MCA

SEM	SUBJECT CODE	COURSE	SUBJECT TITLE	HRS/ WEEK	CREDIT	INT. MARK	EXT. MARK	TOTAL MARK
I	20MCA1CC1	Core I	Programming in Java	4	3	25	75	100
	20MCA1CC2	Core II	Computer System Architecture	4	3	25	75	100
	20MCA1CC3	Core III	Database Systems	4	3	25	75	100
	20MCA1CC4	Core IV	Resource Management Techniques	4	3	25	75	100
	20MCA1CC5	Core V	Management Information Systems	4	3	25	75	100
	20MCA1CC6P	Core VI	Java Programming Lab - Practical	4	3	20	80	100
	20MCA1CC7P	Core VII	RDBMS Lab - Practical	4	3	20	80	100
	20MCA1SE1	SEC 1	Communication Skills *	2	1	100	-	100
TOTAL				**30**	**22**			**800**
II	20MCA2CC8	Core VIII	Data Structures and Algorithms	4	3	25	75	100
	20MCA2CC9	Core IX	R Programming with Statistics	4	3	25	75	100
	20MCA2CC10	Core X	Operating Systems	4	3	25	75	100
	20MCA2DE1A/B/C	DSE 1		4	4	25	75	100
	20MCA2DE2A/B/C	DSE 2		4	4	25	75	100
	20MCA2CC11P	Core XI	Data Structures Lab – Practical	4	3	20	80	100
	20MCA2CC12P	Core XII	R Programming Lab - Practical	4	3	20	80	100
	20MCA2SE2	SEC 2	Quantitative Aptitude *	2	1	100	-	100
	20MCA2EC1	Extra Credit Course – 1	Summer Internship	-	2	-	-	-
TOTAL				**30**	**24**			**800**
III	20MCA3CC13	Core XIII	Python Programming	4	3	25	75	100
	20MCA3CC14	Core XIV	.NET Technology	4	3	25	75	100
	20MCA3CC15	Core XV	Artificial Intelligence and Machine Learning	4	3	25	75	100
	20MCA3DE3A/B/C	DSE 3		4	4	25	75	100
	20MCA3DE4A/B/C	DSE 4		4	4	25	75	100
	20MCA3CC16P	Core XVI	Python Programming Lab - Practical	4	3	20	80	100
	20MCA3CC17P	Core XVII	.NET Lab - Practical	4	3	20	80	100
	20MCA3SE3	SEC 3	Innovation and Startup Skills	2	1	100		100
	20MCA3EC2	Extra Credit Course – 2	Online Certificate Course #	-	1			
TOTAL				**30**	**24**			**800**
IV	20MCA4CC18	Core XVIII	Distributed Technology	4	3	25	75	100
	20MCA4DE5A/B/C	DSE 5		4	4	25	75	100
	20MCA4CC19P	Core XIX	Distributed Technology Lab - Practical	4	3	20	80	100
	20MCA4PW	Project Work	Industrial Experience and Project Work	18	9	25	75	100
	20MCA4EC3	Extra Credit Course – 3	Online Certificate Course #	-	1			
	20PCNOC	MOOC (Mandatory)		-	1	-	-	-
TOTAL				**30**	**20**			**400**
GRAND TOTAL				**120**	**90**			**2800**

DSE – Discipline Specific Elective SEC – Skill Enhancement Course
*** Paper fully Internal**
 # Not considered for Grand Total and CGPA

COURSES	NUMBER	CREDIT
CORE	19	57
DSE	5	20
SEC	3	3
Industry Experience and Project Work	1	9
MOOC - Mandatory	1	1
TOTAL		**90**

*** DISCIPLINE SPECIFIC ELECTIVES**

SEMESTER	COURSE CODE	COURSE TITLE
II	20MCA2DE1A	Computer Networks
	20MCA2DE1B	Network Security and Cryptography
	20MCA2DE1C	Mobile Communication
	20MCA2DE2A	Data Science
	20MCA2DE2B	Big Data Analytics
	20MCA2DE2C	Microprocessors, Interfacing and Applications
III	20MCA3DE3A	Parallel Processing
	20MCA3DE3B	Grid Computing
	20MCA3DE3C	Cloud Computing
	20MCA3DE4A	Software Testing
	20MCA3DE4B	Internet of Things
	20MCA3DE4C	Compiler Design
IV	20MCA4DE5A	Organizational Dynamics
	20MCA4DE5B	Accounting and Financial Management
	20MCA4DE5C	Human Resource Management

MANDATORY BRIDGE COURSES FOR NON-COMPUTER SCIENCE STREAM STUDENTS - 30 CREDITS

SEM	SUBJECT CODE	COURSE	SUBJECT TITLE	HRS/ WEEK	CREDIT	INT. MARK	EXT. MARK	MARK
I	20MCA1ACC1	ADDL.Core I	C and C++ Programming **	-	5	100	-	100
	20MCA1ACC2P	ADDL. Core II	C and C++ Programming Lab ** - Practical	-	5	100	-	100
			TOTAL	**-**	**10**	**200**		**200**
II	20MCA2ACC3	ADDL. Core III	Web Design **	-	5	100	-	100
	20MCA2ACC4P	ADDL. Core IV	HTML and Java Script Lab **-Practical	-	5	100	-	100
			TOTAL	**-**	**10**	**200**	**-**	**200**
III	20MCA3ACC5	ADDL. Core V	Computer Graphics **	-	5	100	-	100
	20MCA3ACC6P	ADDL. Core VI	Animation Lab **-Practical	-	5	100	-	100
			TOTAL	**-**	**10**	**200**	**-**	**200**

**** Course Fully Internal and in Self-study Mode**

EXTRA CREDIT COURSES	SEMESTER	CREDITS
Summer Internship	End of II	2
Online Certificate Course	III	1
Online Certificate Course	IV	1
	TOTAL	**4**

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20MCA1CC1	CORE – I	PROGRAMMING IN JAVA	4	3	100	25	75

Course Outcomes:

On completion of the course, students will be able to

1. Describe the fundamental knowledge of Java language
2. Illustrate the advanced concepts like packages, interfaces, exception handling, multithreading, collection, I/O and Networking classes and database connectivity
3. Apply appropriate problem solving strategies
4. Design GUI based applications
5. Develop Java applications to solve real world problems

UNIT I **12 hours**

Java Buzzwords – Class Fundamentals – Declaring Objects – Introducing Methods – Constructors – The this keyword – Garbage Collection – Overloading Methods – Argument Passing – Recursion – Access Control-Understanding static – final -Nested and Inner classes – Inheritance Basics – Using super – Method overriding – Dynamic Method Dispatch –#Using Abstract Classes#– Final with Inheritance– Object class.

UNIT II **12 hours**

Defining a Package–Packages and Member Access– Importing Packages – Defining, Implementing, Applying Interfaces – Interfaces Can Be Extended–#Default Interface Methods#– Use static Methods in an Interface – Exception Handling Fundamentals – Exception Types – Using try and catch–Multiple catch Clauses – Nested try Statements– throw – throws – finally – Java's Built-in Exceptions– Creating Own Exception Subclasses – The Java Thread Model – Creating a Thread –Creating Multiple Threads-Thread Priorities– Synchronization – Interthread Communication.

UNIT III **12 hours**

String Handling– The Collections Framework: List, Set, Map, Enumeration and Iterator interfaces – ArrayList-LinkedList– Vector– Stack– HashTable– Properties–#StringTokenizer#– Date –Calendar - Random – Scanner– The I/O Classes and Interfaces – File – The Stream Classes – The Byte Streams: InputStream – OutputStream– FileInputStream–FileOutputStream– Buffered Byte Streams– PrintStream– DataOutputStream – DataInputStream–The Character Streams: Reader– Writer – FileReader – FileWriter – BufferedReader – BufferedWriter– PrintWriter – Serialization.

UNIT IV **12 hours**

Networking Basics – InetAddress –TCP/IP Client Sockets – URL – URLConnection – TCP/IP Server Sockets – Datagrams – Java Database Connectivity: Establishing a connection – Creation of Data Tables – Entering Data into Tables – Table Updating – Use of PreparedStatement – Obtaining Metadata.

UNIT V **12 hours**

Event Handling: Delegation Event Model – Event Classes – Event Listener Interfaces – Working with Graphics, Color and Font classes – #Understanding Layout Managers#– The Origins of Swing – Key Swing Features – The MVC Connection – Components and Containers – The Swing Packages – A Simple Swing Application – Exploring Swing: JLabel and ImageIcon–JTextField –Jbutton–JTabbedPane–JScrollPane– JList – JComboBox.

 # ..... # Self-study portion

Text Books:

1. Herbert Schildt, *Java The Complete Reference*, Eleventh Edition, McGraw-Hill Education,2019.

UNIT I Chapter 1, Chapter 6, Chapter 7, Chapter 8
UNIT II Chapter 9, Chapter 10, Chapter 11
UNIT III Chapter 17, Chapter 19, Chapter 20, Chapter 21
UNIT IV Chapter 23
UNIT V Chapter 24, Chapter 25, Chapter 26, Chapter 31, Chapter 32

2. C. Muthu, *Programming with Java*, Vijay Nicole imprints private Limited, 2004(for JDBC only).

UNIT IV Chapter 18

Books for Reference:

1. Sachin Malhotra and Saurabh Chaudhary, *Programming in Java*, Oxford University Press, 2018
2. Daniel Liang, *Introduction to Java Programming*,Tenth Edition, Pearson, 2015.

Web References:

https://www.academia.edu/40343459/Java_The_Complete_Reference_Eleventh_Edition
https://www.tutorialspoint.com/java/index.htm
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	**20MCA1CC1**		**PROGRAMMING IN JAVA**			**4**		**3**	
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: **Checked by:**

Dr. M. Mohamed Surputheen **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
I	20MCA1CC2	CORE – II	COMPUTER SYSTEM ARCHITECTURE	4	3	100	25	75

Course Outcomes:

On completion of the course, students will be able to

1. Understand the various types of number systems and binary codes
2. Apply Boolean laws and theorems to simplify and implement Boolean expressions
3. Design and analyze combinational circuits
4. Design and analyze sequential circuits
5. Understand the architecture and functionality of central processing unit

UNIT I **12 hours**

Number Systems – Decimal, Binary, Octal and Hexadecimal Systems – Addition, Subtraction, Multiplication and Division (whole numbers) – Conversion from one system to another – Binary Codes – BCD codes – Weighted codes, Reflected code, Self-complementing codes – Alphanumeric Codes – #Error Detection Codes#.

UNIT II **12 hours**

Boolean Algebra – Boolean Laws and Theorems – De Morgan's Theorems – Complement of a Function - Duality – Logic Gates – Universal Logic – Boolean Expressions – Sum of Products – Product of Sums – Simplification of Boolean Expressions – Algebraic Method – Karnaugh Map Method (up to 4 Variables) – Implementation of Boolean Expressions using Gate Networks.

UNIT III **12 hours**

Combinational Circuits – Multiplexers – Demultiplexers – Decoders – Encoders – Arithmetic Building Blocks – Half and Full Adders – Half and Full Subtractors – Parallel adder – 2's Complement Adder/Subtractor – #BCD Adder#.

UNIT IV **12 hours**

Sequential Circuits – Flip Flops – RS, Clocked RS, D, JK, T and Master-Slave Flip Flops – Shift Register – Counters – Asynchronous and Synchronous Counters – Mod n Counter - BCD Counter – Ring Counter – Shift Counter.

UNIT V **12 hours**

Central Processing Unit: General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation – Program Control - Status Bit Conditions, Conditional Branch Instructions, Subroutine Call and Return, Program Interrupt, Types of Interrupts – #Reduced Instruction Set Computer: CISC and RISC Characteristics#.

Text Books:

1. Donald P. Leach, Albert Paul Malvino and GoutamSaha, *Digital Principles and Applications*, Tata McGraw Hill, Sixth Edition, 2007.
2. Morris Mano M, *Computer System Architecture*, Prentice Hall of India, Third Edition, 2008

Books for Reference:

1. Thomas C. Bartee, *Digital Computer Fundamentals*, Tata McGraw-Hill, Sixth Edition, 2006.
2. Morris ManoM, *Digital Logic and Computer Design*, Prentice Hall of India, 2008.

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

Semester	Code	Title of the Course	Hours	Credits
I	20MCA1CC2	COMPUTER SYSTEM ARCHITECTURE	4	3

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: **Checked by:**

Dr. T. Abdul Razak **Dr. G. Ravi**

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	20MCA1CC3	CORE – III	DATABASE SYSTEMS	4	3	100	25	75

Course Outcomes:

On completion of the course, students will be able to

1. Understand the basic concepts and various data model in database
2. Apply ER diagrams for real time applications, populate and query a database by SQL
3. Design the database effectively by using normalization techniques
4. Acquire the knowledge of basic database storage structures and access techniques
5. Illustrate the concepts of transaction, Concurrency and Recovery techniques in database

UNIT I **12 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 – Formal Relational Query Languages – #Relational Algebra# – The Tuple Relational Calculus – The Domain Relational Calculus.

UNIT II **12 hours**

Introduction to SQL: Overview of SQL – SQL Definition – Basic Structure of SQL Queries – Additional Basic Operations – Set Operations – 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 **12 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 **12 hours**

Storage and File Structure: Overview of Physical Storage – RAID – #File Organization# – Data-Dictionary Storage – Indexing and Hashing – Basic Concepts – Ordered Indices – B^+-Tree Index Files – Structure of a B^+-Tree – Static Hashing – Dynamic Hashing.

UNIT V **12 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.

 # ..... # Self-study portion

Text Books:

1.Abraham Silberschatz, Hendry F. Korth and S. Sudarshan, *Database System Concepts*, 6th Edition, McGraw- Hill International Edition 2011.

UNITI Chapter 1 (1.1 – 1.5, 1.12), Chapter 2 (2.1, 2.3), Chapter 6 (6.1, 6.2, 6.3)

UNITII Chapter 3 (3.1 – 3.5, 3.7 – 3.9), Chapter 4 (4.1, 4.2), Chapter 7 (7.2, 7.3, 7.5)

UNITIV Chapter 10 (10.1, 10.3, 10.5, 10.7), Chapter 11 (11.3.1, 11.6, 11.7)

UNITV Chapter 17 (17.1, 17.2), Chapter 19 (19.1 – 19.5), Chapter 20 (20.1 – 20.4)

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

UNITIII Chapter 13(13.1 – 13.4, 13.6 – 3.9) 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, 2009.
2. Ramez Elmasri, Shamkant B. Navathe, *Fundamentals of Database Systems*, 5th Edition, Pearson Education Ltd., 2009.

Web References:

https://dl.ebooksworld.ir/motoman/Pearson.Database.Systems.
http://dl.booktolearn.com/ebooks2/computer/databases/9781260515046_Database_System_Concepts_7th_49a4.pdf

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

Semester	**Code**		**Title of the Course**			**Hours**		**Credits**	
I	**20MCA1CC3**		**DATABASE SYSTEMS**			**4**		**3**	
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 (✓) = 43, Relationship: High										

Prepared by: **Checked by:**

Mr. S. Syed Ibrahim **Mr. M. Abdullah**

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	20MCA1CC4	CORE – IV	RESOURCE MANAGEMENT TECHNIQUES	4	3	100	25	75

Course Outcomes:

On completion of the course, students will be able to

1. Discuss the various features and applications of Operations Research
2. Acquire the knowledge of mathematical formulation and use different methods to solve LPP
3. Apply the suitable optimization techniques for transporting quantities, assigning jobs and optimum utilization of inventory
4. Identify the activities, schedule the project and determine the minimum completion time
5. Describe the importance of queues and its applications

UNIT I **12 hours**

Operations Research – Nature and Features of O.R. – Definitions of O.R. – Applications of O.R. – Linear Programming Problem – Mathematical Formulation of the Problem – Graphical Solution Method – Some Exceptional Cases – Simplex Method – The Computational Procedure – Use of Artificial Variables – #Two-Phase Method# – Big-M Method.

UNIT II **12 hours**

Transportation Problem – #Linear Programming Formulation of the Transportation Problem# – Finding an Initial BFS – North-West Corner Rule – Matrix Minima Method – Vogel's Approximation Method – Test for Optimality – Assignment Problem – Mathematical Formulation of the problem – Hungarian Assignment Method – Special Cases in Assignment Problems – The Travelling Salesman Problem.

UNIT III **12 hours**

Network Scheduling by PERT / CPM – Network: Basic Components – Logical Sequencing – Rules for Network Construction – Concurrent Activities – Critical Path Analysis – Probability Considerations in PERT – #Distinction between PERT and CPM# – Applications of Network Techniques.

UNIT IV **12 hours**

Inventory Control – Types of Inventories – Reasons for Carrying Inventories – The Inventory Decisions – Objectives of Scientific Inventory Control – Costs Associated with Inventories – #Factors Affecting Inventory Control# – An Inventory Control Problem – The Concept of EOQ – Deterministic Inventory Problems with No Shortages – Deterministic Inventory Problems with Shortages – ABC Analysis (Always, Better, Control) Technique.

UNIT V **12 hours**

Queueing Theory – Queueing System – Elements of a Queuing System – Operating Characteristics of a Queueing System – Classification of Queuing Models – #Definition of Transient and Steady States# – Queueing Models – (M/M/1):(∞ /FIFO) – (M/M/1):(N/FIFO) – (M/M/C):(∞/FIFO) – (M/M/C):(N/FIFO).

Note: Stress to be on solving numerical problems only.

 # ..... # Self-study portion

Text Book:

Kanti Swarup, P.K. Gupta and Man Mohan, *Operations Research*, Sultan Chand & Sons Educational Publishers, New Delhi, Sixteenth Edition, Reprint 2013.

UNIT I	Chapter 1 (Sec. 1:1, 1:3, 1:10), Chapter 2 (Sec. 2:1, 2:2, 2:3), Chapter 3 (Sec. 3:1, 3:2, 3:3) Chapter 4 (Sec. 4:1, 4:3, 4:4)
UNIT II	Chapter 10 (Sec. 10:1, 10:2, 10:9, 10:10, 10.13), Chapter 11 (11:1, 11:2, 11:4, 11:7)
UNIT III	Chapter 25 (Sec. 25:1 – 25:9)
UNIT IV	Chapter 19 (Sec. 19:1 – 19:11, 19:15 ABC Analysis only)
UNIT V	Chapter 21 (Sec. 21:1 – 21:4, 21.7 – 21:9 - Model I, Model III, Model V and Model VI only)

Books for Reference:

1. Hamdy A. Taha, *Operations Research : An Introduction*, PHI, New Delhi, 8th Edition, 2008.
2. A. Ravindran, Don T. Phillips, James J. Solberg, *Operations Research Principles and Practice*, John Wiley & Sons, Second Edition, Third Reprint 2007.

Web References:

http://ebooks.lpude.in/commerce/bcom/term_5/DCOM303_DMGT504_OPERATION_RESEARCH.pdf
https://www.researchgate.net/publication/313880623_Introduction_to_Operations_Research_Theory_and_Applications

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

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
II	**20MCA1CC4**		**RESOURCE MANAGEMENT TECHNIQUES**			**4**			**3**	
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: **Checked by:**

Dr. O.A. Mohamed Jafar **Dr. G. Ravi**

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	20MCA1CC5	CORE – V	MANAGEMENT INFORMATION SYSTEMS	4	3	100	25	75

Course Outcomes:

On completion of the course, students will be able to

1. Analyse a complex business problems and to apply principles of Information Technology to identify solutions
2. Design, implement and evaluate a computing-based solution to meet a given set of computing requirements
3. Recognize professional responsibilities and make appropriate judgment in computing practice based on legal and ethical principles including computer crimes and cyber laws
4. Communicate effectively in a variety of professional contexts related to Enterprise and Information Technology
5. Support the delivery, use and management of Information Systems within an Information Systems environment

UNIT I **12 hours**

Foundation Concepts: Information Systems in Business - Fundamental Roles of IS in Business – Trends in IS –Roles of e-Business in Business– Managerial Challenges of Information Technology – Components of Information Systems-Information Systems resources – IS Activities. **Fundamentals of Strategic Advantages:** Competitive Strategy Concepts- Competitive Forces and Strategies– Strategic uses of IT – Building a Customer Focused Business –Value Chain and Strategic IS –Re-engineering Business Processes # Virtual Company – Building a Knowledge Creating Company#.

UNIT II

e-Business Systems: Cross Functional Enterprise Applications – Enterprise Applications Architecture-Enterprise Application Integration – Transaction Processing Systems - TP cycle – Enterprise Collaboration Systems. **Functional Business Systems:** IT in Business- Marketing Systems – Manufacturing Systems – Human Resources Systems –Accounting Systems– Financial Management Systems. **Enterprise Business Systems:** CRM – Phases of CRM – Benefits, Challenges and Failure.**Enterprise Resource Planning:** ERP – Benefits, Challenges and Trends.# **Supply Chain Management:** SCM –Roles, Benefits and Trends #.

UNIT III **12 hours**

e-Commerce Fundamentals: Introduction to e-Commerce –Scope of e-Commerce –e-Com Technologies – Essential of e-Commerce Processes –Electronic payment processes – e-Commerce Applications and Issues – e-Com Success Factors – Web Store requirements- Business–to–Business e-Commerce – e – Commerce market Places –Clicks and Bricks in e-Commerce.**Security and Ethical Challenges:** Ethical Responsibility of Business Professionals –Challenges of Working in IT–# Computer Crimes- Privacy Issues– Current State of Cyber Law #.

UNIT IV **12 hours**

Decision Support Systems: Decision Support in Business– Information, Decision and Management– Information Quality – Decision Structure – Decision Support trends – DSS Components – MIS – Online Analytical Processing – Uses of DSS – EIS – Enterprise Portals and Decision Support.**Artificial Intelligence Technologies in Business:** Overview of A.I – Domains of AI – Expert Systems – Developing Expert Systems – Neural Networks – Fuzzy Logic Systems – # Genetic Algorithms – Virtual Reality – Intelligent Agents #.

UNIT V **12 hours**

Developing Business/IT Strategies: Planning Fundamentals – Business/IT Planning – Identifying Business / IT Strategies – Business Applications Planning.**Implementations Challenges:** Implementing IT – Science behind Change – Change Management. **Developing Business Systems:** IS Development– Systems Analysis and Design – Systems Development Life Cycle – System Development Process – Systems Analysis – Systems Design – End user development. **Implementing Business Systems:** Implementing New Systems – # Project Management – Evaluating H/W, S/W and Services – Other Implementation Activities #.

 # ..... # Self-study portion

Text Book:

James A. O 'Brien and George M. Marakas, *Management Information Systems*, Tata McGraw HillPublishing Company Limited, Ninth Edition, 2010.

Books for Reference:

1. Kenneth C. Laudon and Jane P. Laudon, *Management Information Systems: Managing the Digital Firm*, Pearson, Sixteenth Edition, 2020.
2. W.S. Jawadekar, *Management Information Systems*, Tata McGraw Hill Publishing Company Limited, 1998.

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

Semester	Code		Title of the Course			Hours		Credits		
I	20MCA1CC5		MANAGEMENT INFORMATION SYSTEMS			4		3		
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: **Checked by:**

Dr. A.R. Mohamed Shanavas **Mr. M. Abdullah**

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	**20MCA1CC6P**	**CORE – VI**	**JAVA PROGRAMMING LAB - Practical**	**4**	**3**	**100**	**20**	**80**

1. **Write Java Applications for the following:**
(a) EB Bill preparation using else…if statements. (Use suitable fields and conditions)
(b) Find the sum of digits for a given number.
(c) Find the biggest and smallest number in the given set of numbers using array.

2. **Class and Object**
(a) Program for library information system using suitable fields. (Read and Display book details)
(b) Program to find the area of rectangle, triangle, square and circle using method overloading.

3. **Inheritance**
(a) Program to demonstrate single inheritance.
(b) Program to demonstrate method overriding.

4. **Packages and Interfaces**
(a) Prepare a banking application using the package concept.
(b) Program to demonstrate interface.
(c) Program to implement multiple inheritance.

5. **Exception Handling**
(a) Program to handle multiple types of exceptions.
(b) Program to implement user-defined exception.

6. **Thread**
(a) Program to demonstrate multithreading using Thread class.
(b) Program to demonstrate multithreading using Runnable interface.

7. **String Handling**
Program to perform following operations:
i) Number of words in a given sentence.
ii) Reverse the each word using a given sentence.
iii) Check each word is palindrome or not.

8. **Utility Classes**
(a) Menu driven program using vector class.
(b) Program to print the system date and time.
(hours, minutes and seconds & day, monthand year separately)

9. **I/O Streams and Networking**
(a) Program for displaying contents of a given file and find the size, length and create date of a file.
(b) Program to create a directory at server and get a message “Successfully Created’. If the given directory is already created in server, send message to client “Already Exist”. (ServerSocket and Socket classes)

10. **Database Application**
(a) Menu driven program for Employee details. (insert, delete, update and search operations)
(b) Create an Inventory table with suitable fields and insert records through swing components.

Prepared by: **Checked by:**

Dr. M. Mohamed Surputheen **Dr. K. Nafees Ahmed**

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20MCA1CC7P	CORE – VII	RDBMS LAB - Practical	4	3	100	20	80

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.Unique and Check constraints

3. Write DDL query to perform foreign key with on delete cascade - A foreign keywith 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.

4. 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

(a)Finds any values that start with "a"
(b) Finds any values that end with "a"
(c) Finds any values that have “ar" in any position
(d) Finds any values that have "r" in the second position
(e) Finds any values that start with "a" and are at least 2 characters in length
(f) Finds any values that start with "a" and are at least 3 characters in length
(g) Finds any values that start with “J" and ends with “y"

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

(a) To list in alphabetic order all customers who have loan at a branch
(b) To list customer names in descending order.

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

(a) Find all customers having a loan, an account or both at the bank.
(b) Find all customers who have both a loan and account at the bank.
(c) Find all customers who have an account but no loan at the bank.
(d) Find all customers who have a loan but not an account at the bank.

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

(a) Find average account balance at a branch.
(b) Find the minimum balance at a branch. Find the maximum balance at a branch.
(c) Find the total balance at a branch Find the number of accounts in a branch.
(d) Find the 3rd highest balance of account number’s

8. Aggregate functions with group by and having clause)

(a) Find the average account balance at each branch.

(b) Find branch names those branches where the total balance is more than Rs.100000

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

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

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

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

Set Comparison (some, all)

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

Sub-query used in FROM Clause

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

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

With Clause

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

(g) Find all branches where the total account deposit is less than the average of the total account deposits at all branches

(h)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

(a) Delete the tuples of all accounts with balances below the average at the bank

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

12. Updates

(a) All balances are to be increased by 5 percent.

(b) Update with case statements All accounts with balances over 10000 receives 10 percent interest where as others receive 5 percent

13. Join Operations

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

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

(c) Right outer join – Show the relation, which customers bought loan, that loan details not inthe loan relation

(d) 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.
6. Exception Handling

IV. SQL FORMS

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

Prepared by: **Checked by:**

Mr. S. Syed Ibrahim **Dr. G. Ravi**

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20MCA1SE1	SEC 1	COMMUNICATION SKILLS	2	1	100	100	-

UNIT I **6 hours**

Listening Comprehension:

Global as well as local comprehension based on the listening to audio cassettes;A communicative interaction is to be set up in the class room. Testing accuracy of comprehension by asking 'yes' or 'no' questions. Meaning of words the students find difficult, is to be given.Pronunciation and intonation of words and sentences

Materials used:

1. Sweet and Salty – A Folk Tale 2.The Magic Vessels – A Folk Tale
3. TheCrows and Serpent – A Karadi Tale 4. The Monkey and Crocodile – A Karadi Tale
5)Keep up your English – Cassette 3 6.Tiger's Eye – Cassette 1
7. Tiger's Eye– Cassette 2 8. Tiger's Eye– Cassette 3

UNIT II **6 hours**

Video Viewing:

Introducing students to foreign accent

Interaction based on certain important aspects of the clipping used

Discussion of the theme and moral aspects in an interactive way

Materials used:

1. The King and I 2. Beethovan's 2nd 3. Titanic 4. The Sound of Music
5. Mrs. Doubtfire

UNIT III **6 hours**

Grammar and Reading Comprehension:

i. Rules on usage are to be explained clearly
ii. Examples apart from the ones in the text are to be given
iii. Students are made to answer the exercise following the rules on usage
iv. The Comprehension questions following the reading passage are to be answered
v. To improve the usage of rules pertaining to the topic, a guided composition exercise isto be done.

Test book:

Bhaskaran and Horsburgh, *Strengthen Your English*, Second Edition

UNIT IV **6 hours**

Speech Practice and Presentation Skills:

- Speech Preparation: Writing out the speech / Presentation materials with coherenceand cohesion

Delivery and speech presentation:

- Installing confidence and getting ride of stage fear by asking students speak infront of the class
- Adhering to the policy of – Fluency first and accuracy gradually
- Building up learner confidence through encouragement and appreciation

UNIT V **6 hours**

Interview Skills:

(a) **Preparation**

- Introducing yourself
- Traits employers look for in applicants
- Self Inventory (Experience – Skills - Qualities)
- Your USP
- CV and Letter of Application
- First Impression

(b) **Presentation**

- First Impression
- Role of Body Language
- Answering questions
- Certain Do‘s and Don‘ts

(c) **Post Presentation**

- Mock Interview and Assessment
- Guest Lecturers by HR personnel.

Group Dynamics / Discussion:

- Interaction and communication in Group Discussion
- Organisation principles in Group Discussion
- Do‘s and Don‘ts of Group discussion
- Practical Sessions in Group Discussion

Books for Reference:

1. Larry L. Barker, *Communication*, Prentice Hall, London,3rd Edition, 1984.
2. Mohan, Krishna and Meera Banerji, *Developing Communication Skills*, Macmillan, Delhi, 1990.
3. Stanton, Nicky, *Mastering Communication*, Hampshire: Pal grave, 1982.
4. H.M. Prasad, *Group Discussion and Interview*, Tata McGraw Hill PublishingCompany Limited, New Delhi, 2001.
5. Edgar Thorpe and Showick Thorpe, *Winning at Interviews*, PearsonEducation, New Delhi, 2004.
6. Hemant Goswami, *How to be successful in Interviews and get a job*, ChandikaPress Ltd, Chandigarh, 2001.
7. G. Ravindran, S.P. Benjamin Ilango and L. Arockiam, Success Through Soft Skills,IFCOT Publications, 2008.

Prepared by: **Checked by:**

Mr. N. Dhilip Mohamed **Mr. S. Akbar Ali**

MANDATORY BRIDGE COURSE FOR NON-COMPUTER SCIENCE STREAM STUDENTS

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
I	20MCA1ACC1	Addl. Core - I	C AND C++ PROGRAMMING	-	5	100	100	-

Course is fully Internal and in Self-study Mode

Course Outcomes:

On completion of the course, students will be able to

1. Describe the concepts of C and C++ languages
2. Differentiate structured and object-oriented programming
3. Apply suitable program constructs in solving problems
4. Extend the acquired knowledge for higher level course in programming
5. Develop applications to solve real world problems

UNIT I

Basic Structure of C Programs – Keywords and Identifiers – Constants– Variables– Data Types – Declaration of Variables– Assigning Values to Variables– Reading a Character– Writing a Character– Formatted Input– Formatted Output– Decision Making and Branching.

UNIT II

Decision Making and Looping: while Statement– do Statement – for Statement – Arrays: One-dimensional arrays– Declaration– Initialization– Two-dimensional arrays–Initialization– Multi-dimensional arrays – User-defined Functions: Definition of Functions– Return Values and their Types– Function Calls– Function Declaration.

UNIT III

Object-Oriented Programming Paradigm– Basic Concepts of Object-Oriented Programming– Benefits of OOP– Structure of C++ Program– Basic Data Types– User-Defined Data Types– Derived Data Types– Function Overloading– Friend and Virtual Functions– Specifying a Class– Defining Member Functions– A C++ Program with Class.

UNIT IV

Constructors– Parameterized Constructors– Destructors– Defining Derived Classes– Single Inheritance– Multilevel Inheritance– Multiple Inheritance– Abstract Classes– Pointers– Pointers to Objects– this Pointer– Virtual Functions.

UNIT V

C++ Streams– C++ Stream Classes– Unformatted I/O Operations– Formatted Console I/O Operations– Classes for File Stream Operations– Opening and Closing a File– File Pointers and their Manipulations– Sequential Input and Output Operations.

Text Books:

1. E. Balagurusamy, "*Programming in ANSI C"*, Tata McGraw Hill Education Private Limited, Fifth Edition, 2011.
   UNIT I Chapter 1 (Sec. 1.8), Chapter 2(Sec. 2.4 – 2.8, 2.10), Chapter 4 (Sec. 4.2 – 4.5), Chapter 5
   UNIT II Chapter 6 (Sec. 6.2 – 6.4), Chapter 7 (Sec. 7.2 –7.7), Chapter 9 (Sec. 9.5 – 9.8)

2. E. Balagurusamy, "*Object OrientedProgramming With C++"*, Tata McGraw Hill Education Private Limited, Fourth Edition, 2008.
   UNIT III Chapter 1 (Sec. 1.4 – 1.6), Chapter 2 (Sec. 2.6), Chapter 3(Sec. 3.5 –3.7), Chapter 4 (Sec. 4.9, 4.10), Chapter 5(Sec. 5.3 – 5.5)
   UNIT IV Chapter 6 (Sec. 6.1, 6.2, 6.11) Chapter 8(Sec. 8.2, 8.3, 8.5, 8.6, 8.10), Chapter 9(Sec.9.2– 9.4, 9.6)
   UNIT V Chapter 10(Sec.10.2– 10.5), Chapter 11(Sec.11.2, 11.3, 11.6, 11.7)

Books for Reference:

1. D. Ravichandran, *Programming in C*, New Age International (P) Ltd., First Edition, 1996.
2. Bjarne Stroustrup, *The C++ Programming Language*, Addison-Wesley, New York, Third Edition, Eighth Impression, 2012.

Web References:

https://www.javatpoint.com/c-programming-language-tutorial
https://www.w3schools.in/c-tutorial/
https://www.w3schools.com/cpp/
https://www.geeksforgeeks.org/cpp-tutorial/

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

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
I	**20MCA1ACC1**		**C AND C++ PROGRAMMING**			**-**			**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 (✓) = 38, Relationship: High										

Prepared by: **Checked by:**

Dr. K. Nafees Ahmed **Dr. G. Ravi**

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	20MCA1ACC2P	Addl. Core - II	C AND C++ PROGRAMMING LAB - Practical	-	5	100	100	-

Develop a program to implement

1. a) Sum of digits of a given number
   b) Biggest among three given numbers

2. a) Area and perimeter of a rectangle
   b) The use of switch statement

3. Sorting a set of numbers in ascending and descending orders. (Arrays)

4. Matrix manipulations (Addition, Subtraction and Multiplication)

5. Sum of rows, columns and diagonal of a matrix

6. Area of a circle, rectangle and triangle (Functions)

7. The concept of function overloading.

8. Read and display the student mark list (Class & Object)

9. Read and display the employee payroll (Class & Object)

10. The concept of constructors

11. a) Single Inheritance
    b) Multiple Inheritance

12. a) The concept of pointers
    b) The virtual function

13. Copy the contents of one file into another

14. Count the number of vowels present in a file

15. Create, write and read student data using file

Prepared by: **Checked by:**

Dr. K. Nafees Ahmed **Dr. G. Ravi**

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20MCA2CC8	CORE – VIII	DATA STRUCTURES AND ALGORITHMS	4	3	100	25	75

Course Outcomes:

On completion of the course, students will be able to

1. Describe how linear data structures are represented in memory and used by algorithms
2. Acquire the knowledge of non-linear data Structures and its implementation
3. Apply the concept of sorting, searching and algorithm design techniques effectively
4. Understand the performance analysis of algorithms
5. Design and implement an appropriate data structures for solving mathematical and real-world problems

UNIT I **12 hours**

Abstract Data Types – The List ADT – The Linked Lists – Doubly Linked Lists – Circularly Linked Lists – The Stack ADT – Stack Model – Implementation of Stacks – Applications – The Queue ADT – Queue Model – Array Implementation of Queues – #Applications of Queues#.

UNIT II **12 hours**

Trees – Implementation of Trees – Tree Traversals with an Application – Binary Trees – Implementation – Expression Trees – The Search Tree ADT – Binary Search Trees – #FindMin and FindMax# – B-Trees – Hashing – Hash Function – Separate Chaining – Open Addressing – Linear Probing.

UNIT III **12 hours**

Graphs Algorithms – Representation of Graphs – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm – Network Flow Problems – A Simple Maximum-Flow Algorithm – Minimum Spanning Tree – Prim's Algorithm – Kruskal's Algorithm – Applications of Depth-First Search – Undirected Graph – Biconnectivity – #Euler Circuits# – Directed Graphs.

UNIT IV **12 hours**

Divide and Conquer – The General method – Binary Search – Finding the Maximum and Minimum – Merge Sort – Quick Sort – Strassen's Matrix Multiplication – **The Greedy Method:** The General Method – Knapsack Problem – #Job Sequencing with Deadlines#.

UNIT V **12 hours**

Dynamic Programming: The General Method – Multistage Graphs – 0/1 Knapsack – The Travelling Salesperson Problem – **Backtracking:** The General Method – The 8-Queen's Problem – #Sum of Subsets# – Graph Coloring.

 # ..... # Self-study portion

Text Books:

1. Mark Allen Weiss, *Data Structures and Algorithm Analysis in C*, Pearson Education, South Asia, Second Edition, Fifteenth Impression, 2013

UNIT I Chapter 3 (Sec. 3.1– 3.4)
UNIT II Chapter 4 (Sec. 4.1– 4.3, 4.7), Chapter 5 (Sec. 5.1– 5.3, 5.4 (5.4.1))
UNIT III Chapter 9 (Sec. 9.1– 9.2, 9.3 (9.3.1, 9.3.2), 9.4, 9.5, 9.6 (9.6.1– 9.6.4))

2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, *Fundamentals of Computer Algorithms*, Universities Press (India) Private Limited, Second Edition, Reprint 2011.

UNIT IV Chapter 3 (Sec. 3.1, 3.3– 3.6, 3.8), Chapter 4 (Sec. 4.1, 4.3, 4.5)
UNIT V Chapter 5 (Sec. 5.1, 5.2, 5.7, 5.9), Chapter 7 (Sec. 7.1– 7.4)

Books for Reference:

1. J.P. Tremblay and P.G. Sorenson, *An Introduction to Data Structures with Applications*, Tata McGraw-Hill Publishing Company Limited, New Delhi, Second Edition, 26th Reprint, 2004.
2. Anany Levitin, *Introduction to the Design and Analysis of Algorithms*, Pearson Education 2003.
3. V. Aho, J. E. Hopcroft, and J. D. Ullman, *Data Structures and Algorithms*, Pearson Education,1983.
4. Seymour Lipschutz, *Data Structures (Schaum's Outlines)*, Tata McGraw-Hill Publishing Company Limited, Fourth Reprint, 2006.

Web References:

https://www.cs.bham.ac.uk/~jxb/DSA/dsa.pdf
https://www.programiz.com/dsa

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

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
II	**20MCA2CC8**		**DATA STRUCTURES AND ALGORITHMS**			**4**			**3**	
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. O.A. Mohamed Jafar

Checked by:
Dr. G. Ravi

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	20MCA2CC9	CORE – IX	R PROGRAMMING WITH STATISTICS	4	3	100	25	75

Course Outcomes:

On completion of the course, students will be able to

1. Describe the fundamental concepts of R Programming
2. Apply suitable functions to perform matrix manipulations, list operations and data frames
3. Acquire the knowledge of tables and related functions
4. Explore the ideas of files, strings and graphics in R
5. Apply simulation, statistical measures and probability distribution in solving real-world problems using R

UNIT I **12 hours**

Introduction to R –Downloading and installing R and R studio –How to Run R – A First R Session (use of R data set)– Data Types – Variables – Getting Help– R packages – Control Statements– Basic R Operators – Arithmetic, Relational and Boolean Operators – R Data structures– Vectors – Declarations–Recycling– Common Vector Operations –Using all () and any ()– Vectorized Operations–NA and NULL Values– Filtering– Testing Vector Equality–Vector Element Names.

UNIT II **12 hours**

Matrices and Arrays – Creating Matrices– General Matrix Operations–Applying Functions to Matrix Rows and Columns– Adding and Deleting Matrix Rows and Columns– More on the Vector/Matrix Distinction– Naming Matrix Rows and Columns– Higher-Dimensional Arrays – Lists – Creating Lists–General List Operations– Accessing List Components and Values– Applying Functions to Lists– Recursive Lists– Data Frames– Creating Data Frames– Other Matrix– Like Operations – Merging Data Frames– Applying Functions to Data Frames.

UNIT III **12 hours**

Factors and Tables – Factors and Levels – Common Functions Used with Factors – Working with Tables – Other Factor– and Table-Related Functions– R Programming Structures– Introduction to Functions – Variable Scope – Default Arguments – Return Values– Functions are Objects – No Pointers in R – Recursion –Replacement Functions – Anonymous Functions – Object-Oriented Programming – S3 Classes – S4 Classes– S3 Versus S4–Managing Your Objects.

UNIT IV **12 hours**

Input/ Output–Accessing theKeyboard and Monitor–Reading and Writing Files –String Manipulation – String-Manipulation Functions –Regular expressions – Graphics, Creating Graphics – Customizing Graphs– Saving Graphs to Files.

UNIT V **12 hours**

Doing Math and Simulations in R – Math Functions – Sorting – Set Operations – Simulation Programming in R – Generation of Pseudorandom Numbers – Built-in Random Variate Generators – Performing Statistical Calculations in R –Basic Statistical Measures: Mean –Median –Mode – Variance –Standard Deviation –Correlation – Regression–Functions for Statistical Distributions– Probability Distributions in R – Binomial – Poisson – Normal Distributions.

Text Books:

1. Norman Matloff,*The Art of R Programming: A Tour of Statistical Software Design*, No Starch Press, OREILLY & Associates Inc.
2.Kandethody M. Ramachandran and Chris P.Tsokos, *Mathematical Statistics with Applications in R, Academic Press*, Second Edition, 2015.

Books for Reference:

1. SeemaAcharya : Data analytics using R,McGraw Hill Education (India) Private Limited,2018.
2. Jared P. Lander, *R for Everyone*, Pearson.

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

Semester	Code		Title of the Course			Hours		Credits	
II	20MCA2CC9		R PROGRAMMING WITH STATISTICS			4		3	
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: **Checked by:**

Dr. M. Mohamed Surputheen **Dr. S.A. Jameel**

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	20MCA2CC10	CORE – X	OPERATING SYSTEMS	4	3	100	25	75

Course Outcomes:

On completion of the course, students will be able to

1. Understand the services provided by the OS and the design of an operating system
2. Understand the different approaches to memory management
3. Apply the process scheduling and synchronization mechanisms
4. Create the structure and organization of the file system
5. Demonstrate an understanding of different I/O techniques

UNITI **12 hours**

Operating Systems Objectives and Functions – Operating System and User / Computer Interface, Operating System as a Resource Manager: Evolution of Operating Systems – Serial Processing, Sample Batch Systems, Multi Programmed Batch Systems, Time Sharing Systems – Virtual Machines – OS Design consideration for Multiprocessor and Multicore.

UNITII **12hours**

Process – Process States - Process Description, Process Control – Processes and Threads, Concurrency – Principles of Concurrency, Mutual Exclusion – Deadlock Prevention, Deadlock Detection, Deadlock Avoidance. Memory Management – #Memory Management Requirements# – Memory Partitioning – Paging System – Segmentation.

UNITIII **12hours**

Virtual Memory – Paging – Address Translation in a Paging System, Segmentation – Organization, Address Translation in a Segmentation System – Combined Paging and Segmentation – #Virtual Memory# – Operating System Software – Fetch Policy, Placement Policy and Replacement Policy.

UNITIV **12hours**

Scheduling – Types of Scheduling, Scheduling Algorithms, Scheduling Criteria, FCFS, Round Robin, Shortest Process Next, Shortest Remaining Time, Feedback Scheduling.

UNITV **12hours**

I/O Management and disk scheduling – Organization of the I/O function – the Evaluation of the I/O Function, Logical Structure of the I/O Function, I/O Buffering, Disk I/O – Disk Scheduling Policies, Disk Cache. File Management – Files, File Management Systems, Secondary Storage Management – #File Allocation#.

 # ..... # Self-study portion

Text Book:

William Stallings, *Operating Systems – Internals and Design Principles*, Seventh Edition, Prentice Hall, 2012.

Books for Reference:

1. Ann McIver McHoes and Ida M. Flynn, *Understanding Operating Systems*, Sixth Edition, Course Technology, Cengage Learning, 2011
2. Ann McHoes, Ida M. Flynn,*Understanding Operating Systems*, Seventh Edition, Cengage Learning, 2013.
3. Deital H.M., *An Introduction to Operating Systems*, Addison Wesley Publishing , 1998
4. Silberchatz A., Peterson J.L., Galvan P., *Operating System Concepts*, Third Edition, Addison Wesley Publishing Co., 1992
5. Charles Crowley, *Operating Systems – A Design Oriented Approach*, IRWIN Publication, 1998.

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

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
II	**20MCA2CC10**		**OPERATING SYSTEMS**			**4**			**3**	
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: **Checked by:**

Dr. D.I. George Amalarethinam **Dr. A.R Mohamed Shanavas**

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	**20MCA2DE1A**	**DSE1**	**COMPUTER NETWORKS**	**4**	**4**	**100**	**25**	**75**

Course Outcomes:

On completion of the course, students will be able to

1. Enumerate the layers of the OSI model and TCP/IP
2. Recognize the different types of network devices and their functions within a network
3. Understand internetworking principles and how the Internet protocols IP, IPv6 operate
4. Understand internals of main protocols such as HTTP, FTP, SMTP, TCP, UDP and IP
5. Analyze to determine effective ways of securing, managing, and transferring data

UNIT I **12 hours**

Introduction – Uses of Computer Networks – Network Hardware: Personal Area Networks – Local Area Networks–Metropolitan Area Networks– Wide Area Networks – Internetworks. Network Software: Protocol Hierarchies – Design Issues for the Layers – Connection-Oriented Versus Connectionless Service – Service Primitives. Reference Models: The OSI Reference Model–- The TCP/IP Reference Model. The Physical Layer: Guided Transmission Media. The Public Switched Telephone Network: Structure of the Telephone System – #Switching#.

UNIT II **12 hours**

The Data Link Layer: Data Link Layer Design Issues: Services Provided to the Network Layer – Framing - Error Control – Flow Control. Error Detection and Correction – Elementary Data Link Protocols – Sliding Window Protocols– The Medium Access Control Sub-layer Multiple Access Protocols: Carrier Sense Multiple Access Protocols – Collision-Free Protocols – #BLUETOOTH#– Data Link Layer Switching: Uses of Bridges – Learning Bridges – Spanning Tree Bridges – Repeaters, Hubs, Bridges, Switches, Routers, and Gateways.

UNIT III **12 hours**

The Network Layer: Network Layer Design Issues – Routing Algorithms: The Optimality Principle– Shortest Path Algorithm– Distance Vector Routing– Link State Routing– Hierarchical Routing – Broadcast Routing – Congestion Control Algorithms – The Network Layer in the Internet– The IP Version 4 Protocol– #IP Addresses#– IPv6.

UNIT IV **12 hours**

The Transport Layer: The Transport Service: Services Provided to the Upper Layers – Transport Service Primitives – Berkeley Sockets – Elements of Transport Protocols – The Internet Transport Protocols: UDP – Introduction to UDP –#Remote Procedure Call# – TCP: Introduction to TCP – The TCP Service Model – The TCP Protocol – The TCP Segment Header.

UNIT V **12 hours**

The Application Layer: DNS: The Domain Name System– The DNS Name Space – Domain Resource Records – Electronic Mail: Architecture and Services – The User Agent – Network Security: Cryptography – Introduction – Substitution & Transposition Ciphers – DES – RSA– Symmetric-Key Signatures – Public- Key Signatures – Communication Security: Firewalls– VPN– Authentication Protocols– Authentication Based on a Shared Secret Key – Establishing a Shared Key: #The Diffie-Hellman Key Exchange#.

 # ..... # Self-study portion

Text Book:

Andrew S. Tanenbaum and David J. Wetherall, *Computer Networks*, PHI, Fifth Edition, 201.

UNITI Chapter1 (Sec.1.1, 1.2.1 – 1.2.5, 1.3.1 – 1.3.4, 1.4.1, 1.4.2)
Chapter2 (Sec.2.2.1 – 2.2.5, 2.6.1, 2.6.5)
UNITII Chapter3 (Sec.3.1.1 – 3.1.4, 3.2.1, 3.2.2, 3.3.1 – 3.3.3,3.4.1 – 3.4.3)
Chapter4 (Sec.4.2.2. 4.2.3, 4.6.1 – 4.6.6,4.8.1 – 4.8.4)
UNITIII Chapter 5 (Sec.5.1, 5.2.1, 5.2.2, 5.2.4 – 5.2.7, 5.3.1 – 5.3.5, 5.6.1 – 5.6.3)
UNITIV Chapter6 (Sec.6.1.1 – 6.1.3, 6.2, 6.4.1, 6.4.2,6.5.1 – 6.5.4)
UNITV Chapter7 (Sec.7.1.1, 7.1.2,7.2.1 – 7.2.2),
Chapter 8 (Sec.8.1.1 – 8.1.3, 8.2.1, 8.3.1, 8.4.1, 8.4.1, 8.6.1 – 8.6.3, 8.7.1, 8.7.2, 8.9.1 – 8.9.3)

Books for Reference:

1. William Stallings, *Data and Computer Communication*, PHI, Eighth Edition, 2013.
2. Behrouz A. Forouzan, *Data Communication and Networking*, Fourth Edition, Tata McGraw Hill, 2007.

Web Reference:

https://www.slideshare.net/pawan1809/computer-networks-a-tanenbaum-5th-edition

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

Semester	**Code**		**Title of the Course**			**Hours**		**Credits**	
II	**20MCA2DE1A**		**COMPUTER NETWORKS**			**4**		**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: **Checked by:**

Dr. G. Ravi **Mr. S. Syed Ibrahim**

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	20MCA2DE1B	DSE1	NETWORK SECURITY AND CRYPTOGRAPHY	4	4	100	25	75

Course Outcomes:

On completion of the course, students will be able to

1. Analyze and design classical encryption techniques and block ciphers
2. Evaluate the authentication and public-key cryptography
3. Demonstrate the IPSec, Firewall, Web Security and Email Security
4. Comprehend the usage of firewalls and Intrusion Detection Systems for securing data
5. Analyze and compare different security mechanisms and services

UNIT I **12 hours**

Introduction: Security Trends –The OSI Security Architecture –Security Attacks–Security Services – Security Mechanisms–A Model for Network Security–Symmetric Ciphers: Classical Encryption Techniques–Symmetric Cipher Model-Substitution Techniques–Transposition Techniques– Rotor Machines–#Steganography#.

UNIT II **12 hours**

Block Ciphers and the Data Encryption Standard: Block Cipher Principles–The Data Encryption Standard–The Strength of DES–Differential and Linear Cryptanalysis–Block Cipher Design Principles– Public-Key Encryption and Hash Functions: Introduction to Number Theory–Prime Numbers –#Fermat's and Euler's Theorems#– Public-Key Cryptography and RSA: Principles of Public-Key Cryptosystems –The RSA Algorithm.

UNIT III **12 hours**

Digital Signatures and Authentication Protocols: Digital Signatures–Authentication Protocols–Authentication Protocols. Network Security Applications: Authentication Applications–#Kerberos#–X.509 Authentication Service–Public-Key Infrastructure. Electronic Mail Security: Pretty Good Privacy –S/MIME.

UNIT IV **12 hours**

IP Security: IP Security Overview–IP Security Architecture –Authentication Header–Encapsulating Security Payload –Combining Security Associations–Key Management– Web Security: Web Security Considerations–Secure Socket Layer and Transport Layer Security–#Secure Electronic Transaction#

UNIT V **12 hours**

System Security: Intruders –Intruders –Intrusion Detection –Password Management – Malicious Software: Viruses and Related Threats–Virus Countermeasures –Distributed Denial of Service Attacks. Firewalls: Firewall Design Principles–#Trusted Systems#–Common Criteria for Information Technology Security Evaluation

 # ..... # Self-study portion

Text Book:

William Stallings, *Cryptography and Network Security-Principles and Practices*, Prentice-Hall, 4th edition, 2005

UNIT I Chapter1 (Sec.1.1 – 1.6), Chapter2 (Sec.2.1 – 2.5)
UNIT II Chapter 3(Sec.3.1 – 3.5), Chapter 8(Sec.8.1, 8.2), Chapter 9 (Sec.9.1, 9.2)
UNIT III Chapter 13(Sec.13.1 – 13.3), Chapter 14(Sec.14.1 – 14.3), Chapter 15(Sec.15.1, 15.2)
UNIT IV Chapter 16(Sec.16.1 – 16.6), Chapter 17(Sec.17.1 – 17.3)
UNIT V Chapter 18(Sec.18.1 – 18.3), Chapter 19(Sec.19.1 – 19.3), Chapter 20(Sec.20.1 to 20.3)

Books for Reference:

1. Joseph Migga Kizza, *Guide to Computer Network Security*, Springer 2015.
2. Johannes A. Buchaman, *Introduction to Cryptography*, Springer-Verlag 2000.
3. AtulKahate, *Cryptography and Network Security*, Tata McGraw Hill, 2007.

Web Reference:

http://uru.ac.in/uruonlinelibrary/Cyber_Security/Cryptography_and_Network_Security.pdf

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

Semester	Code		Title of the Course			Hours			Credits	
II	20MCA2DE1B		NETWORK SECURITY AND CRYPTOGRAPHY			4			4	
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓		✓	✓	✓		✓
CO3	✓	✓		✓	✓	✓	✓	✓	✓	
CO4	✓	✓	✓		✓	✓		✓		✓
CO5	✓	✓	✓	✓		✓	✓		✓	
Number of Matches (✓) = 40, Relationship: High										

Prepared by: **Checked by:**

Dr. G. Ravi **Mr. S. Syed Ibrahim**

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	20MCA2DE1C	DSE1	MOBILE COMMUNICATIONS	4	4	100	25	75

Course Outcomes:

On completion of the course, students will be able to

1. Understand fundamentals of wireless communications.
2.Analyze the measures to increase the capacity in GSM systems
3. Understand architecture and its specifications of modern wireless LANs
4. Expose to the advances in ad-hoc network design concepts
5.Formulate advance principles and techniques to design wireless communication systems

UNIT I **12 hours**

Introduction: Applications – History of wireless communication – Market for mobile communications –Open research topics – Simplified reference model Wireless transmission:Multiplexing – Cellular systems Medium Access Protocol: Comparison of S/T/F/CDMA

UNIT II **12 hours**

Telecommunication systems: GSM Satellite systems: History –#Applications# – Basics – Routing – Localization – Handover

UNIT III **12 hours**

Wireless LAN: Infra-red vs. radio transmission – Infrastructure and ad-hoc network – System architecture – Protocol architecture – Historical HIPERLAN – Bluetooth User Scenarios – #Architecture#

UNIT IV **12 hours**

Mobile network layer: Mobile IP – #Dynamic host configuration protocol# – Mobile ad-hoc Networks

UNIT V **12 hours**

Mobile transport layer: Traditional TCP – Classical TCP improvements – TCP over 2.5/3G wireless networks Support for mobility: Wireless application protocol Architecture – #Wireless datagram protocol# – Wireless application environment – Wireless markup language – WML Script

 # ..... # Self-study portion

Text Book:

Jochen Schiller, *Mobile Communications*, Pearson Education, Second Edition, 2011.

UNIT I Chapter 1(Sec.1.1 – 1.5), Chapter 2 (Sec.2.5,2.8), Chapter 3 (Section 3.6)
UNIT II Chapter 4 (Section 4.1) &Chapter 5 (Sec. 5.1 – 5.6)
UNIT III Chapter 7 (Sec.7.1, 7.2, 7.3.1, 7.3.2, 7.4.1, 7.5.1, 7.5.2)
UNIT IV Chapter 8 (Sec.8.1, 8.2& 8.3)
UNIT V Chapter 9 (Sec.9.1, 9.2& 9.3) & Chapter 10 (Sec. 10.3.1, 10.3.2, 10.3.6, 10.3.7, 10.3.8)

Book for Reference:

William C.Y. Lee, *Mobile Cellular Telecommunications*, Second Edition, McGraw Hill, 1995

Web Reference:

https://www.iith.ac.in/~tbr/teaching/docs/gsm.pdf

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

Semester	Code		Title of the Course			Hours			Credits	
II	20MCA2DE1C		MOBILE COMMUNICATIONS			4			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 (✓) = 39, Relationship: High										

Prepared by: **Checked by:**

Dr. G. Ravi **Mr. S. Syed Ibrahim**

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	20MCA2DE2A	DSE2	DATA SCIENCE	4	4	100	25	75

Course Outcomes:

On completion of the course, students will be able to

1. Describe the fundamentals concepts and process of data science
2. Apply suitable machine learning techniques for handling large volume of data
3. Understand distributing data storage and NoSQL concepts
4. Select text mining techniques and make use of graph databases
5. Design effective data visualizations and learn the basics of data ethics

UNIT I **12 hours**

Data Science in a big data world: Benefits and uses of data science and big data – Facets of data – The data science process – The big data ecosystem and data science– #An introductory working example of Hadoop# – The data science process: Overview of the data science process – Defining research goals and creating a project character – Retrieving data – Cleansing, integrating and transforming data – Exploratory data analysis – Build the models – Presenting findings and building applications on top of them.

UNIT II **12 hours**

Machine Learning: What is machine learning and why should you care about it – The modeling process – Types of machine learning – Semi-supervised learning – Handling large data on a single computer: The problems you face when handling large data – General techniques for handling large volumes of data – General programming tips for dealing with large datasets – Case Studies: Predicting malicious URLs – #Building a recommender system inside a database#.

UNIT III **12 hours**

First step in big data: Distributing data storage and processing with frameworks – #Case study: Assessing risk when loaning money# – Join the NoSQL movement: Introduction to NoSQL – Case study: What disease is that?

UNIT IV **12 hours**

The rise of graph databases: Introducing connected data and graph databases – Introducing Neo4j: a graph database – Connected data example: a recipe recommendation engine – Text mining and text analytics: Text mining in the real world – Text mining techniques – #Case study: Classifying Reddit posts#.

UNIT V **12 hours**

Data visualization to the end user: Data visualization options – Cross filter, the JavaScript MapReducelibrary – #Creating an interactive dashboard with dc.js# – Dashboard development tools– Data Ethics: Introduction – Building Bad Data Products – Trading Off Accuracy and Fairness – Collaboration – Interpretability – Recommendations – Biased Data – Data Protection – Go Forth and do Data Science: IPython – Mathematics – Not from Scratch – Find Data – Do Data Science.

 # ..... # Self-study portion

Text Books:

1. Davy Cielen, Arno D. B. Meysman, Mohamed Ali,*Introducing Data Science*, Manning Publications Co., First Edition, 2016.

UNIT I Chapter 1(Sec.1.1 – 1.5), Chapter 2 (Sec. 2.1 – 2.7)
UNIT II Chapter 3 (Sec. 3.1 – 3.4), Chapter 4(Sec. 4.1 – 4.4)
UNIT III Chapter 5 (Sec. 5.1, 5.2), Chapter 6(Sec. 6.1, 6.2)
UNIT IV Chapter 7 ((Sec. 7.1 – 7.4), Chapter 8(Sec. 8.1 – 8.3)
UNIT V Chapter 9 (Sec.9.1 – 9.4)

2. Joel Grus, O'Reilly, *Data Science from Scratch*, Shroff Publishers & Distributors Pvt. Ltd, New Delhi, Second Edition, May 2019.

UNIT V Chapters26, 27

Book for Reference:

Valliappa Lakshmanan, O'Reilly, *Data Science on the Google Cloud Platform*, Shroff Publishers & Distributors Pvt. Ltd, New Delhi, Second Indian Reprint, June 2018.

Web References:

https://www.javatpoint.com/data-science
https://www.kaggle.com/kanncaa1/data-sciencetutorial-for-beginners
https://intellipaat.com/blog/tutorial/data-science-tutorial/

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

Semester	Code		Title of the Course			Hours			Credits	
II	20MCA2DE2A		DATA SCIENCE			4			4	
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓			✓	✓			✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO3	✓	✓			✓	✓				✓
CO4	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of Matches (✓) = 40, Relationship: High										

Prepared by: **Checked by:**

Dr. S.A. Jameel **Dr. G. Ravi**

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	20MCA2DE2B	DSE2	BIG DATA ANALYTICS	4	4	100	25	75

Course Outcomes:

On completion of the course, students will be able to

1. Explore the fundamental concepts of big data analytics
2. Understand big data, text analytics and different approaches to big data analysis
3. Develop a well-governed and secure big data environment
4. Analyze the cloud environment for big data
5. Recognize and Implement the applications using MapReduce concepts

UNIT I **12 hours**

Fundamentals of Big Data : The Evolution of Data Management – Understanding the waves of managing data – Defining Big Data – Building a successful Big Data Management Architecture – Examining Big Data Types: Defining Structured Data – Defining Unstructured Data – Looking at Real Time and Non-real Time Requirements – Digging into Big Data Technology Components: Exploring the Big Data Stack – Redundant Physical Infrastructure – Security Infrastructure – Operational Databases – Organizing Data Services and Tools – Analytical Data Warehouses – Big Data Analytics – Big Data Applications.

UNIT II **12 hours**

Defining Big Data Analytics: Using Big Data to get Results – Modifying Business Intelligence Products to Handle Big Data – Studying Big Data Analytics Examples – Big Data Analytics Solutions – Understanding Text Analytics and Big Data: Exploring Unstructured Data – Analysis and Extraction Techniques – Putting Results Together with Structured Data – Putting Big Data to use – Text Analytics Tools for Big Data – Customized Approaches for Analysis of Big Data : Building New Models and Approaches to Support Big Data – Understanding Different Approaches to Big Data Analysis – Characteristics of a Big Data Analysis Framework.

UNIT III **12 hours**

Operationalizing Big Data: Making Big Data a Part of Your Operational Process – Integrating Big Data – Incorporating Big Data into the Diagnosis of Diseases – Understanding Big Data Workflows – Workload in context to the business problem - Ensuring the Validity, Veracity, and Volatility of Big Data – Security and Governance for Big Data Environments: Security in Context with Big Data – Understanding Data Protection Options – The Data Governance Challenge – Putting the Right Organizational Structure in Place – Developing a Well-Governed and Secure Big Data Environment.

UNIT IV **12 hours**

Appliances and Big Data Warehouses: Integrating Big Data with the Traditional Data Warehouse – Big Data Analysis and the Data Warehouse – Changing the Role of the Data Warehouse – Changing Deployment Models in the Big Data Era - Examining the Future of Data Warehouses - Examining the Cloud and Big Data: Defining the Cloud in the Context of Big Data – Understanding Cloud Deployment and Delivery Models – The Cloud as an Imperative for Big Data – Making Use of the Cloud for Big Data – Providers in the Big Data Cloud Market.

UNIT V **12 hours**

MapReduce Fundamentals: Tracing the Origins of MapReduce – Understanding the map function – Adding the reduce function – Putting map and reduce together – Optimizing MapReduce Tasks – Exploring the World of Hadoop: Explaining Hadoop – Understanding the Hadoop Distributed File System – HadoopMapReduce – The Hadoop Foundation and Ecosystem – Building a Big Data Foundation with the Hadoop Ecosystem – Managing Resources and Applications with Hadoop YARN – Storing Big Data with HBase – Mining Big Data with Hive – Interacting with the Hadoop Ecosystem.

Text Book:
Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, *Big Data*, Wiley Publications, 2013.

UNITI Chapter 1, Chapter 2, Chapter 4
UNITII Chapter 2, Chapter13, Chapter 14
UNITIII Chapter 17,Chapter 19
UNITIV Chapter 11, Chapter 6
UNITV Chapter 8,Chapter 9, Chapter 10

Book for Reference:
SoumendraMohanty,MadhuJagadeesh andHarshaSrivatsa,*Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics*, Apress Media, Springer Science+Business Media New York, 2013.

Web References:
www.it-ebooks.info

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

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
II	**20MCA2DE2B**		**BIG DATA ANALYTICS**			**4**			**4**	
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓			✓	✓	✓		✓	✓	
CO2	✓			✓	✓	✓		✓		
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓		✓	✓
Number of Matches (✓) = 40, Relationship: High										

Prepared by: **Checked by:**

Mr. M. Abdullah **Mr. A. Jainulabudeen**

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	20MCA2DE2C	DSE2	MICROPROCESSORS, INTERFACING AND APPLICATIONS	4	4	100	25	75

Course Outcomes:

On completion of the course, students will be able to

1. Understand the architecture and functionality of a microprocessor
2. Classify the instruction set of a microprocessor and distinguish the functions of different instructions
3. Demonstrate programming proficiency by developing simple assembly language programs
4. Identify the different ways of interfacing memory and I/O with microprocessors
5. Design microprocessor-based systems for real time applications

UNIT I **12 hours**

Overview of Microcomputer Systems – Hardware - Addresses – General Operation of a Computer - Intel 8086 CPU Architecture – Internal Operation –Machine Language Instructions – Addressing Modes – Instruction Formats – Instruction Execution Timing – Pin Configuration of 8086: Minimum Mode, Maximum Mode.

UNIT II **12 hours**

Assembler Language Programming – Assembler Instruction Format – Data Transfer Instructions – Arithmetic Instructions – Branch Instructions – Loop Instructions – Flag Manipulation Instructions – Logical Instructions – Shift and Rotate Instructions – Stack Instructions – Call and Return Instructions – Macros – String Instructions – REP Prefix – IN and OUT Instructions.

UNIT III **12 hours**

Assembly Language Programs – Addition, Subtraction, Multiplication and Division – Multibyte Addition and Subtraction – Complements – Assembly and Disassembly of a Word – Sum of a Series – Block Data Transfer – Finding the Smallest and the Biggest Number in an Array – Arranging a Series of Numbers in Descending and Ascending Order – Length of a String – Number of Occurrences of a Character in a String.

UNIT IV **12 hours**

I/O Interfaces – Functions – Address Space Partitioning: Memory Mapped I/O Scheme, I/O Mapped I/O Scheme – Memory and I/O Interfacing – Data Transfer Schemes – I/O Ports – Programmable Peripheral Interface – Programmable DMA Controller.

UNIT V **12 hours**

Microprocessor Applications – Delay Subroutines – Seven Segment Displays – Frequency Measurement – Temperature Measurement – Water Level Indicator and Controller – Traffic Lights Control.

Text Books:

1. Yu-cheng Liu and Glenn A. Gibson, Microcomputer Systems–The 8086/8088 Family – Architecture, Programming and Design, Prentice Hall of India, Second Edition, 2011.
2. B. Ram, Fundamentals of Microprocessors and Microcontrollers, DhanpatRai Publications, Seventh Edition, 2011.

Book for Reference:

Douglas V. Hall, Microprocessors and Interfacing – Programming and Hardware, Tata McGraw Hill, Revised Second Edition, 2006.

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

Semester	Code		Title of the Course			Hours		Credits	
II	20MCA2DE2C		MICROPROCESSORS, INTERFACING AND APPLICATIONS			4		4	
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓		✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO4	✓	✓		✓		✓	✓		✓	✓
CO5	✓	✓		✓	✓		✓		✓	✓
Number of Matches (✓) = 40, Relationship: High										

Prepared by: **Checked by:**

Dr. T. Abdul Razak **Dr. S.A. Jameel**

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	**20MCA2CC11P**	**CORE – XI**	**DATA STRUCTURES LAB - Practical**	**4**	**3**	**100**	**20**	**80**

Develop a C/C++ Program to implement:

1. Array Insertion and Array Deletion
2. Push and Pop operations on Stack using Arrays
3. Push and Pop operations on Stack using Linked Lists
4. Convert infix expression into postfix expression using Stack.
5. Evaluate postfix expression by using Stack
6. Insert and Delete operations on Queue using Arrays.
7. Insert and Delete operations on Queue using Linked Lists
8. Insert and Delete operations on a Linked List
9. Binary Tree using Linked List
10. Preorder, Inorder and Postorder Traversal of Binary Tree
11. Graph representation using Adjacency List
12. Dijkstra's Algorithm to find Shortest Path
13. Minimum-Cost Spanning Tree using
    a) Prim's Algorithm
    b) Kruskal's Algorithm
14. a) Selection Sort
    b) Insertion Sort
15. a) Bubble Sort
    b) Quick Sort
16. Merge Sort
17. a) Linear Search
    b) Binary Search

Prepared by: **Checked by:**

Dr. O.A. Mohamed Jafar **Dr. G. Ravi**

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	**20MCA2CC12P**	**CORE – XII**	**R PROGRAMMING LAB - Practical**	**4**	**3**	**100**	**20**	**80**

Develop R program to

1. a) Demonstrate some Built-in mathematical and statistical functions.
   b) Take input from the keyboard (name and age) and display the values
   c) Display the message "Welcome to R using i)print function ii) cat function

2.Demonstrate control statements

3. a) Create a vector using i) c command ii): operator and iii)seq() function.
   b) Sort a Vector in ascending and descending order.
   c) Find a second highest value in a given vector

4. a) Merge two given lists into one list.
   b) Convert a given matrix to a list.
   c) Count the number of objects in a given list.

5. a) Create two 3x3 matrices and perform addition, subtraction, multiplication, division operations
   b) Read a matrix and perform various operations like Transpose, inverse, row sum, column sum and trace
   c) Solve a linear system of equations

6. a) Get the statistical summary and nature of the data of a given data frame.
   b) Extract first two rows from a given data frame.
   c) Find the elements which are present in two given data frames

7, a) Create an ordered factor from data consisting of the names of months.
   b) Concatenate two given factor in a single factor.
   c) Change the first level of a factor with another level of a given factor.

8. a)Count the odd numbers in a vector of integers using function named 'oddcount()'.
   b) Create a function named 'sum' to perform the addition of three numbers by passing
      i) arguments ii) default arguments
   c) Find the factorial of an integer using recursion.

9. a) Test whether a given string is a palindromeor not using function
   b) Create, read and display i)csv file ii) excel file
   c) Create a) Pie-Chart b) Scatterplots c) Line Chart. d) Multiple Line Chart
      e) Histogram f) Boxplots g) Bar Charts (Use any pre-defined data set)

10. a) Perform the various operations on set.
   b)Generate random numbers from uniform distribution.
   c) Compute the various statistical measures like mean, median, mode variance, standard deviation and correlation. (use any data set)
   d) Calculate probabilities for Binomial, Poissonand Normal distributions.

Prepared by: **Checked by:**

Dr. M. Mohamed Surputheen **Dr. S.A. Jameel**

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20MCA2SE2	SEC 2	QUANTITATIVE APTITUDE	2	1	100	100	-

Course is fully Internal

UNIT I

Numbers, HCF, LCM, Decimal Fractions, Simplification, Square Roots, Cube Roots, Averages, Problems in numbers and ages.

UNIT II

Surds, Indices, Percentages, Profit and Loss, Ratio and Proportion, Partnership, ChainRule, Time and Work, Pipes and Distances.

UNIT III

Time and distance, Problems on Trains, Boats and Streams, Alligation, Simple Interest,Compound Interest, Logarithms, Area.

UNIT IV

Volume and Surface Area, Races and Games of Skill, Calendar, Clocks, Stocks and Shares Permutation and Combination, Probability.

UNIT V

True discount, Banker‘s Discount, Height and Distances, Odd man out and Series,Tabulation, Bar graphs, Pie charts, Line Graphs.

Text Book:

R.S. Aggarwal, *Quantitative Aptitude for Competitive Examinations*, S.Chand and Co. Ltd, 2020.

Book for Reference:

Barron‘s, *Guide for GMAT*, Galgotia Publications, 2018.

Prepared by: **Checked by:**

Mr. B. Mohamed Faize Basha **Dr. S.A. Jameel**

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	**20MCA2EC1**	**Extra Credit Course - 1**	**SUMMER INTERNSHIP**	**-**	**2**	**-**	**-**	**-**

1. At the end of Semester II, during the summer vacation, the eligible students can undergo an Internship in a reputed IT Company or in a IT division of a reputed company after getting permission from the Department.

2. The minimum number of days for the Summer Internship will be 30 days.

3. A consolidated project report and a certificate of attendance are to be submitted to the Department on the first day of Semester III.

MANDATORY BRIDGE COURSE FOR NON-COMPUTER SCIENCE STREAM STUDENTS

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
II	20MCA2ACC3	Addl. Core - III	WEB DESIGN	-	5	100	100	-

Course is fully Internal and in Selfs-study Mode

Course Outcomes:

On completion of the course, students will be able to

1. Understand the fundamental concepts of Internet and Internet Technologies
2. Acquire the knowledge of HTML
3. Apply the knowledge of JavaScripts
4. Recognize the different functions and their usage
5. Design and develop Web Pages for real-world problems

UNIT I

Introduction to the Internet – Computers in Business– Networking– Internet– E-Mail– Resource Sharing– Gopher– World Wide Web– Usenet–Telnet– Bulletin Board Service– Wide Area Information Service – Internet Technologies– Modem– Internet Addressing– Physical Connections– Telephone Lines– Internet Browsers – Internet Explorer– Netscape Navigator.

UNIT II

Introduction to HTML – History of HTML– HTML Documents– Anchor Tag– Hyper Links – Head and Body Sections – Header Section – Title– Prologue– Links– Colorful Web Page– Comment Lines.

UNIT III

Designing the Body Section – Heading Printing– Aligning the Headings– Horizontal Rule –Paragraph –Tab Settings– Ordered and Unordered Lists – Lists – Unordered Lists– Ordered Lists – Nested Lists – Table Handling – Tables – Table Creation in HTML – Width of the table and cells.

UNIT IV

JavaScript: JavaScript in Web Page–The advantage of JavaScript–Writing JavaScript into HTML– Basic programming Techniques – Data types andLiteral – Type Casting–JavaScript Arrays– Operators and Expressions.

UNIT V

Functions–User defined functions–Placing text in a browser–Dialog Boxes–Form object’s methods – Built-in objects–User defined Objects.

Text Books:

1. C. Xavier, *World Wide Web Design with HTML*, Tata McGraw Hill Company Limited, New Delhi, 2017.
2. Ivan Bayross, *HTML, DHTML, JavaScript, Perl, CGI*, BPB, Third Revised Edition, 2006.

Books for Reference:

1. Thomas A. Powell, *The Completer reference HTML*, Tata McHill, Second Edition, 2000.
2. John Pollock, *JavaScript a Beginners Guide*, Fifth Edition, Tata McGraw Hill, 2019.

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

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
II	**20MCA2ACC3**		**WEB DESIGN**			**-**			**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: **Checked by:**

Dr. S.A. Jameel **Mr. A. Jainulabudeen**

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	**20MCA2ACC4P**	**Addl. Core - IV**	**HTML AND JAVA SCRIPT LAB - Practical**	**-**	**5**	**100**	**100**	**-**

1. Develop a HTML document and perform the basic alignments on the headers and format the document using suitable tags.

2. Develop a HTML document to display the Chemical equations.

3. Develop a HTML document to display the advantages and disadvantages of Internet using ordered and unordered list tags facilities.

4. Develop a home page for your company with suitable name, logo, pictures, backgrounddesign and color text with links.

5. Design a web page of your meals menu for a week using table tag with its attributes.

6. Develop a simple application by using frame controls.

7. Develop a web page to display the Resume registration form with suitable controls.

8. Develop a JavaScript to compute the sum of an array of Integers.

9. Develop a JavaScript to perform multiplication & division of two numbers by getting from user

10. Develop a JavaScript that reads five integers and determines the largest and the smallestintegers in the group.

11. Develop a JavaScript for a recursive function to calculate the Fibonacci value of a given number.

12. Develop a JavaScript function to display current date and time using date object.

Prepared by: **Checked by:**

Dr. S.A. Jameel **Mr. A. Jainulabudeen**

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
III	**20MCA3CC 13**	**Core – XIII**	**PYTHON PROGRAMMING**	**4**	**4**	**100**	**25**	**75**

Students will be able to

CO 1: Understand the building blocks of python programming
CO 2: Apply the various control structures and functions to real time problems
CO 3: Perform the List, Tuple and Dictionary concepts
CO 4: Implement the MySQL queries and File handling operations with applications
CO 5: Design and develop Client Server network applications using the GUI components

UNIT I **12 Hours**

History of Python - Introduction to Programming – Data Expressions and Statements: Python interpreter and interactive mode – Value and Types – Variable – Python Data Types –Python Literals – Python constants – Keywords – Expressions – Statements – Operators in Python – Comments – Modules and Functions - Input statements – output Statements – String Formatting options – #Math Library#

UNIT II **12 Hours**

Control Flow, Functions: Boolean values and Operators –Decision Making – Iteration: State – Infinite Loop – While loop with Else – for Loop – for loop with Else Statement – Nesting of Loops – Pass statement – return – parameters – Function arguments in python – local variables and global variables - #Recursive function in python# - Strings – String functions and methods – String module – Lists as arrays

UNIT III **12 Hours**

Lists: List operations – List slices – List methods – List Loop – List Mutability – Deleting elements of a List – comparison of two lists – List as parameter - Tuples: Introduction – Basic Tuple Operations – Tuple built-in functions – Tuple assignments – Tuple as return values –#Dictionaries#

UNIT IV **12 Hours**

Files - Text Files – Reading from Files – Reading Lines from Files – Stripping characters from Files – Writing into Files. Filenames and Paths – Format operator – command line arguments – exceptions in python – python modules – #python packages#. MySQL Database Access: What is MySQL – Database Connection – Creating Database Table –Performing Transactions –Disconnecting database

UNIT V **12 Hours**

Network Programming: What is Socket – The Socket module – Server Socket Methods – Client Socket Methods – #General Socket Methods# – A Simple Server – A Simple Client. GUI Programming: Tkinter Programming - Tkinter Widgets – Button – Checkbutton – Frame –Label – List box – Radiobutton – Text – tkMessagebox

 # ..... # self-study portion

Text Books:

1. S. A. Kulkarni, "Problem solving and Python Programming", Yes Dee Publishing Pvt. Ltd., 2017
   UNIT I: Chapter 2, Chapter 3 **UNIT II:** Chapter 4
   UNIT III: Chapter 5 **UNIT IV:** 6
2. Python Programming Language, www. Tutorialspoint.com, Copyright 2017 by Tutorials Point (I) Pvt. Ltd.
   UNIT IV: Chapter 22 **UNIT V:** Chapter 23 & 27

Book for Reference:

Bill Lubanovi, Introducing Python, Shroff Publishers & Distributors PVT. LTD., First edition, 2015

Web Reference:

https://www.python.org/

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

Semester	Code		Title of the Course			Hours			Credits	
III	20MCA3CC13		PYTHON PROGRAMMING			4			3	
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: M. Kamal

Checked by: S. Syed Ibrahim

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	**20MCA3CC14**	**Core-XIV**	**.NET TECHNOLOGY**	**4**	**3**	**100**	**25**	**75**

Students will be able to

CO1: Understand the .NET framework.
CO2: Find insights of Decision making statements.
CO3: Identify the various components in .NET.
CO4: Understand the concept of Exception Handling in .NET.
CO5: Identify the concepts of ADO.NET.

UNIT I **12 hours**

Introduction to .NET Framework: Evolution and Overview of .NET Framework-Features in VS.NET: The IDE Main Window, Class View Window, Object Browser, Code Window, Intellisense, Compiling and Debugging the Code, Developing simple applications through Visual Studio IDE- Variables, Constants and Expressions: Value Types and Reference Types, Boxing and Unboxing - Operators - Example Programs.

UNIT II **12 hours**

Decision Making Statements: If Statements, Select Case Statement, Looping Statements, Types of Methods-Arrays: One dimensional and Multidimensional Arrays, Jagged Arrays, Example Programs. User Interfacing Controls: The Textbox, Label, Button, Radio Button, Check Box, Group Box, List box, Checked List Box, Combo Box, Timer and Menu controls.

UNIT III **12 hours**

Definition and Usage of Class-Constructors—Properties and Indexers-Virtual Methods-Abstract classes and Methods-Sealed Classes. Definition and Usage of Interfaces-#Interface Inheritance#-Namespaces-Components and Access Modifiers – Delegates-Events-Attributes and Reflection.

UNIT IV **12 hours**

Exception Handling: Default and User-defined Exception Handling Mechanisms, Backtracking and Custom Exception- I/O Streams: Introduction, Binary Data Files, Text Files, Data Files and File Info and Data Info Classes-#Networking Basics#-Socket, TcpClient, TcpListener and Network Stream Classes

UNIT V **12 hours**

ADO.NET- Advantages, Managed Data Providers, Creation of a Data Table, Retrieving Data from Table, Table Updating, Disconnected Data Access through Dataset Object. ASP.NET: Advantages,ASP.NET Object Model, Server-side Controls- Calendar Control, AdRotator Control, #Validation and List Web Controls#.

 # ..... # self-study portion

Text Book:

C. Muthu Visual Basic.NET, Vijay Nicole Imprints Private Limited, 2007.

UNIT I: Chapter 1,2,3 **UNIT II:** Chapter 4,5
UNIT III: Chapter 6,7,8 & 9 **UNIT IV:** Chapter 10,12
UNIT V: Chapter 15,16 & 17

Books for Reference:

1. Evangelos Petroutsos , Mastering Microsoft Visual Basic, Wiley India Edition, 2008.
2. Steven Holzer, Visual Basic.Net Programming Black Book, Dream Tech Press, 2007.

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

Semester	Code	Title of the Course	Hours	Credits
III	20MCA3CC14	.NET TECHNOLOGY	4	3

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: **Checked by:**

M. Abdullah Dr. D.I. George Amalarethinam

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	20MCA3CC15	CORE – XV	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	4	3	100	25	75

Students will be able to

CO1. Understand the problem-solving methods using state space search
CO2. Recognize the heuristic techniques and issues in knowledge representation
CO3. Apply the formal knowledge representation and reasoning for a problem
CO4. Implement and apply the clustering and reinforcement machine learning algorithms
CO5. Implement and apply the supervised and unsupervised machine leaning algorithms

UNIT I **12 hours**

Introduction – Definition of AI- AI Problems – Underlying Assumption – Al Technique – Level of the Model - Criteria for Success. Problems, Problem Spaces, Search: Defining the Problem as State Space Search - Production Systems - Problem Characteristics – Production System Characteristics - #Issues in the Design of Search Programs#.

UNIT II **12 hours**

Heuristic Search Techniques: Generate and Test - Hill Climbing- Best-First-Problem –Problem Reduction- Constraint Satisfaction- Means-end analysis. Game Playing: Minimax Search Procedure – Adding Alpha-beta Cut-offs – Additional Refinements. Knowledge Representation Issues: Representations and Mappings -Approaches to Knowledge Representations -Issues in Knowledge Representations - #Frame Problem##.

UNIT III **12 hours**

Predicate logic: Representing Simple Facts in Logic - Representing Instance and ISA Relationships - Computable Functions and Predicates - Resolution - Natural Deduction. Representing Knowledge Using Rules: Procedural Versus Declarative knowledge – Logic programming - #Forward Versus Backward reasoning #- Matching - Control knowledge.

UNIT IV **12 hours**

Learning: Types of Learning - Machine Learning - Intelligent Agents. Clustering: k-Means Clustering - Fuzzy clustering - Hierarchical clustering - Cluster similarity - Case Studies.Reinforcement learning: Markov Decision Problem - #Q-learning# - Temporal Difference Learning - Case Studies.

UNIT V **12 hours**

Artificial Neural Nets: ANN Basics - ANN Learning Process-Types of Networks –Perceptron-RBF Networks- Case Studies. Supervised Learning: Support Vector Machines – Inductive Logic Programming –#Case-based Reasoning# -Nearest Neighbourhood - Fuzzy Network- Case Studies**.** Unsupervised Learning: Expectation Maximization – Self-organizing Maps - Adaptive Resonance Theory – Case Studies.

 # ..... # Self-study portion

Text Books:

1. Elaine Rich, Kevin Knight, Shivashankar B Nair, *Artificial Intelligence*, Third Edition, Tata McGraw-Hill Education Private Limited, Seventh Reprint 2011.
   UNIT I : Chapter 1, Chapter 2 **UNIT II :** Chapter 3, Chapter 4, Chapter 12
   UNIT III : Chapter 5, Chapter 6
2. Vinod Chandra S.S and Anand Hareendran S.,*Artificial Intelligence and Machine Learning*, PHI Learning Private Limited, 2014.
   UNIT IV : Chapter7, Chapter 9, Chapter 10 **UNIT V:**Chapter 12, Chapter 13, Chapter 14

Books for References:

1. Stuart J. Russell and Norvig, *Artificial Intelligence – A Modern Approach*, Second Edition, Pearson Education, 2007
2. Nils J. Nilsson, *Principles of Artificial Intelligence*, Narosa Publishing House, 1992
3. Tom M. Mitchell,*Machine Learning*,McGraw Hill Education (India) Private Limited, 2018.
4. Ethem Alpaydin, *Introduction to Machine Learning*, Third Edition, PHI Learning Private Limited, 2018.
5. Peter Flash, *Machine Learning*, Cambridge University Press, 2019

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

Semester	**Code**		**Title of the Course**			**Hours**		**Credits**		
I	**20MCA3CC15**		**ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**			**4**		**3**		
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:
Dr. G. Ravi

Checked by:
Dr. S.A. Jameel

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	20MCA3DE3A	DSE3	PARALLEL PROCESSING	4	4	100	25	75

Students will be able to

CO1. Understand on structures, classifications and applications of parallel processing.

CO2. Acquire the knowledge of memory and input-output subsystems.

CO3. Learn the principles of Pipelining and Vector processing.

CO4. Acquire the knowledge about SIMD Array processors and Optimization methods.

CO5. Understand the concepts of Multiprocessor systems.

UNIT I **12 hours**

Introduction to Parallel Processing – Evolution of Computer Systems – Parallelism in Uniprocessor Systems - Parallel Computer Structures - #Architectural Classification Schemes# - Parallel Processing Applications.

UNIT II **12 hours**

Memory and Input-Output Subsystems – #Hierarchical Memory Structure# – Virtual Memory System – Memory Allocation and Management – Cache Memories and Management – Input-Output Subsystems.

UNIT III **12 hours**

Principles of Pipelining and Vector Processing – Pipelining: An Overlapped Parallelism – Instruction and Arithmetic Pipelines – Principles of Designing Pipelined Processors – Vector Processing Requirements.

UNIT IV **12 hours**

Vectorization and Optimization methods – Parallel Languages for Vector Processing –Design of Vectorizing Compiler – Optimization of Vector Functions – SIMD Array Processors – SIMD Interconnection Networks – #Associative Array Processing#.

UNIT V **12 hours**

Multiprocessors Architecture and Programming – Functional Structures – Interconnection Networks- Parallel Memory Organizations – Multiprocessor Operating Systems – Language Features to Exploit Parallelism – Multiprocessor Scheduling Strategies.

#.....# self-study portion

Text Book:

Kai Hwang and Faye A. Briggs,Computer Architecture and Parallel Processing,McGraw Hill India, Edition, 2014.

[Chapters : 1, 2, 3, 4.5.1 – 4.5.3, 5.1, 5.2, 5.4, 6.3, 7.1, 7.2.1, 7.2.2, 7.2.3, 7.3.1, 7.3.3, 7.4, 7.5.1, 8.3]

UNIT I Chapter 1 Section 1.1– 1.5
UNIT II Chapter 2 Sections 2.1 – 2.5
UNIT III Chapter 3 Sections 3.1 – 3.4
UNIT IV Chapter 4 Sections 4.5 , Chapter 5 Sections 5.1 ,5.2 , 5.4
UNIT V Chapter 7 7.1 – 7.4, 7.5-7. 5.1, Chapter 8 Sections 8.3

Books for Reference:

1. Introduction To Parallel Processing, By M. Sasikumar, Dinesh Shikhare, Ravi P.Prakash, Eastern Economy Edition,2014
2. Computer Architecture and Parallel Processing, Kai Hwang andBaye
3. Parallel Computing, Theory and Practice, Michel J.Quinn, McGraw-Hill International Edn., Singapore 1994
4. Richard Kain, *Advanced Computer Architecture,* PHI,1999.
5. V. Rajaraman and C. Siva Ram Murthy, *Parallel Computers, Architecture and Programming,* PHI, 2000.

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

Semester	Code		Title of the Course			Hours			Credits	
III	20MCA3DE3A		PARALLEL PROCESSING			4			4	
Course Outcomes COs	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓		✓		✓		
CO2	✓	✓				✓	✓	✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches (✓) = 40, Relationship: High										

Prepared by:
Dr. D I George Amalarethinam

Checked by:
Dr. G. Ravi

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	20MCA3DE3B	DSE3	GRID COMPUTING	4	4	100	25	75

Students will be able to

CO1: To extend the Introduction on Grid Computing.
CO2: To explore the Grid Technology.
CO3: To identify the components of Grid Computing systems and Architecture.
CO4: To Visualize the Grid Computing standards.
CO5: To get into the supporting towards the standards in Grid Computing.

UNIT I **12 hours**

Introduction: Grid Computing & Key Issues – #Applications# – Other Approaches – Grid Computing Standards – Pragmatic Course of Investigation.

UNIT II **12 hours**

Grid Benefits & Status of Technology: Motivations – History of Computing, Communications and Grid Computing – Grid Computing Prime Time – #Suppliers and Vendors#– Economic Value – Challenges.

UNIT III **12 hours**

Components of Grid Computing Systems and Architectures: Basic Constituent Elements - A Functional View – A Physical View – Service View.

UNIT IV **12 hours**

Grid Computing Standards-OGSI: Standardization – Architectural Constructs – Practical View – GSA/OGSI Service Elements and Layered Model – #More Detailed View#.

UNIT V **12 hours**

Standards Supporting Grid Computing-OGSA: Functionality Requirements – OGSA Service Taxonomy – Service Relationships – OGSA Services – #Security Considerations#.

 # ..... # self-study portion

Text Book:

Daniel Minoli, A Networking Approach to Grid Computing, Wiley Publication, 2004.

UNIT I: Chapter I, Section 1.1 – 1.2, 1.4 – 1.6
UNIT II: Chapter II, Section 2.1 –2.6
UNIT III: Chapter III, Section 3.1 – 3.4
UNIT IV: Chapter IV, Section 4.1 – 4.6
UNIT V: Chapter V, Section 5.1 – 5.6

Book for Reference:

Ahmar Abbas, Grid Computing – A Practical Guide to Technology and Applications, Charles River Media Publication, 2004.

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

Semester	Code		Title of the Course			Hours			Credits	
III	20MCA3DE3B		GRID COMPUTING			4			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:
M. Abdullah

Checked by:
Dr. D.I. George Amalarethinam

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	20MCA3DE3C	DSE3	CLOUD COMPUTING	4	4	100	25	75

Students will be able to

CO1: To understand the Roots of the Cloud computing.
CO2: To analyse the evolution of Cloud Paradigms.
CO3: To Discuss the anatomy of Cloud Infrastructure.
CO4: To explore the workflow management systems and Clouds.
CO5: To identify the various issues in Cloud and some Case studies.

UNIT I **12 hours**

Introduction to Cloud Computing: Roots of Cloud Computing - Layers and Types of Cloud - Features of a cloud -Infrastructure Management-Infrastructure as a Service Providers-Platform as a Service Providers Challenges and Risks. Broad Approaches to Migrating into the Cloud - Seven Step Model of Migration into a Cloud.

UNIT II **12 hours**

The Evolution of SaaS-The Challenges of SaaS Paradigm- Approaching the SaaS Integration Enigma-New Integration Scenarios- The Integration Methodologies- SaaS Integration Products, Platforms and ServicesB2Bi Services -. Background of Enterprise cloud computing paradigm- Issues for Enterprise Applications on the Cloud- Transition Challenges- Enterprise Cloud Technology and Market Evolution -Business drivers toward a marketplace for Enterprise cloud computing- The Cloud Supply Chain.

UNIT III **12 hours**

The Anatomy of Cloud Infrastructure- Distributed Management of Virtual Infrastructures- Scheduling Techniques for Advance Reservation of Capacity- RVWS Design - Cluster as a Service: The Logical Design - Cloud Storage : from LANs TO WANs- Technologies for Data Security in Cloud Computing.

UNIT IV **12 hours**

Workflow Management Systems and Clouds - Architecture of Workflow Management Systems – Utilizing Clouds for Workflow Execution- A Classification of Scientific Applications and Services in the Cloud SAGA based Scientific Applications that Utilize Clouds. Map Reduce Programming Model-Major Map Reduce Implementations for the Cloud- Map Reduce Impacts and Research Directions. A Model for Federated Cloud Computing - Traditional Approaches to SLO Management- Types of SLA -Life Cycle of SLA - SLA Management in Cloud- Automated Policy based Management.

UNIT V **12 hours**

Grid and Cloud- HPC in the Cloud: Performance related Issues -Data Security in the Cloud- The Current State of Data Security in the Cloud- Homo Sapiens and Digital Information- Risk- Identity- The Cloud, Digital Identity and Data Security - Content Level Security : Pros and Cons- Legal Issues in Cloud Computing - Data Privacy and Security Issues- Cloud on tracting models- Case Studies : Aneka and Comet Cloud.

#.....# self study portion

Text Book:

Cloud Computing - Principles and Paradigms, by Rajkumar Buyya, James Broberg, and Andrzej Goscinski.2011.

UNIT I: Chapter 1 & 2
UNIT II: Chapter 3 & 4
UNIT III: Chapter 6,7 & 8
UNIT IV: Chapter 12,13,14,15 & 16
UNIT V: Chapter 17, 23 & 24

Book for Reference:

Cloud Application Architectures, George Reese, ISBN: 184047142, Shroff/O'Reilly,2009.

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

Semester	Code	Title of the Course	Hours	Credits
III	20MCA3DE3C	CLOUD COMPUTING	4	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:
M. Abdullah

Checked by:
Dr. D.I. George Amalarethinam

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	20MCA3DE4A	DSE4	SOFTWARE TESTING	4	4	100	25	75

Students will be able to

CO1: Identify the Models in Software Life Cycle.
CO2: Clarify the Testing Methods.
CO3: Understand the concepts of System, Acceptance, Performance testing and its Practices.
CO4: Clarify the Testing of Object Oriented Systems.
CO5: Infer the Perspectives of software quality errors in software Processes.

UNIT I **12 Hours**

Software Development Lifecycle Models: Phases of Software Project – Life Cycle Models –Testing Concepts, Issues, and Techniques: Purposes, Activities, Processes, and Context –Questions about Testing – Functional vs. Structural Testing-Coverage Based vs. Usage Based Testing – Test Activities, Management, and Automation: Test Planning and Preparation – Test Execution, Result Checking, and Measurement – Analysis and Follow up-Activities, People, and Management – Test Automation

UNIT II **12 Hours**

White Box Testing: Meaning – Static Testing – Structural Testing – Challenges – Black Box Testing: Meaning – When & How to do Black Box Testing – Integration Testing: Meaning –Integration Testing as type of Testing – As a Phase of Testing – Scenario Testing – Defect Bash

UNIT III **12 Hours**

System and Acceptance Testing: Overview – Functional vs. Non-Functional Testing – Functional System Testing – Non-Functional Testing – Acceptance Testing – Summary of Testing Phases – Performance Testing: Introduction – Factors Governing Performance Testing – Methodology – Tools – Process – Regression Testing: Meaning – Types – When & How to do Regression – Testing – Best Practices

UNIT IV **12 Hours**

Testing of Object Oriented Systems: Introduction – Primer on Object – Oriented Software – Differences in OO Testing – Usability and Acceptance Testing: Meaning – Approach – Quality Factors for Usability – Aesthetics Testing – Accessibility Testing – Tools for Usability –Test Roles for Usability

UNIT V **12 Hours**

Software Quality: Perspectives and Expectations-Quality Frame Works and ISO 9126 – Correctness and Defects – Historical Perspective of Quality – Quality Assurance: Classification – Defect Prevention – Defect Reduction – Defect Containment – Quality Assurance in Context: Handling Discovered Defect During QA Activities – QA Activities in Software Processes –Quality Engineering: Activities and Process – Quality Planning: Goal Setting and Strategy Formation-Quality Assessment and Improvement-Quality Engineering in Software Processes.

#.....# self study portion

Text Books:

1. Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing Principles and Practices, Pearson Education, 2007.

UNIT I: Chapter 2 **UNIT II:** Chapter 3,4 & 5
UNIT III: Chapter 6,7 & 8 **UNIT IV:** Chapter 11 & 12

2. Jeff Tian, Software Quality Engineering: Testing, Quality Assurance, And Quantifiable Improvement, Wiley India Edition, 2005.

UNIT I: Chapter 6 & 7 **UNIT V:** Chapter 2,3,4 & 5

Reference Book:

Advanced Software Testing, Rex Black, Jamie L Mitchell, published by Rocky Nook, 2011

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

Semester	Code	Title of the Course	Hours	Credits
III	20MCA3DE4A	SOFTWARE TESTING	4	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:
M. Abdullah

Checked by:
Dr. D.I. George Amalarethinam

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	20MCA3DE4B	DSE 4	INTERNET OF THINGS	4	4	100	25	75

Students will be able to

CO 1. Recognize the underlying concepts of Internet of Things.

CO 2. Identify the various IoT enabling technologies and comprehend the idea of M2M.

CO 3. Apply the concept of IoT in real world scenarios.

CO 4. Describe the IoT design methodology and IoT devices

CO 5. Implement IoT applications using Python packages.

UNIT I **12 Hours**

Introduction: Definition and Characteristics of IoT-Things in IoT-IoT Protocols-IoT Functional Blocks-IoT Communication Models-IoT Communication APIs.

UNIT II **12 Hours**

IoT Enabling Technologies: Wireless Sensor Networks-Cloud Computing- #Big Data Analytics# - Communication Protocols-Embedded System. **IoT & M2M:** Machine to Machine-Difference between IoT and M2M-SDN and NFV for IoT.

UNIT III **12 Hours**

Domain Specific IoTs: Home Automation-Cities-Environment-Retail-Logistics- #Agriculture# - Industry-Health & Lifestyle.

UNIT IV **12 Hours**

Developing IoTs: IoT Design Methodology. **IoT Physical Devices & Endpoints:** What is an IoT Device-Exemplary Device:Raspberry Pi-Linux on Raspberry Pi-Other IoT Devices.

UNIT V **12 Hours**

Python Packages of Interest for IoT: JSON-XML-HTTPLib & URLLib-SMTPLib. **Case Studies:** Home Automation- #Productivity Applications#.

 # ..... # Self-study portion

Text Book:

1. Arshdeep Bahga and Vijay Madisetti, "*Internet of Things: A Hands-On Approach"*, Universities Press (India) Private Limited, 1st Edition, 2015.

UNIT I: Chapter 1(1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.3.2, 1.3.3)

UNIT II: Chapter 1(1.4) & Chapter 3(3.1,3.2,3.3,3.4)

UNIT III: Chapter 2(2.2, 2.3, 2.4, 2.6, 2.7, 2.8, 2.9 2.10)

UNIT IV: Chapter 5(5.1, 5.2) & Chapter 7(7.1, 7.2, 7.4, 7.7)

UNIT V: Chapter 6.11 & Chapter 9(9.2, 9.6)

Book for Reference:

1. Cuno Pfister, "Getting started with the internet of things", O'Rielly Publication.

Web References:

1. http://www.internet-of-things-book.com
2. https://www.tutorialspoint.com/internet_of_things/index.htm
3. https://data-flair.training/blogs/iot-tutorial

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

Semester	Code	Title of the Course	Hours	Credits
III	20MCA3DE4B	INTERNET OF THINGS	4	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 (✓) = 35, Relationship: High										

Prepared by:
Dr. K. Nafees Ahmed

Checked by:
Dr. G. Ravi

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	20MCA3DE4C	DSE4	COMPILER DESIGN	4	4	25	75	100

Students will be able to

CO 1. Understand the major phases of compilation and to understand the knowledge of Finite Automata.
CO 2. Develop the parsers and experiment the knowledge of different parsers design without automated tools.
CO 3. Construct the Syntax Directed Translation, intermediate code representations and generation.
CO 4. Implement Symbol table, Error detection and Error correction.
CO 5. Apply for various optimization techniques, convert source code into machine code.

UNIT I **12 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 **12 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#

UNIT III **12 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 **12 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 **12 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

Textbook:

1. Principles of Compiler Design Alfred V.Aho and Jeffrey D.Ullman, Narosa Publishing House, TwentyFifth Reprint 2002.

Books for References:

1. Santara Chattopadhyay, Compiler design, PHI, New Delhi, 1st Edition, 2009.
2. Kenneth C. Louden San Jose State University, Compiler Construction: Principles and Practice, 1st Edition.
3. Bal, H., Grune, D., Jacobs C., and Langendoen, K.: Modern Compiler Design. Wiley, First Edition 2000

Web Reference:

https://www.tutorialspoint.com/compiler_design/index.htm
https://www.geeksforgeeks.org/compiler-design-tutorials/

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

Semester	Code		Title of the Course			Hours			Credits	
II	20MCA2DE4C		COMPILER DESIGN			4			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:
Dr. S. A. Jameel

Checked by:
Dr. D. I. George Amalarethinam

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	**20MCA3CC 16P**	**CORE – XVI**	**PYTHON PROGRAMMING LAB**	**4**	**3**	**100**	**20**	**80**

Develop the following programs using Python and MySQL

1. Demonstrate the usage of built-in mathematical functions.
2. Find the prime numbers from 1 to 100 using condition statements.
3. Count the number of digits using condition statements for 8 digits.
4. Reverse the number and sum of the digits.
5. Demonstrate various functions of Strings.
6. Check the bigger of the two input Strings.
7. Count the number of vowels in the given Sentence.
8. Sort words entered by user in alphabetical order.
9. Compute the sum of ODD and Even numbers for a given range in a List.
10. Sum and average of the given numbers using Lists.
11. Using Tuple to input Student details, the program should accept a given student's Roll number and display his specific records.
12. Using Dictionary to accept a sentence and generate the frequency of words for the same.
13. Compute the number of lines, words and characters in a given a File.
14. Copy file contents from one file to another.
15. Send a message from one system to another using Sockets.
16. Perform various database operations (create, insert, delete, update) using MySQL
17. Prepare the layout using Tkinter for Employee and store their personal details using MySQL database.
18. Prepare the layout for the Stock inventory using Tkinter and store the suitable field using MySQL.

Prepared by: **Checked by:**

M. Kamal S. Syed Ibrahim

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
III	**20MCA3CC17P**	**CORE-XVII**	**.NET LAB**	**4**	**3**	**100**	**20**	**80**

Develop the following programs using VB.NET

1. Placing Textboxes dealing with its properties.
2. Making use of placeholders, literals and controls.
3. Making use of list box, check box and radio button controls.
4. Setting up and using Adrotator control.
5. Making use required field validator and compare validator controls.
6. Using range validator, regular expression validator and validation summary.
7. Database connectivity through connected approach.
8. Develop a project to insert few records using MS-Access
9. Develop a project to update and delete few records using Disconnected Access.
10. Data view with the help of grid view control.
11. Formatting data with a help of data list control.
12. Develop a project to view the records using GridView, DetailsView, FormView Controls.

Prepared by: **Checked by:**

M. Abdullah Dr. G. Ravi

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
III	**20MCA3SE3**	**SEC 3**	**INNOVATION AND STARTUP SKILLS**	**2**	**1**	**100**	**100**	**-**

Students will able to

CO1: Understand the basic principles of entrepreneurship
CO2: Analyze and evaluate Business model and strategy
CO3: Acquire knowledge about innovation and creative problem solving
CO4: Well verse in idea generation and Intellectual Property Rights.
CO5: Enrich knowledge regarding Internal Policy and Organizational Culture.

UNIT – I **6 Hours**

Evolution of the Concept of Entrepreneur – Characteristics, Functions and types of an Entrepreneur – Corporate entrepreneurship –Indigenous entrepreneurship – women entrepreneurship– entrepreneurship in backward regions; – International entrepreneurship – #Entrepreneur biographies#.

UNIT – II **6 Hours**

Strategies, resources and capabilities–identifying attributes of strategic resources – #Opportunity Analysis –SWOT analysis# – Business model- Pricing strategy.

UNIT – III **6 Hours**

Concept of innovation - difference between innovation and invention – Objectives of innovation - process of innovation- #creative problem solving# - organizational features that facilitate innovation

UNIT - IV **6 Hours**

Idea generation - discovery process for opportunities - idea generation process - methods for discovering opportunities - *Innovation and intellectual property rights* - Prototypes – Types of Prototypes.

UNIT – V **6 Hours**

Innovation in organizations- Types of innovation-decisions- Incentives for Innovating- organizing external innovators - Internal Policy- Policy Development – Attributes- Adoption.

#...#Self-Study portion

…Swayam Course Content**: Innovation and Start-up Policy By Prof. Rahul K. Mishra IILM Institute for Higher Education Statistics for Business Economics - Gujarat University, Ahmedabad, India.**

Text Books:

1. Carayannis, Elias G., Elpida T. Samara, and Yannis L. Bakouros. *Innovation and entrepreneurship: theory, policy and practice*. Springer, 2015. **For UNIT I :** Chapter 6, 7
2. Furr, Nathan, and Jeff Dyer. *The Innovator's Method: Bringing the Lean Start-Up Into Your Organization*. Harvard Business Review Press, 2014. **For UNIT II :** Chapter 3, 6,7, 8
3. Rogers, Everett M. *Diffusion of innovations*. Simon and Schuster, 2010.
   For UNIT III, IV & V : Chapter 1,5,7

Books for References:

1.Hargadon, A. "How Breakthroughs Happen (Harvard Business School Press, Boston)." (2003).
2.Charantimath, Poornima M. *Entrepreneurship development and small business enterprise*. Pearson Education India, 2005.
3.Scarborough, Norman M. *Essentials of entrepreneurship and small business management*. publishing as Prent ice Hall, One Lake Street, Upper Saddle River, New Jersey 07458., 2011.

Prepared by: **Checked by:**

Dr. A. Jainullabdeen Dr. G. Ravi

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
IV	20MCA4CC18	Core XVIII	DISTRIBUTED TECHNOLOGY	4	3	100	25	75

Students will be able to

CO1. Understand the fundamental concepts of two tier and three-tier technologies in Java
CO2. Develop the simple applications using RMI, JavaMail API and JMS
CO3. Design the web based applications using Servlets and JSP
CO4. Create components based on real time problems using different types of Beans
CO5. Apply appropriate problem solving techniques in software development

UNIT I **12 Hours**

Distributed Component Architecture: Introduction- Methods of Distribution: Sockets, RPC,DCE, RMI, CORBA,DCOM-Multi-tier Architecture -Component Concepts-Characteristics- RMI: Basic concepts-Server side and Client side processes.

UNIT II **12 Hours**

Introduction to Node.js- Features of Node.js – Environment Setup – REPL – NPM-Callback Concepts-Event Driven Programming-#Streams-File System# – Utility Modules.

UNIT III **12 Hours**

Presentation Techniques: Java Servlets – Reading Data from Client and HTTP Request Header-Sending Data to a Client and writing the HTTP Response Header- Working with Cookies- Tracking Sessions. Java Server Pages- JSP Tags – Tomcat- #Session objects#.

UNIT IV **12 Hours**

Interconnection Techniques: Java Mail API: Send Email Message-Retrieving Email Messages- Deleting Email Messages-#Replaying and Forwarding an Email Message#. Java Messaging Services- JMS fundamentals- Components-Sending and Receiving Message on Queue-Compiling and running the Publisher and Subscriber.

UNIT V **12 hours**

Component Programming: Enterprise Java Beans - Deployment Descriptors-Session Java Bean - Life cycle of Session Beans - Entity Java Bean – Life cycle of Entity Bean – Message Driven Bean- Life cycle of Message Driven Bean –#The JAR file#.

 # ..... # self-study portion

Text books:

1. G. SudhaSadasivam, Distributed Component Architecture, Wiley India Pvt. Ltd, 2008.
   UNIT I : Chapter 1 – 1.1, 1.3, 1.5 & 1.6
2. Jim Keogh, J2EE-The Complete Reference, Tata McGraw Hill Education Pvt. Ltd, 2010
   UNIT I : Chapter 6 **UNIT III** : Chapter 10,11
   UNIT IV: Chapter 13,15 and 16 **UNIT V**: Chapter 12

Web Reference:

UNIT II: http://www.tutorialspoint.com/nodejs/nodejs_quick_guide.htm

Book for Reference:

Richard Monson Haefel, Enterprise Java Beans, O 'Reilly Fourth Edition, 2004

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

Semester	Code	Title of the Course	Hours	Credits
IV	20MCA4CC18	DISTRIBUTED TECHNOLOGY	4	3

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: Dr. S. Abdul Saleem

Checked by: 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	20MCA4DE5A	DSE5	ORGANIZATIONAL DYNAMICS	4	4	100	25	75

Students will be able to

CO1: Understand the basic principles of organizational behavior
CO2: Analyze and evaluate social systems and appraisal methods
CO3: Acquire knowledge about leadership skills and interpersonal behavior
CO4: Well verse in developing informal, formal groups and team building
CO5: Enrich knowledge regarding change at work place, overcoming stress

UNIT I **12 Hours**

Fundamentals of Organization Behavior: – Understanding Organization Behavior – Fundamental Concepts – Contingency Approach – Limitation of Organization Behavior – AnOrganization Behavior System – Model of Organization Behavior. Managing Communications:communications Fundamentals – #Upward and Downward Communication# – Other Forms of Communication – Informal Communication

UNIT II **12 Hours**

Social Systems and Organizational Culture: Understanding a Social System – Social Culture – Role – Status – Organizational Culture – Motivation: Model – Motivational Drives – Human Needs – Behavior Modification - #Goal Setting. Appraising: Organizational Behavior and Performance Appraisal# - Economic Incentive Systems.

UNIT III **12 Hours**

Leadership – The Nature of Leadership – Behavior Approaches to Leadership Style – Contingency approaches to Leadership Style – Individual and Interpersonal Behavior: Nature of Employee Attitudes – Effects of Employee Attitudes – Studying Job Satisfaction. Interpersonal Behavior: Conflict in Organizations – #Power and Politics#.

UNIT IV **12 hours**

Organizations and Individuals: Rights to Privacy – Discipline – QWL –IndividualResponsibilities. Informal and Formal Groups: Group Dynamics – #Nature of Informal Group# –Formal Group. Team and Team Building: Organizational Context for Teams – Teamwork – Team Building

UNIT V **12 hours**

Change and its Effects: Change at Work- Resistance to Change – Implementing ChangeSuccessfully – Understanding Organization Development. Stress and counseling: Employee Stress – #Employee Counseling – Types of counseling#.

#..... # self-study portion.

Text Book:

John W Newstrom, ―Organizational Behavior: Human Behavior at Work‖, 12th Edition, Tata McGraw Hill Education Private Limited, 2015.

UNIT I: Chapter 1, 2, 3 **UNIT II**: Chapter 4, 5, 6
UNIT III: Chapter 7, 9, 11 **UNIT IV**: Chapter 10, 12, 13
UNIT V:Chapter 14, 15

Book for Reference:

Organizational Behavior, Fred Luthans,12th Edition, Tata McGraw Hill Education Private Limited, 2011.
Stephen P. Robbins, Organizational Behavior, 13th Edition, PHI Pvt. Ltd, New Delhi, 2010.

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

Semester	Code	Title of the Course	Hours	Credits
IV	20MCA4DE5A	ORGANIZATIONAL DYNAMICS	4	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: **Checked by:**

Dr. A.R. Mohamed Shanavas Dr. G. Ravi

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	20MCA4DE5B	DSE5	ACCOUNTING AND FINANCIAL MANAGEMENT	4	4	100	25	75

Students will be able to

CO1: To learn book keeping and accountancy for financial management
CO2: To understand accounting principles, journal, Ledger, Trial Balance, and final accounts.
CO3: Understanding and analysis of financial statements and ratios
CO4: Establish the areas of application of managerial costing technique. Exhibit the relationship between cost and volume and profit analysis.
CO5: Apply different methodologies to prepare the budgets enhance the knowledge of students in establishing budgetary control system and integrate the learned skills for preparation of budgets.

UNIT I **12 hours**

Accounting Principles and Concepts – Double Entry Book Keeping **–** Income and Expenditure – Accounting Record and System – #Assets and Liabilities#

UNIT II **12 hours**

Journal – Ledger – #Trial Balance# – Trading, Manufacturing and Profit and Loss Account – Balance Sheet with simple Adjustments

UNIT III **12 hours**

Analysis and Interpretation of Financial Statements with Ratios: – Ratio Analysis- Meaning – Importance – Classifications of ratio- Analysis and Computation of Ratios

UNIT IV **12 hours**

Marginal Costing – Definition - Advantages and Limitations – Marginal Cost statement - Cost Volume – Profit Analysis – Break Even Analysis – Standard Costing – Variance Analysis (Material and Labour variances only)

UNIT V **12 hours**

Budgeting and Budgetary Control – Types of Budgets – Preparation of Various Functional Budgets – Preparations of Cash Budgets – Flexible Budgets – #Advantages of Budgeting and Budgetary Control#

 # ----- # self-study portion

Text Books:

1. K.L. Nagarajan, N. Vinayakam, P.L. Mani, *Principles of Accountancy,* EURASIA Publishing House (PVT) Ltd., Revised Edition, 2002.
   UNIT I : Chapter-1 **UNIT II** : Chapter-2, 4, 6
2. S.N. Maheswari, *Principles of Management Accounting*, Sultan Chand & Sons, 2001.
   UNIT III: Section-B Chapter - 1, 2 **UNIT IV** : Section-C Chapter - 4
   UNIT V : Section-C Chapter - 1

Books for Reference:

M.C. Shukla, T.S. Grewal, *Advanced Accounts*, S.Chand & Company Pvt., Ltd, Eleventh Edition, Reprinted, 1988.
M.Y. Khan and P.K. Jain, Financial Management: Text, Problems *and Cases*, Tata McGraw Hill, Fourth Edition, 2007.
S.K.Guptha and R.K.Sharma "Practical Problems in Management Accounting" Recent Edition

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

Semester	Code			Title Of The Paper				Hours	Credits
III	20MCA4DE5B			ACCOUNTING AND FINANCIAL MANAGEMENT				4	4
Course outcomes (COs)	Programme Outcomes (POs)					Programmes 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: **Checked by:**

Dr. U. Jahir Hussain Dr. M. Radhakrishnan

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	20MCA4DE5C	DSE5	HUMAN RESOURCE MANAGEMENT	4	4	100	25	75

Students will be able to

CO1: Understanding Human resource management concept to organization relevance

CO2: Analyze the new strategic issues and strategies required to select and develop manpower resources.

CO3: Develop, analyze and apply advanced training strategies and specifications for the delivery of training programs

CO4: Appraise a job-based compensation scheme with organizational goals, mission, values and linked to the labor market.

CO5: Explain change in global scenario and summarize the causes and context of emerging changes.

UNIT - I **12 Hours**

HRM: Meaning – Nature - Significance – Objectives- Scope and Functions – #Evolution of Human Resource Management# – Role of Human Resource Manager – Human Resource Policies.

UNIT - II **12 Hours**

Human Resource Planning: Importance – Need for HRP – HRP Process – Determinants of HRP-*****Job analysis, Job Description and Job specification: Definition- Need - advantages - Importance of Recruitment – Internal and External sources – Selection – Meaning -#Selection process# – Retention of Employees*****

UNIT - III **12 Hours**

*****Training: Definition - Purpose- Types***** – #Steps in Training Program# – Evaluation of Training Program– Career Planning - Career Development Stages – Performance Appraisal – #Meaning- Need- Importance- Objectives# - Methods - Problems – Requisites of Good appraisal Plan- Performance metrics.

UNIT - IV **12 Hours**

Employee Remuneration: Components – #Factors Influencing Employee compensation#– Types of Benefits: Fringe Benefits, Monetary and Non-Monetary Benefits.

UNIT - V **12 Hours**

International HR Management– #Model of IHRM# - HR Accounting - HR Auditing- Green HRM– Meaning – Need, Benefits - E–Learning – Meaning, Aims-Developing e-learning processes.

#..... # Self-study portion

****Swayam Course Content** - "Principles of Human Resource Management" (IIT KGP)

Text Books:

1. Aswathappa.K, Human Resource Management- Text and Cases 8th Edition Tata McGraw-Hill Education Private Ltd. New Delhi, 2017

UNIT I: Chapter I – Chapter II **UNIT II:** Chapter IV – Chapter VII

UNIT IV: Chapter XI - Chapter XIII

2. Gary Dessler and BijuVarkkey, Human Resource Management 15th Edition Pearson Education New Delhi. 2017

UNIT III: Chapter VIII- Chapter X **UNIT V:** Chapter III, XVII

Books for Reference:

L. M. Prasad, Human Resource Management, Sultan and Sons, 2018
UdayKuamrHaldar- JuthikaSarkar- Human Resource Management- Oxford University Press, 2013
Biswajeet Pattnayak- Human Resource Management 5th edition Prentice Hall of India, New Delhi 2018
Harold Koontz and Heinz Weihrich. Essentials of Management 10th Edition, Tata McGraw-Hill Education Private Ltd. New Delhi 2015.
A Handbook of Human Resource Management Practice 14th edition, Michael Armstrong, Kogan Page India, New Delhi, 2017

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

Semester	Code		Title of the Course			Hours			Credits	
IV	20MCA4DE5C		HUMAN RESOURCE MANAGEMENT			4			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. P.L. Senthil

Checked by: Dr. G. Ravi

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	**20MCA4CC 19P**	**CORE XIX**	**DISTRIBUTED TECHNOLOGY LAB**	**4**	**3**	**100**	**20**	**80**

Develop the applications using Eclipse IDE:

1. Creation, insertion, deletion and modification of records in a database using Prepared Statement Interface in Java
2. Simple RMI application for downloading and uploading files on the server by using multiple clients
3. Simple application to display the current date and time on the browser window using Node.js
4. Server side application by extending HttpServlet class
5. Session Tracking application in Servlet
   a) using HttpSession class b) using Cookies
6. Simple application for database manipulation using Servlet program.
7. JSP code for checking number of times a particular page is visited using Cookies
8. Application for sending E-Mail using JavaMail API
9. Application for sending and receiving messages using JMS
10. Application to display factorial of a given number using Stateless Session Bean
11. Application to display the result of a student using Stateful Session Bean
12. Simple Banking application using Entity Bean

Prepared by: **Checked by:**

Dr. S. Abdul Saleem M. Kamal

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
IV	**20MCA4PW**	**PROJECT WORK**	**INDUSTRIAL EXPERIENCE AND PROJECT WORK**	**18**	**9**	**100**	**25**	**75**

Students carry out a project in software development companies

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
III	20MCA3ACC5	ADDL. CORE V	COMPUTER GRAPHICS	--	5	100	100	--

Students will be able to

CO1: Understand the basic concepts of computer graphics.
CO2: Identify the various output primitives and its attributes.
CO3: Analyze and acquire knowledge about 2D geometric transformation.
CO4: Understand the various graphical user interface and interactive input methods.
CO5: Acquire knowledge about 3D geometric and various modelling transformations.

UNIT I

Overview of Computer Graphics System: Video Display Devices –Raster Scan Systems–Random – Scan Systems -Graphics Monitors and Workstations – Input Devices –Hardcopy Devices –Graphics Software.

UNIT II

Output Primitives: Line Drawing Algorithms –Loading the Frame Buffer –Line Function –Circle – Generating Algorithms. Attributes of Output Primitives: Line Attributes –Curve Attributes – Color and Grayscale levels –Area fill Attributes –Character Attributes – Bundled Attributes –Inquiry Functions.

UNIT III

2D Geometric Transformations: Basic Transformation –Matrix Representations –Composite Transformations –Window to View port Co-Ordinate Transformations. Clipping: Point Clipping –Line Clipping –Cohen-Sutherland Line Clipping –Liang Barsky Line Clipping –Polygon Clipping – Sutherland –Hodgman Polygon Clipping –Curve Clipping –Text Clipping.

UNIT IV

Graphical User Interfaces and Interactive Input Methods: The User Dialogue –Input of Graphical Data –Input Functions –Interactive Picture Construction Techniques. Three Dimensional Concepts: 3D-Display Methods – Three Dimensional Graphics Packages

UNIT V

3D Geometric and Modeling Transformations: Translation –Scaling –Rotation –Other Transformations. Visible Surface Detection Methods: Classification of Visible Surface Detection Algorithm –Backface Detection – Depth-Buffer Method – A-Buffer Method –Scan-Line Method – Applications of Computer Graphics.

Text Book:

Donald Hearn M. Pauline Baker, Computer Graphics, Second Edition, Prentice Hall of India, New Delhi, 2005
UNIT I: Chapter 2 Sections 2.1 -2.7
UNIT II: Chapter 3 Sections 3.2 –3.5 , Chapter 4 Sections 4.1 –4.7
UNIT III: Chapter 5 Sections 5.1–5.3 , Chapter 6Sections 6.3,6.6-6.10
UNIT IV: Chapter 8 Sections 8.1 –8.3 , 8.5 , Chapter 9 Sections 9.1 –9.2
UNIT V: Chapter 11Sections 11.1-11.4, Chapter Sections 13.1-13.5Chapter 1 Sections 1.1-1.8

Book for Reference:

William M. Newman, Robert F. Sproull, Principles of Interactive Computer Graphics, Second Edition, Tata McGraw Hill, 26th Reprint, 2011.

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

Semester	Code	Title of the Course	Hours	Credits
IV	20MCA3ACC5	COMPUTER GRAPHICS	--	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 (✓) = 35 , Relationship: High										

Prepared by: **Checked by:**

M. Abdulah Dr. A.R. Mohamed Shanavas

Semester	Code	Course	Title of the Course	Hours	Credits	Max. Marks	Internal Marks	External Marks
III	**20MCA3ACC 6P**	**ADDL. CORE VI**	**ANIMATION LAB**	**--**	**5**	**100**	**100**	**--**

Develop the following programs using **PENCIL and GIMP (Open Source Animation Tools)**

1. Use different tools and types of tweens to create a simple animation. (bouncing ball, bud blooming (morphing) into a flower)

2. Draw two Scenes for any Animation of your choice

3. Create an Animated Birthday Card

4. Create an animated advertisement

5. Create a simple story with a moral

6. Create an interactive Photo Album

7. Redesign any existing scenery giving it different effects. (water fall, smoky night, rainbow colour, or fire effect)

8. Design a Brochure for a College.

9. Design an Invitation for an event.

10. Create a collage.

Prepared by: **Checked by:**

M. Abdulah Dr. A.R. Mohamed Shanavas