

M.Sc. Computer Science

SEM	Course Code	Course	Course Title	Ins.Hrs / Week	Credit	Marks		Total
						CIA	ESE	
I	20PCS1CC1	Core– I	Mathematical Foundations	6	5	25	75	100
	20PCS1CC2	Core – II	Java Programming	6	5	25	75	100
	20PCS1CC3	Core– III	Open Source Technology	6	4	25	75	100
	20PCS1CC4P1	Core– IV A	Java Programming Lab	3	2	10	40	50
	20PCS1CC4P2	Core– IV B	Open Source Technology Lab	3	2	10	40	50
	20PCS1DE1	DSE – I#		6	4	25	75	100
		TOTAL			30	22		
II	20PCS2CC5	Core– V	Database Systems	6	5	25	75	100
	20PCS2CC6	Core– VI	Data Science and Python	6	5	25	75	100
	20PCS2CC7	Core– VII	Design and Analysis of Algorithms	6	4	25	75	100
	20PCS2CC8P1	Core– VIII A	RDBMS Lab	3	2	10	40	50
	20PCS2CC8P2	Core– VIII B	Python Programming Lab	3	2	10	40	50
	20PCS2DE2	DSE – II#		6	4	25	75	100
		TOTAL			30	22		
III	20PCS3CC9	Core– IX	Principles of Compiler Design	6	5	25	75	100
	20PCS3CC10	Core– X	Machine Learning and R Programming	6	5	25	75	100
	20PCS3CC11	Core– XI	Web Programming	6	4	25	75	100
	20PCS3CC12P1	Core– XII A	Web Programing Lab	3	2	10	40	50
	20PCS3CC12P2	Core– XII B	R Programming Lab	3	2	10	40	50
	20PCS3DE3	DSE – III#		6	4	25	75	100
	20PCS3ECC1	Extra Credit - I	Online Course (MOOC)	-	1*	-	-	-
	TOTAL			30	22			500
IV	20PCS4CC13	Core– XIII	Middleware Technology	6	5	25	75	100
	20PCS4CC14P1	Core– XIV A	Middleware Technology Lab	3	3	10	40	50
	20PCS4CC14P2	Core– XIV B	Angular JS Lab	2	2	10	40	50
	20PCS4PW	Project	Project Work	18	13	-	300	300
	20PCNOC	Online Course (Compulsory)		-	1	-	-	-
	20PCS4EC2	Extra Credit - II	Computer Science for Career Examinations	-	5*	-	100	100*
		TOTAL			30	24		
GRAND TOTAL					90			2000

#Discipline Specific Elective

SEM	COURSE CODE	COURSE TITLE
I	20PCS1DE1A	Computer Architecture
	20PCS1DE1B	Embedded Systems
II	20PCS2DE2 A	Computer Networks and Cryptography
	20PCS2DE2 B	Object Oriented Analysis and Design
III	20PCS3DE3 A	Cloud Computing
	20PCS3DE3 B	Distributed Operating Systems

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PCS1CC1	Core - I	MATHEMATICAL FOUNDATIONS	6	5	100	25	75

Course Outcomes:

1. Remember the basic concept of Mathematical logics and Tautological implication with an examples.
2. Demonstrate and illustrate examples of sets, identities and Cartesian Product.
3. Analyze and computational approaches on Recurrence relation and Generating function.
4. Applying domain knowledge for Graphs, operations on graphs with an example.
5. Describe and discuss on Trees and Fundamental circuits with example.

UNIT I

18 hours

Mathematical Logic: Introduction – Statements and Notation – Connectives – (AND, OR, NOT) Negation, Conjunction, Disjunction, Conditional and Biconditional – Tautologies, Contradiction, Related Problems – Tautological Implication – Normal Forms – **# Theory of Inference #**.

UNIT II

18 hours

Basic Concept of Set Theory: Notation-Inclusion and Equality of sets- the power set-some operations on sets- Some basic set Identities- **#Cartesian products #**.

UNIT III

18 hours

Recurrence Relation and Recursive Algorithms – Introduction – Recurrence Relations – Linear Recurrence Relations with Constant Coefficients – Homogeneous Solutions – Particular Solutions – Total Solutions – Solution by the Method of Generating Functions.

UNIT IV

18 hours

Graph – **#Applications of Graphs#** – Finite and Infinite graphs – Incidence and Degree – Isolated vertex, pendant vertex and Null graphs. Paths and Circuits: Isomorphism – Sub-graphs – Walks, Paths and Circuits – Connected and disconnected graphs – Euler graphs- Operations on Graphs.

UNIT V

18 hours

Trees and fundamental circuits: Trees – Properties of Trees – Pendant vertices in a Tree – Distance and centers in a Tree- Spanning Trees – Fundamental circuits – **#Finding all spanning trees of graph#** – Spanning trees in a weighted graph.

..... # Self-study portion

Text Books:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill Education Private Limited, 38th reprint 2010.
UNIT I : Chapter 1 (1.1, 1.2 (1.2.1-1.2.3, 1.2.6, 1.2.8, 1.2.11), 1.3, 1.4)
UNIT II : Chapter 2 (2.1.1-2.1.4, 2.1.6, 2.1.9)
2. C.L. Liu and D. P. Mohapatra, Elements of Discrete Mathematics. A Computer Oriented Approach, Tata McGraw-Hill Publishing Education (India) Private Limited, New Delhi, Fourth Edition, Second Reprint, 2013.
UNIT-III: Chapter 9 (9.1 - 9.8).
3. Narsingh Deo, Graph theory with application to Engineering and Computer Science, Prentice Hall of India Pvt. Ltd. (2005).
UNIT-IV: Chapter 1 Sections 1.1 – 1.5. Chapter 2 Sections 2.1, 2.2, 2.4 – 2.7
UNIT-V : Chapter 3 Sections 3.1 – 3.4, 3.7 – 3.10

Books for Reference:

G. Shanker Rao, Discrete Mathematical Structures, New Age International (P) Limited, Second Edition.

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

Semester	Code	Title of the Course					Hours	Credits			
I	20PCS1CC1	MATHEMATICAL FOUNDATIONS					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 (✓) = 42, Relationship: High											

Prepared by:

1. Dr. A.Prasanna

Checked by:

1. M. Kamal

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PCS1CC2	Core - II	JAVA PROGRAMMING	6	5	100	25	75

Course Outcomes (COs):

Students will be able to

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

18 hours

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

18 hours

The Collection Interfaces and Utility Classes: ArrayList, LinkedList, Vector, Stack, StringTokenizer, 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

18 hours

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 Books

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:

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			
I	20PCS1CC2	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 (✓) = 39, Relationship: High											

Prepared by:

1. M. Kamal

2. J. Shahita Banu

Checked by:

O.S. Abdul Qadir

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PCS1CC3	Core - III	OPEN SOURCE TECHNOLOGY	6	4	100	25	75

Course Outcomes (COs):

Students will be able to

1. Observe to install and configure the open source technology software
2. Illustrate the various functions in PHP language
3. Apply and to develop the small software using various components
4. Learn to connect MySQL database with PHP program
5. Develop a real time applications using with Open source technologies

UNIT I

18 hours

Creating and Running your First PHP page – Printing some Text – Printing some HTML – Adding comments to PHP code – Creating and Storing data in Variables – **# Creating Constants – Internal Data types #**– PHP operators – if , else if, switch statements – while, do...while and for each loop.

UNITII

18 hours

Some basic String Functions – Some basic Array Functions – Creating Functions: Passing Function some Data – Passing Arrays to Functions – Passing by Reference – Returning Data from Functions – Returning Arrays – Returning References.

UNITIII

18 hours

Reading Data in web pages: Handling Text Fields, Text Areas, Check Boxes, Radio Buttons, List Boxes, Image Maps, File Uploads, Buttons – **# Creating Classes and Objects #** – Getting access to properties and methods – Using Constructor and Destructor – Overriding and overloading methods.

UNITIV

18 hours

Working with Database: Creating a MySQL Database – Creating a New Table – Data into the New Database – Accessing the Database – Updating Databases – Inserting and Deleting Records in a database – Session, Cookies and FTP: Setting, Reading and Deleting Cookies – Working with FTP – Downloading , Uploading and Deleting a File with FTP.

UNITV

18hours

Getting Started with Ajax – Writing Ajax – **# creating and Opening the XMLHttpRequest Object #** – Ajax with some PHP – Passing Data to the server with GET and POST – Handling XML with PHP.

..... # Self-study portion

Text Book:

Steven Holzner, PHP:The Complete Reference, McGraw Hill Education (India) Private Limited, Edition 2008.

UNIT I : Chapter 1 & 2

UNITII : Chapter 3 & 4

UNITIII : Chapter 5 & 7

UNITIV : Chapter 10 & 11

UNITV : Chapter 12

Books for References:

Kevin Yank, PHP & MySQL, Novice to Ninja, published by Site Point Pvt. Ltd., Fifth Edition, 2012

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

Semester	Code	Title of the Course					Hours	Credits			
I	20PCS1CC3	OPEN SOURCE TECHNOLOGY					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 (✓) = 36, Relationship: High											

Prepared by:

1. M. KAMAL

Checked by:

1. O.S. Abdul Qadir

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PCS1CC4P1	Core - IV A	JAVA PROGRAMMING LAB	3	2	50	10	40

Develop a program in Java using NetBeans

1. To create class and object to prepare student report.
2. To implement inheritance to find area & perimeter of a rectangle.
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.
9. To print the contents of ArrayList in reverse order.
10. To display the file properties of a given file or directory.
11. To merge the two files using SequenceInputStream.
13. To find the local machine and Host IP address.
14. To send a text from one system to another using TCP/IP Sockets.
15. To prepare invoice using swing controls and to store the details in database using JDBC.
16. Program using 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
2. J. Shahita Banu

Checked by:

1. O.S. Abdul Qadir

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PCS1CC4P2	Core - IV B	OPEN SOURCE TECHNOLOGY LAB	3	2	50	10	40

Develop a program in PHP

1. Create simple programs:

- a. To find odd or even of a given number
- b. To calculate Electricity bill using else if ladder and nested if...else

2. To display different messages based on time of day.

(For example page should display "Good Morning" if it is accessed in the morning)

3. To find biggest of 'n' numbers using array.

4. To demonstrate various string handling functions

5. To demonstrate use session

6. To demonstrate the use of cookies.

7. Write a program that keeps track of how many times a visitor has loaded the page.

8. To upload image.

9. To design student bio-data using form elements.

10. To create a database and table using MySQL.

11. To insert records using MySQL.

12. To update and delete records using MySQL.

13. To prepare employee report with suitable details of employees using MySQL

14. Write a simple application with AJAX and PHP.

Prepared by:

1. M. KAMAL

Checked by:

1. O. S. Abdul Qadir

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PCS1DE1A	DSE - I	COMPUTER ARCHITECTURE	6	4	100	25	75

Course Outcomes (COs):

Students will be able to

1. To understand the different parallel computer models.
2. To review the program flow mechanisms and network properties.
3. To assess the advanced processor technology like super scalar, vector and pipeline processors.
4. To explore multiprocessor system concepts and fine grain multi computers.
5. To learn parallel programming models, languages and compilers.

UNIT I

18 hours

Parallel computer models: - The state of computing - Multiprocessors and multicomputers – Multivector and SIMD computers.

UNIT II

18 hours

Program and Network properties:- Conditions of parallelism – Program partitioning and scheduling – program flow mechanisms – **#system interconnect architectures#**.

UNIT III

18 hours

Processors and memory hierarchy: Advanced processor Technology – Super scalar and vector processors – **#Linear Pipeline Processors#** – Nonlinear pipeline Processors.

UNIT IV

18 hours

Multiprocessors and Multicomputers: Multiprocessor System Interconnects – Message Passing Mechanisms – **#SIMD Computer Organizations#** – The Connection Machine CM 5 – Fine-Grain Multicomputers.

UNIT V

18hours

Software for Parallel Programming:- Parallel Programming Models – Parallel Languages and Compilers – **#Dependence Analysis of Data Arrays#**.

Self-study portion

Text Book:

Kai Hwang, “Advanced Computer Architecture, “McGraw-Hill International Edition Singapore, 1993.

UNIT I : Chapter I: Section 1.1 – 1.3

UNIT II : Chapter II: Section 2.1 – 2.3

UNIT III : Chapter IV: Section 4.1, 4.2

UNIT IV: Chapter VII: Section 7.1 – 7.4, Chapter VIII: Section 8.5, Chapter IX: Section 9.3

UNIT V : Chapter X: Section 10.1 – 10.2

Books for References:

1. Kai Hwang and Faye A.Briggs, “Computer Architecture and Parallel Processing”, McGraw-Hill International Edition, Singapore, 1985.
2. Michael J.Quinn, “Parallel Computing, Theory and Practice”, McGrawHill, International Edition, Singapore, 1994.

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

Semester	Code	Title of the Course					Hours	Credits			
I	20PCS1DE1A	COMPUTER ARCHITECTURE					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 (✓) = 42, Relationship: High											

Prepared by:

1. K. Syed Kousar Niasi

Checked by:

1. M. Kamal

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PCS1DE1B	ELECTIVE I	EMBEDDED SYSTEMS	6	4	100	25	75

Course Outcomes (COs):

Students will be able to

1. To acquire knowledge in Embedded systems, processor and ICT Technology
2. To explain Application specific instruction set processors and general purpose microprocessor design.
3. To understand memory types, hierarchy and cache.
4. To explore communication basics like interfacing, bus architectures and protocols.
5. To identify the requirement specifications of digital camera, control systems and PID.

UNIT I

18 hours

Introduction – Embedded systems overview – Design Challenge – Processor Technology- ICTechnology- Design technology – Tradeoffs - Custom Single Purpose Processors: Hardware- Introduction-Combinational logic – Sequential logic – Custom Single Purpose Processor Design- RT level custom single purpose processor design – Optimizing Custom Single Purpose Processors.

UNITII

18 hours

Introduction – Basic architecture- operation – Programmer’s view- Development Environment-Application specific Instruction set processors- selecting a microprocessor general purpose processor design– Peripherals: Timers, Counters and Watchdog Timer – UART – **# Pulse Width Modulators #** - LCD controllers-Keypad controllers – Analog to Digital converters.

UNITIII

18 hours

Introduction – Memory write ability and storage permanence write ability – common memory types –composing memory – **# Memory Hierarchy and cache #** – Advanced RAM.

UNITIV

18 hours

Introduction – communication basics – microprocessor interfacing: I/O addressing – interrupts –Direct memory access – Arbitration – Multilevel bus architectures – Advanced communication principles –serial protocols – parallel protocols- wireless protocols.

UNITV

18hours

Introduction to a simple digital camera – requirements specification – Design. Control systems: Openloop and Closed loop control systems – General control systems – PID controllers – software coding – **# PIDtuning #** – Benefits of Computer based control implementation.

Self-study portion

Text Book:

Frank Vahid, Tony Givargis ,”Embedded System Design: A Unified Hardware/ Software Introduction”, Wiley Student Edition, 2008.

UNIT I : Chapters 1 & 2

UNITII : Chapter 3 (Section 3.1 to 3.8) & Chapter 4 (Section 4.1 to 4.9)

UNITIII : Chapter 5 (Section 5.1 to 5.6) **UNITIV** : Chapter 6 (Section 6.1 to 6.11)

UNITV : Chapter 7 (Section 7.1 to 7.4) & Chapter 9 (Section 9.1 to 9.5 and 9.7) & Chapter 10 (Section 10.1 to 10.3)

Books for References:

1. Steve Heath, “Embedded Systems Design”, Elsevier Science, Second Edition, 2008
2. Scott MacKenzie, Raphael C.W.Phan, “The 8051 Microcontroller”, Pearson, 2012.
3. Rajiv Kapadia, “The 8051 Microcontroller and Embedded Systems”, Jaico Student Edition, 2009.

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

Semester	Code	Title of the Course					Hours	Credits			
I	20PCS1DE1B	EMBEDDED 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 (✓) = 38, Relationship: High											

Prepared by:

1. K. Syed Kousar Niasi

Checked by:

1. M. Kamal

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PCS2CC5	Core - V	DATABASE SYSTEMS	6	5	100	25	75

Course Outcomes (COs):

Students will be able to

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 Users and Administrator – Structure of Relational Database – Keys – # **Schema Diagrams #** – Formal Relational Query Languages – Relational Algebra – The Tuple Relational Calculus – The Domain Relational Calculus.

UNIT II

18 Hours

Introduction to SQL: Overview 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. Database Design: Entity-Relationship Model – Constraints – Entity-Relationship Diagram.

UNIT III

18 Hours

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

18 Hours

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.

UNIT V

18 Hours

Database-System Architectures: Centralized and Client-Server Architectures – Server System Architecture. Distributed Databases: Homogeneous and Heterogeneous Databases – Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control in Distributed Database– Data Warehousing and Mining: Decision Support Systems – Data Warehousing – # **Data Mining – Classification #**.

..... # Self-study portion

Text Books

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, 1.12, 2.1, 2.3, 2.4, 6.1, 6.2, 6.3)

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

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

UNIT V : Chapter (17.1, 17.2, 19.1-19.5, 20.1-20.4)

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

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			
II	20PCS2CC5	DATABASE SYSTEMS					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 (✓) = 41, Relationship: High											

Prepared by:

1. S. Syed Ibrahim

Checked by:

1. M. Kamal

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PCS2CC6	Core - VI	DATA SCIENCE AND PYTHON	6	5	100	25	75

Course Outcomes (COs):

Students will be able to

1. Acquire knowledge in Data science, Data analysis, Big data
2. Apply statistical methods for decision making.
3. Express different Decision Making statements and Functions
4. Gaining knowledge in file handling in Python programming.
5. Develop applications using Python programming.

UNIT I

18 hours

Introduction: Data Science- Big Data and Data Science Hype – Getting Past and Hype –The current Landscape (with a little history) – A Data Science Profile – Thought Experiment: Meta – Definition. Statistical Inference, Exploratory Data Analysis, and the Data Science Process: Statistical Thinking in the Age of Big Data – Exploratory Data Analysis – The Data Science Process – Thought Experiment.

UNIT II

18 hours

Algorithms: Machine Learning Algorithms – Three Basic Algorithms – Exercise: Basic Machine Learning Algorithms – Thought Experiments: **# Automated Statistician #**.

UNIT III

18 hours

Introducing to Python Object Types: The Python Conceptual Hierarchy -Use of built-in Types – Python Core Data Types – Numbers – Strings – Lists – Dictionaries – **# Tuples – Files – Other Core Types #**. Numeric Types: Numeric Types Basics – Numbers in Action.

UNIT IV

18 hours

List and Dictionaries: Lists – List in Action – Dictionaries – Dictionaries in Action. Tuples, Files, and Everything Else: Tuples - Files.

UNIT V

18hours

if Tests and Syntax Rules : if statements – Python Syntax Revisited – Truth Values and Boolean Tests – The if/else Ternary Expression. while and for loops : while loops –**# break, continue, pass, and the Loop else #**– for Loops – Loop Coding Techniques. Function Basics: Use of Functions – Coding Functions – A First Example: Definitions and Calls – A Second Example: Intersecting Sequences.

..... # Self-study portion

Text Books:

1. Doing Data Science by Rachel Schutt and Cathy O’Neil

UNIT I : Chapter 1, 2

UNIT II : Chapter 3

2. Learning Python by Mark Lutz, Fifth Edition.

UNIT III : Chapter 4, 5

UNIT IV : Chapter 8, 9

UNIT V : Chapter 12, 13, 16

Books for References:

1. Python data Science Hand book by Jake VanderPlas O’Reilly
2. Fundamentals of Data Science by Samuel Burns

Web Reference:

<https://www.proschoolonline.com/pgd-data-science-course/what-is-data-science>

<https://www.python.org/>

<https://developers.google.com/edu/python>

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

Semester	Code	Title of the Course					Hours	Credits			
II	20PCS2C6	DATA SCIENCE AND PYTHON					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 (✓) = 42, Relationship: High											

Prepared by:

1. Dr. S. Vaaheetha Kfatheen
2. K. M. Akbar Badusha

Checked by:

1. M. Kamal

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PCS2CC7	Core - VII	DESIGN AND ANALYSIS OF ALGORITHMS	6	4	100	25	75

Course Outcomes (COs):

Students will be able to

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

UNIT I

18 hours

INTRODUCTION: Algorithm Definition – Algorithm Specification – Performance Analysis
ELEMENTARY DATA STRUCTURES: Stacks and Queues – Trees – Dictionaries – # Priority Queues – Sets and Disjoint Set Union # – Graphs

UNIT II

18 hours

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 III

18 hours

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 IV

18 hours

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 #.

BASIC TRAVERSAL AND SEARCH TECHNIQUES: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS

UNIT V

18 hours

BACKTRACKING: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem. **BRANCH AND BOUND:** The Method - # 0/1 Knapsack Problem #.

..... # Self-study portion

Text Book:

Ellis Horowitz, Satraj Sahn and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009.

UNIT I : Chapter 1 & 2

UNIT II : Chapter 3 (3.1 – 3.8)

UNIT III : Chapter 4

UNIT IV : Chapter 5 & 6

UNIT V : Chapter 7 & 8 (8.1 – 8.2)

Books for References:

Narasimha Karumanchi, Data Structures and Algorithms Made Easy, Second Edition, 2011.

Web Reference:

<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			
II	20PCS2CC7	DESIGN AND ANALYSIS OF ALGORITHMS					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 (✓) = 45, Relationship: Very High											

Prepared by:

1. O.S. Abdul Qadir

Checked by:

1. M. Kamal

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PCS2C8P1	Core- VIII A	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, and balance)

Loan (loan-number (Primary key), branch-name, and 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. Alter with three options

Add – add columns in the existing table

Add – constraints

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

Drop – delete column from existing table

II Data Manipulation Language

1. Insertion

2. Arithmetic, Logical, Comparison operations

3. String Operations

Find the customer names whose names start with T.

Find the customer names whose names end with V.

Find the customer name whose names contain — ‘an’|| as a substring

Find the customer name whose names exactly six character.

Find the customer name whose names at least five character.

4. 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)

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 not in)

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)

Sub-query used in FROM Clause

Find the average account balance of those branches where the average account balance is greater than Rs.3000

Find the maximum across all branches of the total balance at each branch

With Clause

Select accounts with the maximum balance; if there are many accounts with the same maximum balance.

Find all branches where the total account deposit is less than the average of the total account

deposits

at all branches

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

Full outer join

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. M. Kamal

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PCS2CC8P2	Core - VIII B	PYTHON PROGRAMMING LAB	3	2	50	10	40

Develop a python program

1. To generate Floyd Triangle.
2. To calculate GCD of two numbers.
3. To find the maximum of numbers in a list without using Built-in function.
4. To generate first n prime numbers.
5. To demonstrate how to create slice, change, add, delete, and index elements using list.
6. To demonstrate how to create slice, change, add, delete, and index elements using tuples.
7. To demonstrate how to change, delete, add and remove elements in dictionaries.
8. To demonstrate linear search and binary search.
9. To find the most frequent word in a text, read from file.
10. To demonstrate selection sort.
11. To simulate bouncing ball using Pygame.
12. To demonstrate various controls in GUI programming using tkinter.

Prepared by:

1. Dr. S. Vaaheetha Kfatheen
2. K. M. Akbar Badusha

Checked by:

1. M. Kamal

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PCS2DE2A	DSE - II	COMPUTER NETWORKS AND CRYPTOGRAPHY	6	4	100	25	75

Course Outcomes (COs):

Students will be able to

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. Understand cryptography and network security concepts and application.
5. Apply security principles to system design. Identify and investigate network security threat.

UNIT I

18 Hours

Introduction: Data communications – Networks – Internet. Network Models: The OSI Model – Layers in the OSI Model – TCP/IP Protocol suite – Physical Layer: Multiplexing – Transmission Media: Guided Media.

UNIT II

18 Hours

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

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: The IP Version 4 Protocol – IP Addresses – **# IP Version 6 #**.

UNIT IV

18 Hours

Transport Layer: Process to Process Delivery – User Datagram Protocol (UDP) – TCP. Application Layer: Name Space – Domain Name Space – Distribution of Name Space – DNS in the Internet – Remote Logging – E-Mail – **# File Transfer#**.

UNIT V

18 Hours

Network Security: Cryptography - Introduction to Cryptography - Substitution Ciphers - Transposition Ciphers – DES – RSA – Digital Signature: Symmetric Key Signature – Public Key Signature – Communication Security: Firewalls – VPN. Authentication Protocols: Authentication Based on a Shared Secret Key - Establishing a Shared Key: The Diffie-Hellman Key Exchange. E-Mail Security: PGP – Web Security: Threats – **# Secure Naming #- SSL**.

..... # Self-study portion

Text Books

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

UNIT I: Chapter 1.1 – 1.3, 2.2 – 2.4, 6.1, 7.1

UNIT II: Chapter 10.1, 10.2, 10.4, 10.5, 11.1 – 11.6,

UNIT IV: Chapter 23.1 – 23.3, 25.1 – 25.4, 26.1 – 26.3 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, 5.6.1 – 5.6.3

UNIT V: Chapter 8.1.1 – 8.1.3, 8.2.1, 8.3.1, 8.4.2, 8.4.3, 8.6.2, 8.6.3, 8.7.1, 8.7.2, 8.8.1, 8.9.1 – 8.9.3

Books for References:

Bhushan Trivedi, Computer Networks, First Published 2011, Oxford Higher Education.

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

Semester	Code	Title of the Course					Hours	Credits			
II	20PCS2DE2A	COMPUTER NETWORKS AND CRYPTOGRAPHY					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. S. Syed Ibrahim

Checked by:

1. M. Kamal

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PCS2DE2B	DSE - II	OBJECT ORIENTED ANALYSIS AND DESIGN	6	4	100	25	75

Course Outcomes (COs):

Students will be able to

1. Design and implement projects using OO concepts.
2. Use the UML analysis and design diagrams.
3. Apply appropriate design pattern.
4. Create code from design.
5. Compare and contrast various testing techniques.

UNITI: UML DIAGRAMS

18 hours

Introduction to OOAD – Unified Process – UML diagrams – Use Case – Class Diagrams – Interaction Diagrams – State Diagrams –# **Activity Diagrams** #– Package, component and Deployment Diagrams.

UNITII: DESIGN PATTERNS

18 hours

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller – Design Patterns – Creational – factory method – structural – Bridge – Adapter – behavioural – Strategy – Observer.

UNITIII: CASE STUDY

18 hours

Case study – the Next Gen POS system, Inception – Use case Modelling – Relating Use cases – include, extend and generalization – Elaboration – Domain Models – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies –# **Aggregation and Composition** #.

UNITIV : APPLYING DESIGN PATTERNS

18 hours

System sequence diagrams – Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement – UML class diagrams –# **UML interaction diagrams** # – Applying GoF design patterns.

UNITV:

18hours

Mapping design to code – Testing: Issues in OD Testing – Class Testing – # **OO Integration Testing** #– GUI Testing – OO System Testing.

..... # Self-study portion

Text Book:

Craig Larman, “Applying UML and Patterns: An Introduction to Object – Oriented Analysis and Design and Iterative Development”, Third Edition, Pearson Education, 2005.

UNITI :

UNITII :

UNITIII :

UNIT IV:

UNIT V :

Books for References:

1. Simon Bennelt, Steve Mc Robb and Ray Farmer, “Object Oriented Systems Analysis and Design Using UML”, Fourth Edition, Mc-Graw Hill Education, 2010.
2. Erich gamma and Richard Helm, Ralph Johnson, John Vlissides, “Design patterns: Elements of Reusable Object-Oriented Software”, Addison-Wesley, 1995.

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

Semester	Code	Title of the Course					Hours	Credits			
II	20PCS2DE2B	OBJECT ORIENTED ANALYSIS AND DESIGN					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 (✓) = 42, Relationship: High											

Prepared by:

1. S. Peerbasha

Checked by:

1. M. Kamal