hours

Mobile Computing Through Telephony: Evolution of Telephony - Multiple Access Procedure –Mobile Computing Through Telephone - Voice XML - TAPI – Emerging Technologies: Bluetooth – RFID –**# Mobile IP – IPV6 #**.

UNIT III

18hours

GSM: Global System for Mobile Communications – GSM Architecture – GSM Entities – Call Routing in GSM – Network Aspects in GSM. SMS: Mobile Computing Over SMS – SMS – Value Added Services through SMS.

UNIT IV

18hours

GPRS: GPRS and Packet Data Network – GPRS Network Architecture – Data Services in GPRS – Billing and Charging in GPRS. WAP: Evolution of Wireless Data and WAP – **# GPRS Applications #**.

UNIT V

18hours

CDMA and 3G: Introduction – Spread Spectrum Technology – Direct Sequence Spread Spectrum (DSSS) – IS-95: IS 95 Architecture – IS 95 Authentication and Security – IS 95 Handoff and Roaming. CDMA versus GSM. Wireless LAN: Introduction – Wireless Advantages – Wireless LAN Architecture: Types of Wireless LAN – Mobility in Wireless LAN – **# Wireless LAN Security #**.

Self-study portion

Text Book:

Mobile Computing – Asoke K Talukder, RoopaRYavagal, Tata MC Graw Hill Publishing

UNIT I : Chapter 1 &2 (1.3 to 1.8,1.11 to 1.12, 2.4 to 2.6)

UNIT II : Chapter 3& 4 (3.1 to 3.2,3.4,3.6,3.7,4.2 to4.3,4.5 to 4.6)

UNIT III : Chapter 5&6 (5.1 to 5.4,5.7,6.1 to 6.3)

UNIT IV : Chapter 7 (7.2, 7.3, 7.5, 7.8) Chapter 8 (8.1.1, 8.4)

UNIT V : Chapter 9 (9.1, 9.2.1, 9.3.2, 9.3.5, 9.3.6, 9.4) Chapter 10 (10.1, 10.2, 10.4.1, 10.5, 10.8)

Books for References:

T.G. Palanivelu, R.Nakkeeran, Wireless and Mobile Communication, PHI Learning Private Limited, New Delhi, 2009

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
II	20PIT2CC6	MOBILE COMMUNICATION					6	5			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓			✓		✓					
CO2	✓	✓		✓	✓	✓	✓	✓	✓		
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓		
CO4	✓			✓		✓					
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 33, Relationship: Moderate											

Prepared by:

1. B. DIANA

Checked by:

1. Dr. S. VaaheethaKfatheen

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PIT2CC7	Core – VII	DATA SCIENCE AND R PROGRAMMING	6	4	100	25	75

Course Outcomes (COs):

1. Understand Data Science Process, Statistical Inference, New kinds of Data, Exploratory Data Analysis.
2. Gain basic notions of Model building, Evaluation Metrics formulas, Concepts of Data Engineering and Next-Gen Data Scientists.
3. Fetch insights behind R Programming for Data Science
4. Understand basic statistics and execute Data visualization method via R packages.
5. Implement and apply Data Analysis Techniques (Regression, Clustering, and Classification) via R Packages to build a Machine Learning model.

UNITI: Introduction to Data Science

18 hours

Introduction: Big Data and Data Science Hype – Getting past the hype –Datafication – The Current Landscape (Little History): Data Science Jobs - Data Science Profile – What is a Data Scientist, Really – In Academia – In Industry – Statistical Thinking in the age of Big Data – Statistical Inference – New kinds of data - Exploratory Data Analysis (EDA): Basic tools of EDA - Philosophy of exploratory data analysis – Data Science Process: Data Scientist’s Role in this process – Connection to scientific method. Data Science and Risk – About Square – The Risk Challenge (Risk Engine) – Trouble with Performance Estimation: Define error metric – Defining the labels –# **Challenges in features and learning #.**

UNITII: Model Building, Evaluation & Data Engineering

18hours

Model Building Tips (Good Guidelines): Code readability and reusability – Productionizing Machine Learning models – Data Leakage: Market predictions – How to avoid leakage - Evaluating models: Accuracy – Probabilities matter, Not 0’s and 1’s. – Data Engineering: MapReduce – Enter MapReduce – Other examples of MapReduce – What can’t MapReduce Do? – Pregel – Hadoop: Brief Introduction to Hadoop – Cloudera – How to get started with Hadoop Next-Generation Data Scientists: Data Science Again –Next-Gen Data Scientists: Being a Problem Solvers – Cultivating Soft Skills –# **Being Question Askers – Being an Ethical Data Scientist #.**

UNITIII:

18hours

Introduction to R: Using R – Working with R – Packages – Batch Processing – Using output as input – Working with large datasets – Working through an example – Creating a dataset: Understanding datasets – Data structures in R: Vectors - Matrices – Arrays – Data frames – Factors – Lists – Data Input: Entering data from keyboard – Importing data from delimited text – Importing data from Excel –# **Importing data from XML #.**

UNITIV: Basic Statistics and Visualizations in R

18hours

Discriptive Statistics: Via *summary()* – *apply()* – *describe()* – *stat.desc()* – by group using *aggregate()* – *by group using by()*.
Data Visualization (Plotting): Packages – Scatter plots - Bar Charts & Plots - R Graphics:# **Packages - The ggplot2 package – Maps #.**

UNITV: Data Analysis via R Packages

18hours

Regression Analysis: Packages – Simple Regression – Clustering: Packages – k-means clustering – Machine Learning in Action (Classification): Packages – Train methods (Decision Tree – Neural Networks –# **Random Forests #).**

..... # Self-study portion

Text Book:

1. RachellSchutt& Cathy O’Neil, “Doing Data Science – Straight Talk from the Frontline”, O’Reilly Media Inc., 2014, ISBN: 978-1-449-35865-5.

UNITI : Chapter 1, 2 & 9

UNITII : Chapter 9, 13, 14

2. Robert I Kabacoff, “R in Action - Data Analysis and Graphics with R”, Manning Publications Co., 2011, ISBN: 9781935182399.

UNITIII : Chapter 1 & 2

UNITIV: Chapter 7 & 8

3. Dan Toomy, “R for Data Science – Learn and Explore the Fundamentals of Data Science with R”, Packt Publishing Ltd., 2014, ISBN: 978-1-78439-086-0.

UNITIV : Chapter 7 & 8

UNITV : Chapter 4, 1, 6 & 10

Books for References:

1. Roger D. Peng, “R Programming for Data Science”, Leanpub, 2014.
2. Hadley Wickham, Garrett Golemund, “ R for Data Science – Import-Tidy-Transform-Visualize and Model Data”, O’Reilly Media Inc., 2017, ISBN: 978-1-491-91039-9
3. Richard Cotton, “Learning R – A Step by step Function Guide to Data Analysis”, O’Reilly Media Inc.,2013, ISBN: 978-1-449-35710-8.
4. Garrett Golemund, “Hands-on Programming With R – Write your own functions and Simulations”, O’Reilly Media Inc., 2014, ISBN: 978-1-449-35901-0.
5. Joel Grus, “Data Science from Scratch – First Principles with Python”, O’Reilly Media Inc.,, 2015, 978-1-491-90142-7.
6. NimaZumel, John Mount, “Practical Data Science with R”, Manning Publications, 2014. ISBN 9781617291562.
7. Avrim Blum, John Hopcraft, RavindranKannan, “Foundations of Data Science”, January 2018.
8. W.N. Venables, D.M. Smith and R Core Team, “An Introduction to R”, Manual for R, version 3.6.1, 2019.

Web Reference:

- www.r-project.org
- www.cran.r-project.org
- <https://www.rstudio.com>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
II	20PIT2CC7	DATA SCIENCE AND R PROGRAMMING					6	4			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓			✓	✓	✓		✓			
CO2	✓			✓	✓	✓		✓			
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 40, Relationship: High											

Prepared by:

Checked by:

1. Dr. M. Sabibullah

1. Dr. K. Nafees Ahmed

2. Dr. S. VaaheethaKfatheen

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PIT2CC8P1	Core – VIII A	JAVA PROGRAMMING LAB	3	2	50	10	40

Develop a program in Java

1. To create class and object to prepare student report using NetBeans.
2. To implement inheritance to find area & perimeter of a rectangle using NetBeans.
3. To create abstract class Department with abstract method calcBonus(double salary) and normal method dispTotSalary(string dept). Define classes Accounts and Sales which extends Department and contains
calcBonus() with its own implementation.
4. To implement multilevel inheritance by applying various access controls to its data members and methods.
5. To create two threads. First thread displays a message for every one second, the second thread displays a message for every two seconds.
6. To create thread using Runnable interface to compute and display factorials of first five natural numbers.
7. To arrange the given names in alphabetical order and to display the all the names in reverse order.
8. To demonstrate various Vector operations using NetBeans.
9. To print the contents of ArrayList in reverse order using NetBeans.
10. To display the file properties of a given file or directory using NetBeans.
11. To merge the two files using SequenceInputStream using NetBeans.
13. To find the local machine and Host IP address using NetBeans.
14. To send a text from one system to another using TCP/IP Sockets using NetBeans.
15. To prepare invoice using swing controls and to store the details in database using JDBC.
16. To make use of Swing controls to create three buttons Red, Green and Blue. Using ActionEvent class set background by applying color on button click.

Prepared by:

1. M. Kamal

Checked by:

1. Dr. S. VaaheethaKfatheen

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PIT2CC8P2	Core – VIII B	R PROGRAMMING LAB	3	2	50	10	40

1. Installing R and R Studio
2. Applying Simple Commands in R
3. R as a Calculator application
4. Execution of Loops and Functions via R - Control Structures
5. Basic Descriptive Statistics using *summary()* – *sapply()* – *describe()* – *stat.desc()* – by group using *aggregate()* in R
6. Reading and writing different types of Datasets in R
7. Visualizations: Visualize various Plotting and Graphics in R
8. Regression: Perform Simple Regression using R Package
9. Clustering: Apply k-means by using R Package
10. Classification: Use Random Forest / Naïve Bayes / NN by using R Package

Text Book

Dan Toomy, “R for Data Science – Learn and Explore the Fundamentals of Data Science with R”, Packt Publishing Ltd., 2014, ISBN 978-1-78439-086-0.

Prepared by:

1. Dr. M. Sabibullah
2. Dr. S. VaaheethaKfatheen

Checked by:

1. Dr. K. Nafees Ahmed

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PIT2DE2A	DSE - II	SEMANTIC WEB	6	4	100	25	75

Course Outcomes (COs):

1. Understanding the syntactic web
2. Understanding the notions for description logic and precisely define reasoning techniques.
3. Web ontology language helps in understanding classes and properties.
4. Semantic web service brings the full potential of the web.
5. Ontology libraries that is relevant to indexing of resources in the semantic web.

UNIT I

18 hours

Future of internet: Introduction – The syntactic web- The semantic web- Working of semantic web -What the semantic web is not. Ontology in computer science: Defining the term ontology-Classifying the Ontologies-Web Ontology Description Languages-# **Ontologies, categories and intelligence** #.

UNIT II

18hours

Knowledge representation in description logic: Introduction – Informal Examples Inference problems. RDF and RDF schema: introduction – # **XML essentials** #– RDF- RDF schema

UNIT III

18hours

OWL: Introduction – Requirement for web ontology description languages-Header information, versioning , annotation properties-Properties – # **Classes- Individuals – Data types** #- A summary of OWL vocabulary. Rule languages: introduction – Usage scenarios for rule languages- ruleML- SWRL-TRIPLE.

UNIT IV

18hours

Semantic web services: Introduction –Web service essentials- OWL-S service ontology- An OWL-S example-scenario description – Informal process definition – OWL-S process definition. Methods for ontology development: Introduction – ushold and king ontology development method- Methontology.

UNIT V

18hours

Ontology sources: introduction- Meta data Definition –Dublin core – Warwick framework-Upper ontologies: SUMO-KR Ontology-word net. Semantic web software tools: Introduction- Metadata and ontology editors.

..... # Self-study portion

Text Book:

Karin K. Breitman, Macro Antonio Casanova,Walter Truszkowski, Semantic Web, Springer International Edition.

UNIT I : Chapter 1.1-1.5, 2.1, 2.3-2.5

UNIT II : Chapter 3.1, 3.2-3.4, 4.1-4.4

UNIT III : Chapter 5.1-5.8, 6.1-6.2, 6.4-6.6

UNIT IV : Chapter 7.1-7.4 (7.4.1-7.4.2), 8.1, 8.2, 8.4

UNIT V : Chapter 9.1-9.2 (9.2.1-9.2.3), 9.3.1-9.3.2, 9.3.4, 10.1-10.2

Books for References:

- 1.
- 2.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
II	20PIT2DE2A	SEMANTIC WEB					6	4			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓			✓	✓	✓					
CO2	✓			✓	✓	✓					
CO3	✓			✓	✓	✓					
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 32, Relationship: Moderate											

Prepared by:
1. MoziburRaheman Khan

Checked by:
1. Dr. S. VaaheethaKfatheen

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PIT2DE2B	DSE - II	CRYPTOGRAPHY AND NETWORK SECURITY	6	4	100	25	75

Course Outcomes (COs):

1. Understand cryptography and network security concepts and applications
2. Apply security policy in system design
3. Analyse network security protocols
4. Identify a network security threat
5. Design the code to implement the cryptographic algorithm

UNIT I

18 hours

Overview: Computer Security Concepts- The OSI Security Architecture -Security Attacks -Security Services - Security Mechanisms - A Model for Network Security - Classical Encryption Techniques: Symmetric Cipher Model - # **Substitution Techniques #** -Transposition Techniques - Steganography

UNIT II

18hours

Block Ciphers and the Data Encryption Standard: Block Cipher Principles - The Data Encryption Standard - A DES Example - The Strength of DES - Differential and Linear Cryptanalysis - Block Cipher Design Principles - Advanced Encryption Standard - AES Structure - AES Transformation Functions - AES Key Expansion -An AES Example

UNIT III

18hours

Block Cipher Operation: Multiple Encryption and Triple DES - Electronic Code Book - Cipher Block Chaining Mode. Public-key Cryptography and RSA: Principles of Public-key Cryptosystems - # **The RSA Algorithm #**. Other Public-Key Cryptosystems: Diffie-Hellman Key Exchange.

UNIT IV

18hours

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions - Two Simple Hash Functions - Requirements and Security - Hash Functions Based on Cipher Block chaining - Secure-Hash Algorithm (SHA) - SHA-3. Message Authentication Codes: Message Authentication Requirements - # **Message Authentication Functions #** - Requirements for Message Authentication Codes

UNIT V

18hours

Digital Signatures: Digital Signatures. Key Management and Distribution: Symmetric Key Distribution using Symmetric Encryption - Symmetric Key Distribution using Asymmetric Encryption - Distribution of Public keys - X.509 Certificates - Public-Key Infrastructure - User Authentication: Kereberos.

..... # Self-study portion

Text Book:

William Stallings, "Cryptography and Network Security Principles and Practice", Fifth Edition, Pearson Education Inc, First Impression 2011.

UNIT I : Chapter 1: 1.1 - 1.6 & Chapter 2: 2.1 – 2.3, 2.5

UNIT II : Chapter 3: 3.1 - 3.6 & Chapter 5: 5.2 - 5.5

UNIT III : Chapter 6: 6.1 - 6.3, Chapter 9: 9.1 - 9.2 & Chapter 10: 10.1

UNIT IV : Chapter 11: 11.1 - 11.6 & Chapter 12: 12.1 - 12.3

UNIT V : Chapter 13: 13.1, Chapter 14: 14.1 to 14.5 & Chapter 15: 15.3

Books for References:

1. William Stallings, "Network Security Essentials Applications and Standards", Third Edition, Pearson Education Inc, Fifth Impression 2011
2. Behrouz A. Ferouzan, "Cryptography and Network Security", Tata McGraw Hill, 2007

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
II	20PIT2DE2B	CRYPTOGRAPHY AND NETWORK SECURITY					6	4			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓		✓	✓		✓		✓	✓	
CO2	✓		✓		✓	✓	✓	✓			
CO3	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO4		✓	✓	✓	✓		✓		✓	✓	
CO5				✓	✓			✓		✓	
Number of matches (✓) = 33, Relationship: Moderate											

Prepared by:

1. M. Kamal
2. Dr. M. Sabibullah

Checked by:

1. Dr. S. VaaheethaKfatheen