

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 - Practical	3	2	10	40	50
	20PCS1CC4P2	Core- IV B	Open Source Technology Lab - Practical	3	2	10	40	50
	20PCS1DE1A/B	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 - Practical	3	2	10	40	50
	20PCS2CC8P2	Core- VIII B	Python Programming Lab - Practical	3	2	10	40	50
	20PCS2DE2A/B	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 Programming Lab - Practical	3	2	10	40	50
	20PCS3CC12P2	Core- XII B	R Programming Lab - Practical	3	2	10	40	50
	20PCS3DE3A/B	DSE – III#		6	4	25	75	100
	20PCS3EC1	Extra Credit - I	Online Course (MOOC)	-	1*	-	-	-
	TOTAL				30	22		
IV	20PCS4CC13	Core- XIII	Middleware Technology	6	5	25	75	100
	20PCS4CC14P1	Core- XIV A	Middleware Technology Lab - Practical	3	3	10	40	50
	20PCS4CC14P2	Core- XIV B	Angular JS Lab - Practical	3	2	10	40	50
	20PCS4PW	Project	Project Work	18	13	-	300	300
	20PCS4EC2	Extra Credit - II	Computer Science for Career Examinations	-	5*	-	100*	100*
	20PCNOC	Online Course (Compulsory)		-	1	-	-	-
TOTAL				30	24			500
GRAND TOTAL				120	90			2000

*Not considered for grand total and CGPA

#DISCIPLINE SPECIFIC ELECTIVE

SEM	COURSE CODE	COURSE TITLE
I	20PCS1DE1A	Advanced Computer Architecture
	20PCS1DE1B	Embedded Systems
II	20PCS2DE2A	Computer Networks and Cryptography
	20PCS2DE2B	Object Oriented Analysis and Design
III	20PCS3DE3A	Cloud Computing
	20PCS3DE3B	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 example.
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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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.

UNITIV

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.

UNITV

18 hours

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.

UNITI : Chapter 6, 7, 8

UNITII : Chapter 9, 10, 11

UNITIII : Chapter 15, 17

UNITV : Chapter 20, 26

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

UNITIV: 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:

1. O.S. Abdul Qadir

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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.

UNIT II

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.

UNIT III

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.

UNIT IV

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.

UNIT V

18 hours

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

UNIT II : Chapter 3 & 4

UNIT III : Chapter 5 & 7

UNIT IV : Chapter 10 & 11

UNIT V : 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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20PCS1CC4P1	Core -IV A	JAVA PROGRAMMING LAB - Practical	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 - Practical	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.

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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

18 hours

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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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.

UNIT II

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.

UNIT III

18 hours

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

UNIT IV

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.

UNIT V

18 hours

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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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

18 hours

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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20PCS2CC8P1	Core- VIII A	RDBMS LAB - Practical	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 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)

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 thebranch.

11. Deletion

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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

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.

UNIT I: 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.

UNIT II: 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.

UNIT III: 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** #.

UNIT IV: 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.

UNIT V:

18 hours

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.

UNIT I : Chapter 1.4, 1.6, 2.10, 3.3, Chapter 2, Chapter 30 (30.1, 30.3, 30.4)

UNIT II : Chapter 3, 9, 9.5, 9.6, 9.13, 9.14, 9.16, Chapter 28 (4, 5), Chapter 31

UNIT III : Chapter 10, Chapter 13, Chapter 16

UNIT IV: Chapter 17 – 17.10, 17.11, 17.12, 17.13, 17.14, Chapter 19, Chapter 26, 26.126.4, 26.5, 26.9

UNIT V: Chapter 38.1, 38.2

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.

Web Reference:

https://www.tutorialspoint.com/object_oriented_analysis_design/index.htm

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

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
III	20PCS3CC9	CORE– IX	PRINCIPLES OF COMPILER DESIGN	6	5	100	25	75

Course Outcomes (COs):

On completion of the course, students will be able to

1. Specify and analyse the lexical, syntactic and semantic structures of advanced language features
2. Separate the lexical, syntactic and semantic analysis into meaningful phases for a compiler to undertake language translation
3. Write a scanner, parser, and semantic analyzer without the aid of automatic generators
4. Describe techniques for intermediate code and machine code optimization
5. Design the structures and support required for compiling advanced language features.

UNIT I

18 Hours

Introduction to Compilers: Compilers and Translators – The Structure of a Compiler – Lexical Analysis – Syntax Analysis – Intermediate Code Generation – Optimization – Code Generation. Finite Automata and Lexical Analysis: #The Role of Lexical analyzer Regular Expressions# – Finite Automata – From a regular expression to Finite Automata – Minimizing the Number of States of a DFA

UNIT II

18 Hours

The Syntactic Specification of Programming Languages: Context-free grammars – Derivations and parse trees. Basic Parsing Techniques: Parsers – Shift-reduce Parsing -Operator precedence parsing – Top-down Parsing – Predictive Parsers. Automatic Construction of Efficient Parsers: LR Parsers – The Canonical Collection of LR(0) items – Constructing SLR Parsing Tables - #Constructing canonical LR Parsing Tables# - Constructing LALR Parsing Tables

UNIT III

18 Hours

Syntax Directed Translation: Syntax Directed Translation: Implementation of Syntax Directed Translation - Intermediate code – Postfix Notation – Parse Trees and Syntax Trees – Three-address Code, Quadruples and Triples – Boolean Expressions

UNIT IV

18 Hours

Symbol Table: The Contents of Symbol table – Data Structures for Symbol table – Runtime storage Administration: Implementation of a Simple Stack allocation scheme - Implementation of a Block Structured Languages. Error Detection and Recovery: Errors – Lexical-phase Errors - #Syntactic-phase Errors# – Semantic Errors

UNIT V

18 Hours

Introduction to Code Optimization: The Principal Sources of Optimization – Loop Optimization – The DAG Representation of Basic Blocks. Code Generation: Problems in Code Generation – A Machine Model – #A Simple Code Generator# – Register allocation and Assignment – Peephole optimization

#.....# Self-study portion

Text Book:

Alfred V. Aho and Jeffrey D. Ullman, *Principles of Compiler Design*, 5th Edition, Narosa Publishing House, New Delhi, 2002

- UNIT I** :Chapter 1(1.1,1.3–1.8) Chapter 3 (3.1, 3.3 – 3.6)
UNIT II : Chapter 4 (4.1 – 4.2) Chapter 5 and Chapter 6 (6.1 – 6.5)
UNIT III : Chapter 7 (7.1 – 7.6 and 7.8)
UNIT IV : Chapter 9 (9.1 – 9.2) Chapter 10 (10.1– 10.2) and Chapter 11
UNIT V : Chapter 12 (12.1 – 12.3) Chapter 15 (15.2– 15.5 and 15.7)

Books for Reference:

1. Dr. M. Joseph, *Elements of Compiler Design*, University Science Press, 2011.
2. SantaraChattopadhyay, *Compiler Design*, PHI, New Delhi, 1st Edition, 2009.

Web Reference

https://www.tutorialspoint.com/compiler_design/index.htm

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

Semester	Code	Title of the Course					Hours	Credits			
III	20PCS3CC9	PRINCIPLES OF COMPILER DESIGN					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:

Mr. O.S. Abdul Qadir

Checked by:

Mr. Mohamed Faize Basha

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
III	20PCS3CC10	CORE- X	MACHINE LEARNING AND R PROGRAMMING	6	5	100	25	75

Course Outcomes (COs):

On completion of the course, students will be able to

1. Understand Machine Learning and R
2. Gain basic ideas on Types and Methods in ML
3. Fetch insights on R Package
4. Implement and apply the different categories of Machine Learning Algorithms
5. Apply the machine learning concept using R Programming

Unit - I

18 hours

Introducing Machine Learning : What is ML? – Varieties of ML – Types of Learning – Sample Applications – Introducing ML: Origins of Machine Learning (ML) – Uses and Abuses of ML – How do Machines Learn? – Steps to apply ML to your data choosing a ML algorithm – Using R for Machine Learning: Installing and Loading R Packages.

Unit - II

18 hours

Lazy Learning – Classification Using Nearest Neighbors : Understanding Classification using Nearest Neighbours (NN): KNN Algorithm – Calculating Distance – Choosing an appropriate K – Preparing data for use with KNN – Why is the KNN algorithm lazy? - Probabilistic Learning - Classification using Naïve Bayes : Understanding Naïve Bayes - Basic concepts of Bayesian Methods – The Naïve Bayes Algorithm - Naïve Bayes classification – #Laplace Estimator# – using Numeric features with Naïve Bayes.

Unit – III

18 hours

Divide and Conquer – Classification using Decision Trees and Rules : Understanding Decision Trees - Divide and Conquer – C5.0 decision Tree algorithm – Understanding Classification Rules – Separate and Conquer – The One Rule algorithm – The RIPPER algorithm – Rules for Decision Trees – Forecasting Numeric Data – Regression Methods : Understanding Regression – Simple Linear Regression – #Ordinary Least Squares Estimation# – Correlations – Multiple Linear Regression – Understanding Regression Trees and model trees.

Unit - IV

18 hours

Black Box Methods: Neural Networks and Support Vector Machines (SVM) : Understanding Neural Networks: From biological to Artificial Neurons – Activation Functions – Network Topology – Training Neural Networks with Backpropagation – Modelling the strength of concrete with ANNs: Collecting Data – Exploring and Preparing the data – Training a model on the data – Evaluating model performance – improving model performance – Understanding SVM: Classification with hyper planes – Finding the maximum margin – Using Kernels for Non-Linear Spaces – #Finding Groups of Data# –clustering with K-Means: Understanding Clustering – K-Means algorithm for Clustering.

Unit - V

18 hours

Using R for Machine Learning : Managing and Understanding Data: R Data Structures – Vectors – Factors: Lists – Data Frames – Matrices and Arrays – Managing Data with R: Saving and Loading R Data structures – Importing and Saving data from CSV files – Importing Data from SQL databases – Exploring and Understanding Data: Exploring the structure of data – Exploring numeric variables #Exploring Categorical Variables# – Exploring relationships between variables.

#.....# Self-study portion

Text Book:

Brett Lantz, *Machine Learning with R*, PACKT Publishing, Open Source, 2013.

Unit I: Chapter: 1 **Unit II:** Chapters 3 & 4 **Unit-III:** Chapter 5 **Unit-IV:** Chapter 7, **Unit V:** Chapter 2

Books for Reference:

1. Shai Shalev-Shwartz, *Understanding Machine Learning: From Theory to Algorithms*, Cambridge University Press, 2014.
2. Alex Smola and SVN Vishwanathan, *Introduction to Machine Learning*, - Cambridge University Press.- ISBN: 0 521 82583 0, 2010.
3. Jason Bell, *Machine Learning – Hands-on for Developers and Technical Professionals*, Wiley Publications.

Web Reference

<https://www.datacamp.com/community/tutorials/machine-learning-in-r>

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

Semester	Code	Title of the Course					Hours	Credits			
III	20PCS3CC10	MACHINE LEARNING AND R 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 (✓) = 40, Relationship: High											

Prepared by:

Dr. M. Sabibullah

Checked by:

Mr. M. Kamal

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
III	20PCS3CC11	CORE- XI	WEB PROGRAMMING	6	4	100	25	75

Course Outcomes (COs):

On completion of the course, students will be able to

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

UNIT I

18 hours

ASP.NET Introduction : 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 #

UNIT II

18 hours

Developing ASP.NET Applications : 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

UNIT III:

18 hours

Forms : 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 #

UNIT IV

18 hours

Working with Data : 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

UNIT V

18 hours

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:

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

UNIT I : 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 Reference:

1. Bill Evjen , Devin Rader , Farhan Muhammad , Scott Hanselman, SrivakumarWrox , *Professional ASP.NET 1.1*.
2. Kogent Learning Solutions Inc., ASP. NET 2.0 Black Book Dreamtech Press, 2006

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			
III	20PCS3CC11	WEB 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 (✓) = 37, Relationship: High											

Prepared by:

Mr. M. Kamal

Checked by:

Dr. K. Nafees Ahmed

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
III	20PCS3CC12P1	Core–XII A	WEB PROGRAMMING LAB - Practical	3	2	50	10	40

1. Simple Program to
 - a) Develop a Program to demonstrate String Object.
 - b) Display first N Fibonacci numbers.
 - c) Find the eligibility of admission for a professional course based on the following criteria:
 Marks in Mathematics ≥ 65 , Marks in Physics ≥ 55 , Marks in Chemistry ≥ 50 , Total in all three subject ≥ 180 , total in Mathematics 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 Program:
 - a) To Make use of Currency Changes.
 - b) To create a table dynamically.
 - c) To generate a Greeting Card Automatically.
3. Write a program to make 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. Mr. M. Kamal

Checked by:

Dr. K. Nafees Ahmed

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
III	20PCS3CC12P2	CORE–XII B	R PROGRAMMING LAB - Practical	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

Prepared by:

Dr. M. Sabibullah

Checked by:

Mr. K. M. Akbar Badhusha

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
III	20PCS3DE3	DSE – III	CLOUD COMPUTING	6	4	100	25	75

Course Outcomes (COs):

On completion of the course, students will be able to

1. Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
2. Apply fundamental concepts in cloud infrastructures to understand the tradeoffs in power, efficiency and cost, and then study how to leverage and manage single and multiple datacenters to build and deploy cloud applications that are resilient, elastic and cost-efficient.
3. Discuss system, network and storage virtualization and outline their role in enabling the cloud computing system model.
4. Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS.
5. Analyze various cloud programming models and apply them to solve problems on the cloud.

UNIT I

18 hours

PRINCIPLES OF PARALLEL AND DISTRIBUTED COMPUTING: Eras of Computing - Parallel vs. Distributed Computing - Elements of Parallel Computing - Elements of Distributed Computing - Technologies for Distributed Computing

UNIT II

18 hours

INTRODUCTION -Cloud Computing at a Glance - Historical Developments - Building Cloud Computing Environments

UNIT III

18 hours

CLOUD COMPUTING ARCHITECTURE: Introduction - Cloud Reference Model Types of Clouds - # Economics of the Cloud # - Open Challenges

UNIT IV

18 hours

INFRASTRUCTURE AS A SERVICE: Virtual Machines provisioning and Migration Services – Introduction and Inspiration – Background and Related Work - Virtual Machine Provisioning and manageability – Virtual Machine Migration Services - PLATFORM AND SOFTWARE AS A SERVICE: Aneka – Integration of Private and Public clouds – Introduction – Technologies and Tools for Cloud computing – Aneka cloud Platform – # Aneka Resource Provisioning Service #– Hybrid Cloud Implementation

UNIT V

18 hours

SLA Management in Cloud Computing: Inspiration - Traditional Approaches to SLO Management - Types of SLA – Life Cycle of SLA. Resource Cloud Mashups - Introduction - Concepts of a Cloud Mashup - Realizing Resource Mashups. GOVERNANCE AND CASE STUDIES: Data Security in the Cloud – # The current state of data security in the cloud # – Cloud Computing and Data Security Risk`

#.....# Self-study portion

Text Books:

1. RajkumarBuyya, Christian Vecchiola, S. ThamaraiSelvi, “Mastering Cloud Computing”, McGraw Hill Education (India) Private Limited Publications, First Reprint, 2013

UNIT I - Chapter 2.1-2.5

UNIT II- Chapter 1.1-1.3

UNIT III- Chapter 4.1- 4.5

2. RajkumarBuyya, James Broberg and Andrzej Goscinski, “Cloud Computing Principles and Paradigms”, Wiley Publications, 2013

UNIT IV - Chapter 5.1-5.4 & Chapter 9.1-9.5 UNIT V- Chapter – 16.1-16.4, Chapter 21.1-21.3, Chapter 23.2, 23.4

Book for Reference

Michael Miller, “Cloud Computing Web Based Applications that change the way you work and collaborate online”, Pearson Education, 2009.

Web Reference

<https://www.zdnet.com/article/what-is-cloud-computing-everything-you-need-to-know-about-the-cloud/>

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

Semester	Code	Title of the Course					Hours	Credits			
III	20PCS3DE3	CLOUD COMPUTING					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:

Dr. S.Vaaheedha Kfhadeen

Checked by:

Mr. M. Kamal

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
III	20PCS3DE3	DSE – III	DISTRIBUTED OPERATING SYSTEMS	6	4	100	25	75

Course Outcomes (COs):

On completion of the course, students will be able to

1. Identify and characterize the fundamental principles of distributed system design.
2. Recognize and explain message passing techniques in distributed environments.
3. Describe the concept of distributed shared memory and acquire knowledge in synchronization.
4. Analyze how to store data in distributed file systems
5. Analyze and categorize the concept of security in distributed systems.

UNIT I

18 hours

Fundamentals : What is a Distributed Computing System – Evolution of Distributed Computing Systems –Distributed Computing System Models – Why are Distributed Computing Systems gaining popularity – What is a Distributed Operating System – Issues in Designing Distributed Operating System – Introduction to Distributed Computing Environment. # Introduction to Computer Networks – Network types – LAN –WAN # – Communication protocols – Internetworking – ATM Technology.

UNIT II

18 hours

Message Passing : Desirable features – Issues in IPC by Message Passing –Synchronization – Buffering – Multi-datagram Messages – # Encoding and Decoding of Message Data # –Process Addressing – Failure Handling – Group Communication

UNIT III

18 hours

Distributed Shared Memory : General Architecture of DSM Systems – Design and Implementation Issues of DSM – Granularity – Structure of Shared Memory Space – Consistency Models – Replacement Strategy – Thrashing – Other Approaches to DSM – # Heterogeneous DSM – Advantages of DSM# .**Synchronization:** Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithm

UNIT IV

18 hours

Distributed File Systems : Desirable features – File Models – File Accessing Models – File Sharing Semantics – File Caching Schemes – File Replication – Fault Tolerance – Atomic Transactions – # Design Principles#

UNIT V

18 hours

Security : Potential Attacks to Computer Systems – Cryptography – Authentication – Access Control – Digital Signatures – Design Principles

..... # Self-study portion

Text Book:

Pradeep K Sinha, “Distributed Operating Systems – Concepts and Design”, PHI, 2013.

UNIT I : Chapter 1 & Chapter 2

UNIT II : Chapter 3

UNIT III : Chapter 5 & Chapter 6

UNIT IV : Chapter 9

UNIT V : Chapter 11

Book for Reference:

Andrew S. Tanenbaum, “Distributed Operating Systems”, Pearson Education India, 2001.

Web References:

1. <https://www.slideshare.net/sandpoonia/distributed-operating-system>
2. [http://archive.mu.ac.in/myweb_test/MCA%20study%20material/M.C.A.\(Sem%20-%20V\)%20Distributed%20Computing.pdf](http://archive.mu.ac.in/myweb_test/MCA%20study%20material/M.C.A.(Sem%20-%20V)%20Distributed%20Computing.pdf)

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

Semester	Code	Title of the Course					Hours	Credits			
III	20PCS3DE3	DISTRIBUTED OPERATING 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 (✓) = 37, Relationship: High											

Prepared by

Dr. K. Nafees Ahamed

Checked by

Mr. M. Kamal

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
IV	20PCS4CC13	Core–XIII	MIDDLEWARE TECHNOLOGY	6	5	100	25	75

Course Outcomes (COs):

On completion of the course, students will be able to

1. Design a dynamic remote application with RMI and CORBA
2. Understand how middleware facilitates the development of distributed applications in heterogeneous environments.
3. Study how it helps to incorporate application portability, distributed application component interoperability and integration
4. Gain the knowledge of the basic principles of Angular JS
5. Understand the design of single-page applications and how AngularJS facilitates their development

UNIT I

18 hours

Java RMI: Introduction – Architecture of RMI – The RMI Package- Creation of RMI applications- Advantages and Disadvantages of RMI. CORBA: Object Management Architecture-#CORBA Architecture#-OMG CORBA IDL-CORBA Object Life Cycle-CORBA Services: Object Location Service, Messaging Service, Security Service, Transaction Service and Persistency Services

UNIT II

18 hours

Introduction – Advantages of Servlets over CGI – The Servlet Life Cycle – Server API – A Simple Servlet – Handling HTTP GET Requests – Handling HTTP POST Requests – Cookies – Session Tracking – Multi-tier Applications using Database Connectivity – Servlet changing

UNIT III

18 hours

JSP: Introduction – Advantages of JSP – Developing first JSP – Components of JSP – Reading request information – Retrieving the data posted from a HTML file to a JSP file – JSP Sessions – Cookies – Disabling sessions

UNIT IV

18 hours

Introducing AngularJS: Introduction: What is MVC? - Benefits - Philosophy - Starting out with AngularJS: A Basic AngularJS Application - AngularJS Hello World - Basic Angular JS Directives and Controllers: AngularJS Modules - Working with and Displaying arrays - Working with ng-repeat: ng-repeat Over an Object - Helper Variables in ng-repeat - # Track by ID # - ng-repeat Across Multiple HTML Elements.

UNIT V

18 hours

Forms, Inputs and Services: Working with ng-model – Working with Forms – # Leverage Data Binding and Models # - Form Validation and States – Error Handling with Forms – Other Forms Controls: Textareas – Checkboxes – Radio Buttons – Combo Boxes/Drop-Downs – Working with Filters: What are AngularJS Filters? – Creating AngularJS Filters

..... # Self-study portion

Text Books

1. G. Sudha Sadasivam, *Distributed Component Architecture*, Wiley India Pvt. Ltd, 2008.
UNIT I: Chapter 2 – 2.1 to 2.5, Chapter10 – 10.1
2. N.P. Gopalan & J. Akilandeswary, *Web Technology A Developer Perspective*, PHI Learning Private Limited, 2009.
UNIT II: Chapter 10 **UNIT II:** Chapter 11
3. Shyam Seshadri & Brad Green, *Angular JS: Up and Running*, Published by O’Reilly Media, Inc., First Edition, 2014
UNIT IV: Chapter 1 & 2 **UNIT V:** Chapter 4 & 8

Books for Reference:

1. James McGovern and Rahim Adatia, *J2EE 1.4 Bible*, Willey India Pvt. Ltd, New Delhi, 2012.
2. Richard Monson Haefel, *Enterprise Java Beans*, O’Reilly, Fourth Edition, 2004
3. M.N. Rao, *Fundamentals of Open Source Software*, PHI Learning Private Ltd., Delhi, 2015

Web References:

<https://www.w3schools.com/angular/>
<https://www.tutorialspoint.com/angularjs/index.htm>

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

Semester	Code	Title of the Course					Hours	Credits			
IV	20PCS4CC13	MIDDLEWARE TECHNOLOGY					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:

Mr. M. Kamal

Checked by:

Dr. A. Abdul Saleem

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
IV	20PCS4CC14P1	CORE– XIV A	Middleware Technology Lab - Practical	3	3	50	10	40

Using Eclipse Integrated Development Environment (IDE)

1. Develop a simple RMI application for
 - a) Downloading and uploading files on the server by using multiple clients
 - b) Display the Factorial of the given number
2. Develop a Servlet application to display a welcome message on the browser .
3. Develop a Servlet program for calculating the factorial of a given number that has been submitted through the form.
4. Develop a Servlet program for authenticating and personal details form filling .
5. Develop a Servlet program to create a cookie that counts the number of accesses to a Web page.
6. Write a Servlet program that accepts the age and name and displays if the user is eligible for voting or not.
7. Write a program to display the multiples of 2 using JSP.
8. Write a JSP application to count the total number of visits on your website.
9. Write a JSP application to validate the username and password from the database.
10. Write a JSP program to design student mark sheet preparation and to store the information to a database using MYSQL.
11. Write a JSP program to perform the DML operations using MySQL and display all the records.
12. Write a JSP application to select the record from the database using MYSQL.
13. Write a program to display the session ID, creation time, and the last accessed time of the Web page.

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Checked by

Dr. A. Abdul Saleem

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
IV	20PCS4CC14P2	Core– XIV B	ANGULAR JS LAB - Practical	3	2	50	10	40

Develop the programs using Angular JS:

1. Simple application to
 - a) Display the values for different data types
 - b) Perform basic arithmetic operations
2. Demonstrate a shopping list using various built-in functions in Array
3. Change the date format using ng-model
4. Illustrate the use of Filter
5. Apply Keyboard and Mouse events
6. Use slide Toggle animation
7. Read JSON values and display it
8. Design a simple calculator
9. Design Login form and validate the username and password
10. Implement a basic search functionality application
11. Develop a simple text fade application
12. Develop a simple To-Do application

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Mr. M. Kamal

Checked by

Dr. A. Abdul Saleem