

Rajagiri College of Social Sciences, Kalamassery

Department of Computer Science



COURSE PLAN MCA

(2021 - 2023 Batch)

Semester: I

Duration of Course: August 2021 to December 2021

ACADEMIC CALENDAR – SEMESTER 1

Date	Day	MCA Batch 2021
11-08-2021	Wednesday	Bridge Program Starts
12-08-2021	Thursday	
13-08-2021	Friday	
14-08-2021	Saturday	
15-08-2021	Sunday	
16-08-2021	Monday	
17-08-2021	Tuesday	
18-08-2021	Wednesday	
19-08-2021	Thursday	Onam Holidays
20-08-2021	Friday	
21-08-2021	Saturday	
22-08-2021	Sunday	
23-08-2021	Monday	
24-08-2021	Tuesday	
25-08-2021	Wednesday	
26-08-2021	Thursday	
27-08-2021	Friday	
28-08-2021	Saturday	
29-08-2021	Sunday	
30-08-2021	Monday	
31-08-2021	Tuesday	Finale of Bridge
01-09-2021	Wednesday	Sem 1 Starts
02-09-2021	Thursday	2
03-09-2021	Friday	3
04-09-2021	Saturday	4
05-09-2021	Sunday	
06-09-2021	Monday	5
07-09-2021	Tuesday	6
08-09-2021	Wednesday	7
09-09-2021	Thursday	8
10-09-2021	Friday	9
11-09-2021	Saturday	
12-09-2021	Sunday	
13-09-2021	Monday	10
14-09-2021	Tuesday	11
15-09-2021	Wednesday	12
16-09-2021	Thursday	13
17-09-2021	Friday	14
18-09-2021	Saturday	15
19-09-2021	Sunday	
20-09-2021	Monday	16
21-09-2021	Tuesday	
22-09-2021	Wednesday	17
23-09-2021	Thursday	18
24-09-2021	Friday	19
25-09-2021	Saturday	20

26-09-2021	Sunday	
27-09-2021	Monday	21
28-09-2021	Tuesday	22
29-09-2021	Wednesday	23
30-09-2021	Thursday	24
01-10-2021	Friday	25
02-10-2021	Saturday	
03-10-2021	Sunday	
04-10-2021	Monday	27
05-10-2021	Tuesday	28
06-10-2021	Wednesday	29
07-10-2021	Thursday	30
08-10-2021	Friday	31
09-10-2021	Saturday	
10-10-2021	Sunday	
11-10-2021	Monday	cae#1
12-10-2021	Tuesday	cae#1
13-10-2021	Wednesday	cae#1
14-10-2021	Thursday	
15-10-2021	Friday	
16-10-2021	Saturday	
17-10-2021	Sunday	
18-10-2021	Monday	38
19-10-2021	Tuesday	39
20-10-2021	Wednesday	40
21-10-2021	Thursday	41
22-10-2021	Friday	42
23-10-2021	Saturday	43
24-10-2021	Sunday	
25-10-2021	Monday	44
26-10-2021	Tuesday	45
27-10-2021	Wednesday	46
28-10-2021	Thursday	47
29-10-2021	Friday	48
30-10-2021	Saturday	49
31-10-2021	Sunday	
01-11-2021	Monday	50
02-11-2021	Tuesday	51
03-11-2021	Wednesday	52
04-11-2021	Thursday	53
05-11-2021	Friday	54
06-11-2021	Saturday	55
07-11-2021	Sunday	
08-11-2021	Monday	
09-11-2021	Tuesday	57
10-11-2021	Wednesday	58
11-11-2021	Thursday	59
12-11-2021	Friday	60

13-11-2021	Saturday	
14-11-2021	Sunday	
15-11-2021	Monday	61
16-11-2021	Tuesday	62
17-11-2021	Wednesday	63
18-11-2021	Thursday	64
19-11-2021	Friday	65
20-11-2021	Saturday	66
21-11-2021	Sunday	
22-11-2021	Monday	cae#2
23-11-2021	Tuesday	cae#2
24-11-2021	Wednesday	cae#2
25-11-2021	Thursday	cae#2
26-11-2021	Friday	cae#2
27-11-2021	Saturday	CAEP
28-11-2021	Sunday	
29-11-2021	Monday	CAEP
30-11-2021	Tuesday	74
01-12-2021	Wednesday	75
02-12-2021	Thursday	76
03-12-2021	Friday	Last Day
04-12-2021	Saturday	
05-12-2021	Sunday	
06-12-2021	Monday	
07-12-2021	Tuesday	
08-12-2021	Wednesday	ESE1
09-12-2021	Thursday	
10-12-2021	Friday	ESE2
11-12-2021	Saturday	
12-12-2021	Sunday	
13-12-2021	Monday	ESE3
14-12-2021	Tuesday	
15-12-2021	Wednesday	ESE4
16-12-2021	Thursday	
17-12-2021	Friday	ESE5
18-12-2021	Saturday	
19-12-2021	Sunday	
20-12-2021	Monday	ESE6
21-12-2021	Tuesday	ESE6
22-12-2021	Wednesday	ESE7
23-12-2021	Thursday	ESE7

Course Code: MCA101

Name of the course: Probability, Statistics and Computational Mathematics

Course Facilitator: Prof.Sabeen Govind

sabeengovind@rajagiri.edu

9496442093

1. Course Details:MCA101

Course Code	MCA101	Course Title	<i>Probability, Statistics and Computational Mathematics</i>
Course Type	Core	Contact Hours	4 Hours per Week
Credit	3	Domain	Core

Syllabus

I	Probability Theory: Sample space, Events, Different approaches to probability, Addition and multiplication theorems on probability, Independent events, Conditional probability, Bayes Theorem.
II	Random variables and Distribution: Random variables, Probability density functions and distribution functions, Marginal density functions, Joint density functions, mathematical expectations, moments and moment generating functions. Discrete probability distributions - Binomial, Poisson distribution, Continuous probability distributions- uniform distribution and normal distribution.
III	Basic Statistics :Measures of central tendency: - mean, median, mode; Measures of dispersion: Range, Mean deviation, Quartile deviation and Standard deviation; Moments, Skewness and Kurtosis, Linear correlation, Karl Pearson's coefficient of Correlation, Rank correlation and linear regression

IV	Mathematical Logic: Propositional and Predicate Logic, Propositional Equivalences, Normal Forms, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference
V	Counting, Mathematical Induction: Basics of Counting, Pigeonhole Principle, Permutations and Combinations, Inclusion- Exclusion Principle, Mathematical Induction.

TEXT/REFERENCE BOOKS:

R	Fundamentals of statistics: S. C. Gupta, 6th Revised and enlarged edition April 2004, Himalaya Publications
R	Fundamentals of Mathematical Statistics- S.C.Gupta ,V.K.Kapoor. Sultan Chand Publications.
R	Introduction to Mathematical Statistics -Robert V. Hogg & Allen T. Craig. Pearson education
R	Discrete Mathematical Structures with Applications to Computer Science by J. P. Tremblay and R. P. Manohar, Tata McGraw-Hill, 2001.
R	C. L. Liu, Elements of Discrete Mathematics, 2nd Edition, Tata McGraw-Hill, 2000

COURSE PRE-REQUISITES

Bridge course in Mathematics and statistics

COURSE OBJECTIVES

To understand the concept of probability, statistics and computational mathematics and its uses in computer science problems.

COURSE OUTCOMES

MCA101.1	To gain fundamental understanding of Probability, conditional probability and Bayes theorem.
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MCA101.2	Understand and describe various probability distributions
MCA101.3	To apply the concept of statistics in real life problems
MCA101.4	To gain fundamental understanding of mathematical logic.
MCA101.5	To have the concept of counting and mathematical induction

CO-PO AND CO-PSO MAPPING

	PO 1	P O 2	P O 3	PO 4	P O 5	P O 6	P O 7	P O 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	P S O 3	PS O4
MCA101.1	2	2		1									2			
MCA101.2	2	2	3										2			
MCA101.3	2	3	3	3									2			
MCA101.4	2	3	1	3												
MCA101.5	2	2		2												

Justification of CO- PO/ PSO Mapping

- MCA 101.1 By understanding probability, conditional probability, Bayes theorem etc., they will be able to achieve computational knowledge and development of solutions.
- MCA101.2 By comprehending the various probability distributions they will be able to achieve computational knowledge and thereby they can develop solutions.
- MCA101.3 By understanding statistical concept they will be able to achieve knowledge in data science and thereby they can solve real life problems.
- MCA101.4 Realizing the concept of mathematical logic, they will be able to

achieve computational knowledge.

- MCA101.5 By learning counting and mathematical induction, they will be able to achieve computational knowledge.

CO ASSESSMENT RUBRICS

Evaluation Criteria	C O
Written Assignment	MCA 101.1
CAE1	MCA 101.1, MCA 101.2
CAE2	MCA 101.3, MCA 101.4
Viva	MCA 101.5

Session Plan

Session No	Topic Planned	Date/Remark
1	Probability Theory: Sample space, Events etc.	
2	Addition and multiplication theorems on probability	
3	Cont..	
4	Conditional probability	
5	Bayes Theorem	
6	Cont.	
7	Random variables, Probability density functions and distribution functions	
8	Marginal density functions, Joint density functions	

9	Mathematical expectations	
10	Discrete probability distributions - Binomial	
11	Cont..	
12	Poisson distribution,	
13	Continuous probability distributions- uniform distribution and normal distribution.	
14	Cont..	
15	Measures of central tendency	
16	Cont..	
17	Measures of dispersion	
18	Cont..	
19	Skewness and Kurtosis	
20	Linear correlation	
21	Rank correlation	
22	Regression	
23	Propositional and Predicate Logic	
24	Normal Forms	
25	Predicates and Quantifiers	
26	Nested Quantifiers,	

27	Rules of Inference	
28	Basics of Counting, Pigeonhole Principle.	
29	Permutations and Combinations.	
30	Inclusion- Exclusion Principle, Mathematical Induction.	

Course Code: MCA 102

Name of the course: Data Structure Using C

Course Facilitator: Mr. Shiju Thomas M.Y

shijuthomas@rajagiri.edu

9847186884

Course Details: MCA102

Course Code	MCA102	Course Title	<i>Data Structure Using C</i>
Course Type	Core	Contact Hours	4 Hours per Week
Credit	3	Domain	Core

Syllabus

Course Code	MCA102	Course Title	Data Structures using C
Course Type	Core	Contact Hours	4 Hours per Week
Credit	3	Domain	Computing
Syllabus			
I	Introduction: Data Structures, Data Types, Structure. Arrays: Polynomial Representations, Polynomial addition, Polynomial Multiplication and sparse matrices Stack: Definition and concepts, Operations on stacks. Application of stacks- Infix to postfix conversion, Evaluation of Arithmetic Expression.		
II	Queue: Representation of queue, circular queue and double ended queue. Priority queue: implementation by array using Heap Sort Dynamic Memory Allocation Functions: malloc, calloc, realloc and free Linked List: Operations - insertion, searching, removing, updating, sorting and reversing. Polynomial: Representations, Addition, Multiplication using Linked List.		
III	Linear Data Structures: Linked stacks, Linked queues, Circular Linked List and Double Ended Queue, Doubly Linked List and Circular doubly linked list. Non-Linear Data Structures: Trees, Graphs. Graph: Representation of Graph on Computer: Adjacency matrix and adjacency list, merits and demerits of graph representation Searching: Linear Search, Binary Search		
IV	Trees: Basic terminology, binary trees, binary search tree Binary search tree: Insertion, Deletion, searching and Traversal - inorder, pre-order and post-order. Threaded Binary Tree: Operations		

	Balanced Trees: AVL Tree: properties, insertion, deletion and rotations
V	Advanced Data Structures: Red black tree: properties. B-Trees: Data Structure on secondary storage, Definition of B trees, Basic operations on B Trees – searching, creating an empty node, splitting a node in B Tree, Inserting a key in to B Tree and Deleting a Key from a B Tree Definition and Structure: B+ Trees Data Structure for Disjoint Sets: Disjoint set operation, linked list representation of disjoint sets, Disjoint-set forests

REFERENCE BOOKS:

Introduction to Algorithms - Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest

Fundamentals of data structures – Ellis Horowitz and SartajSahni (Galgotia , 1994)

Fundamentals of computer algorithms- Ellis Horowitz, SartajSahni, SanguthevarRajeshkharan (Universities Press , 2007)

Data Structure using C & C++ b, Tannenbaum and Augustine,prentice hall.

Data Structures – a pseudocode approach with C –Richard F Gilberg, Behrouz A Forouzan, Thomson Learning, 2 Edn., Cengage Learning C2005

Data Structures and program design – R. L Kruse (Prentice Hall of India),C2001

COURSE PRE-REQUISITES:

Bridge Course in C

COURSE OBJECTIVES:

1. To introduce the concept of linear and nonlinear data structures.
2. To implement the concepts using arrays and linked list
3. To apply it to advanced data structures.

COURSE OUTCOMES:

CO. No	Course Outcome description
MCA102.1	To differentiate the linear and nonlinear data structures
MCA102.2	Implement the various kinds of sorting and searching techniques.
MCA102.3	To implement the concept of nonlinear data structures using arrays and linked list.
MCA102.4	Familiarize the concept of advanced data structures like red black trees, avl trees etc.
MCA102.5	Implement the concept of balancing a tree and the rotations to do it.

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
MCA102.1	3						1				2	2		2	
MCA102.2			3				1				2	2		2	
MCA102.3	3		2				1				2	2		2	
MCA102.4			3				1				2	2		2	
MCA102.5			2				1				2	2		2	

6	Queue: Representation of queue,	
7	circular queue and double ended queue.	
8	Priority queue: implementation by array using Heap Sort	
9	Dynamic Memory Allocation Functions: malloc, calloc, realloc and free	
10	Linked List: Operations – insertion, searching, removing, updating, sorting and reversing.	
11	updating, sorting and reversing.	
12	Polynomial: Representations, Addition, Multiplication using Linked List.	
13	CAE1	
14	Linear Data Structures: Linked stacks, Linked queues,	
15	Circular Linked List and Double Ended Queue,	
16	Doubly Linked List and Circular doubly linked list.	
17	Non-Linear Data Structures: Trees, Graphs. Graph: Representation of Graph on Computer: Adjacency matrix and adjacency list, merits and demerits of graph representation	
18	Searching: Linear Search, Binary Search	
19	Trees: Basic terminology, binary trees, binary search tree	

20	Binary search tree: Insertion, Deletion, searching and Traversal - inorder, pre-order and post-order.	
21	Threaded Binary Tree: Operations	
22	Balanced Trees: AVL Tree: properties, insertion, deletion and rotations	
23	CAE2	
24	Advanced Data Structures: Red black tree: properties.	
25	B-Trees: Data Structure on secondary storage, Definition of B trees, Basic operations on B Trees – searching	
26	creating an empty node, splitting a node in B Tree, Inserting a key in to B Tree and Deleting a Key from a B Tree	
27	Definition and Structure: B+ Trees	
28	Data Structure for Disjoint Sets: Disjoint set operation,	
29	linked list representation of disjoint sets, Disjoint-set forests	
30	Revision	

Course Code: MCA103

Name of the course: Database Management Systems with SQL/PL-SQL

Course Facilitator: Dr. Ann Baby

ann@rajagiri.edu

9895012317

Course Details: MCA103

Course Code	MCA103	Course Title	<i>Database Management Systems with SQL/PL-SQL</i>
Course Type	Core	Contact Hours	4 Hours per Week
Credit	3	Domain	Core

Syllabus

Course Code	MCA103	Course Title	Database Management System
Course Type	Core	Contact Hours	4 Hours per Week
Credit	3	Domain	Computing

Syllabus

I	Module 1: Introductory concepts of DBMS Introduction and applications of DBMS, Purpose of data base, Data, Independence, Database System architecture- levels, Mappings, Database users and DBA Relational Model : Structure of relational databases, Domains, Relations, Entity Relationship model Basic concepts, Design process, constraints, Keys, Design issues, E-R diagrams, weak entity sets, extended E-R features – generalization, specialization, aggregation, reduction to E-R database schema.
II	Module 2: Relational Database design Functional Dependency – definition, trivial and non-trivial FD, closure of FD set, closure of attributes, irreducible set of FD, Normalization – 1NF, 2NF, 3NF, Decomposition using FD dependency preservation, BCNF, Multivalued dependency, 4NF, Join dependency and 5NF
III	Module 3: SQL Concepts Basics of SQL, DDL ,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions – numeric, date, string functions, set operations, subqueries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. transaction

	control commands – Commit, Rollback, Save point
IV	Module 4: PL/SQL Introduction to PL/SQL, PL/SQL Identifiers, Control Structures, Composite Data Types, Explicit Cursors, Stored Procedures and Functions, Triggers, Compound, DDL, and Event Database Triggers
V	Module 5: Transaction Management Transaction concepts, properties of transactions, serializability of transactions, testing for serializability, System recovery, Two- Phase Commit protocol, Recovery and Atomicity, Log based recovery, concurrent executions of transactions and related problems, Locking mechanism, solution to concurrency related problems, deadlock, , two-phase locking protocol, Isolation, Intent locking
REFERENCE BOOKS:	
Database Management Systems – Raghu Ramakrishnan and Johannes Gehrke, Third Edition, McGraw Hill, 2003	
Database Systems: Design , Implementaion and Management, Peter Rob, Thomson Learning, 7Edn.	
Concept of Database Management, Pratt, Thomson Learning, 5Edn.	
Database System Concepts – Silberchatz, Korth and Sudarsan, Fifth Edition, McGraw Hill, 2006	
COURSE PRE-REQUISITES:	
Basic Computer Knowledge	
COURSE OBJECTIVES:	
<ol style="list-style-type: none"> 1. To introduce the basic concepts including the structure and operation of the relational data model. 2. Understand and successfully apply logical database design principles, including E-R diagrams and database normalization. 3. Construct simple and moderately advanced database queries using Structured Query Language (SQL). 4. Understand the concept of a database transaction and related database facilities, including concurrency control, backup ,recovery, locking protocols, Security and Integrity. 	
COURSE OUTCOMES: (CO)	
CO. No	Course Outcome description
MCA103.1	Have good understanding of the relational data model.
MCA103.2	Understand and successfully apply logical database design principles, E-R diagrams.
MCA103.3	Understand normalizing database
MCA103.4	Gain ability to write database queries using SQL.
MCA103.5	Understand the concept of database transactions, concurrency control, backup, recovery, locking protocols, Security and Integrity.
CO-PO AND CO-PSO MAPPING	

	PO 1	PO2	PO3	PO 4	PO5	PO6	PO7	PO 8	PO9	PSO1
MCA103.1		3	2				1			
MCA103.2		3	2				1			
MCA103.3		3	2				1			
MCA103.4		3			2		1			
MCA103.5		3	2				1			

Justification of CO- PO/ PSO Mapping

- MCA103.1 By understanding different types of data models, students will be able to apply them to the real life situations.
- MCA103.2 By applying logical database design principles, E-R diagrams and database normalization can be used for database design.
- MCA103.3 By understanding dynamic data structures.
- MCA103.4 By implementing the Structured Query Language (SQL), effective solutions for database querying and retrieving can be achieved.
- MCA103.5 Realizing the concept of a database transaction and related database facilities, including concurrency control, backup, recovery, locking protocols, Security and Integrity can be implemented.

CO ASSESSMENT RUBRICS

Evaluation Criteria	CO
Written Assignment	MCA103.1,MCA103.2
CAE1	MCA103.1, MCA103.2
CAE2	MCA103.3, MCA103.4
Viva Voce	MCA103.3, MCA103.4,MCA103.5

Session Plan

Session No	Topic Planned	Date/Remark
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1	Introductory concepts of DBMS Introduction and applications of DBMS, Purpose of data base, Data Independence	
2	Database System architecture- levels, Mappings, Database users and DBA Relational Model	
3	Structure of relational databases, Domains, Relations, Entity Relationship model Basic concepts,	
4	Design process, constraints, Keys, Design issues, E-R diagrams, weak entity sets	
5	extended E-R features – generalization, specialization, aggregation	
6	reduction to E-R database schema	
7	SQL Concepts Basics of SQL, DDL ,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator	
8	Functions - aggregate functions, Built-in functions – numeric, date, string functions, set operations	
9	subqueries, correlated sub-queries,	
10	Use of group by, having, order by, join and its types	
11	Exist, Any, All , view and its types. transaction control commands – Commit, Rollback, Save point	
12	CAE1	
13	PL/SQL	

	Introduction to PL/SQL, PL/SQL Identifiers	
14	Control Structures, Composite Data Types	
15	Explicit Cursors	
16	Stored Procedures and Functions	
17	Triggers, Compound	
18	DDL, and Event Database Triggers	
19	Relational Database design Functional Dependency – definition, trivial and non-trivial FD	
20	closure of FD set, closure of attributes, irreducible set of FD	
21	Normalization – 1NF, 2NF, 3NF	
22	Decomposition using FD dependency preservation, BCNF	
23	Multivalued dependency, 4NF	
24	Join dependency and 5NF	
25	CAE2	
26	Transaction Management Transaction concepts, properties of transactions	
27	serializability of transactions, testing for serializability , System recovery	
28	Two- Phase Commit protocol, Recovery and Atomicity, Log based recovery	

29	concurrent executions of transactions and related problems, Locking mechanism	
30	solution to concurrency related problems, deadlock, two-phase locking protocol, Isolation, Intent locking	

WRITTEN ASSIGNMENT

Questions

1. Explain the structure of a DBMS with a neat diagram.
2. Explain in detail on the steps in designing a database.
3. Discuss in detail on mapping cardinalities with examples.
4. Draw an ER diagram for an airport database. Specify the key and participation constraints for each entity and relationship set.
5. Draw an ER diagram for an Online Shopping system. Make necessary assumptions on the database.

Course Code: MCA 104

Name of the course: Data Communications and Computer Networks

Course Facilitator: Dr. Keerthy A S

keerthy@rajagiri.edu

9446483652

Course Details: MCA104

Course Code	MCA104	Course Title	<i>Data Communications and Computer Networks</i>
Course Type	Core	Contact Hours	4 Hours per Week
Credit	3	Domain	Core

Syllabus

I	Introduction: Data Communications, Computer Networks, Network Layering- OSI reference Model, TCP-IP Protocol Suite. Physical Layer: Data and Signals, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data rate Limits. Digital-to-Digital Conversion, Analog-to-Digital Conversion, Digital-to-Analog Conversion, Analog-to-Digital Conversion.
II	Physical Layer: Transmission and Switching Transmission Modes, Transmission media- Guided, unguided media. Multiplexing, Switching-Circuit Switching, packet switching
III	Data Link Layer: Nodes and Links, Link-Layer Addressing, error Detection and Correction- Block coding, Cyclic Codes, Checksum, Forward Error Correction, Simple, Stop-and-wait, Go-back-N, SelectiveRepeat. Media Access Control: Random Access-ALOHA, CSMA, CSMA/CD, Controlled Access, Channelization-FDMA, TDMA, CDMA
IV	Network Layer: Services, Routing Algorithms: Distance Vector, Link State, Path Vector, and Unicast Routing Algorithms.
V	Multicasting Basics: Addresses, Delivery at Data Link Layer, Multicast Forwarding, Two Approaches to Multicasting. IP Addressing, Classes, Subnetting.
REFERENCE BOOKS:	
Forouzan, "Data Communications and Networking", 5th Edition, McGraw Hill, 2013	
Andrews. Tanenbaum, "Computer Networks", 5th edition . Prentice-Hall.	

William Stallings, “Data and Computer Communication”, 8th edition											
COURSE PRE-REQUISITES:											
Basic Knowledge in Computer Hardware and Networks											
COURSE OBJECTIVES:											
1. To give idea of basics of Data communication and Computer Networks. The first part of the course emphasis on fundamentals of Data and Signal and Encoding Standards and detail about the physical layer and transmission modes.											
2. To give an overview of communications switching and routing, types of communication, network congestion, network topologies, network configuration and management, network model components, layered network models (OSI reference model, TCP/IP networking architecture) and their protocols, various types of networks (LAN, MAN, WAN and Wireless networks) and their protocols.											
COURSE OUTCOMES:											
CO. No		Course Outcome description									
MCA104.1		Build an understanding of the fundamental concepts and reference models of data communications and Computer Networks.									
MCA104.2		Train the students in basics of Data communications and transmission media									
MCA104.3		Familiarize the student with the basic taxonomy and protocols used in the Data Link layer of OSI reference Model									
MCA104.4		Introduce the student to advanced networking concepts like wired and wireless protocols, and routing algorithms									
MCA103.5		Build an understanding of IP addressing and multicasting.									
CO-PO AND CO-PSO MAPPING											
	PO 1	PO2	PO3	PO 4	PO5	PO6	PO7	PO 8	PO 9	PO10	PSO3
MCA104.1	3	1			3		1				1
MCA104.2	3	3			2		1				1
MCA104.3	3	3			2		1				1
MCA104.4	3	3			2		1				1
MCA104.5	3	2			2		1				1

Justification of CO- PO/ PSO Mapping

- MCA104.1 Different reference models and signal conversions are learnt.
- MCA104.2 Understanding transmission modes, transmission media and switching techniques will give a deeper insight into transmission of signals in network.
- MCA104.3. Understand the different error detection and correction techniques along with channel allocation protocols

- MCA104.4 By understanding Routing protocols the students will learn how to choose the best possible paths for data transmission
- MCA104.5 Understand the basic concepts of address allocation and multicasting

CO ASSESSMENT RUBRICS

Evaluation Criteria	CO
Written Assignment	MCA104.1,MCA104.2
CAE1	MCA104.1, MCA104.2
CAE2	MCA104.3, MCA104.4
Case Study	MCA103.3, MCA103.4,MCA103.5

Session Plan

Session No	Topic Planned	Date/Remark
1	Introduction: Data Communications, Computer Networks	
2	Network Layering- OSI reference Model ,TCP-IP Protocol Suite	
3	Physical Layer: Data and Signals	
4	Periodic Analog Signals, Digital Signals Transmission Impairment, Data rate Limits	
5	Digital-to-Digital Conversion, Analog-to-Digital Conversion	
6	Digital-to-Analog Conversion, Analog-to-Analog Conversion,	
7	Physical Layer: Transmission and Switching Transmission Modes	

8	Transmission media- Guided, Unguided media.	
9	Multiplexing	
10	Switching-Circuit Switching,	
11	Packet switching	
12	CAE1	
13	Data Link Layer: Nodes and Links, Link-Layer Addressing	
14	Error Detection and Correction- Block coding,	
15	Cyclic Codes	
16	Checksum, Forward Error Correction	
17	Simple, Stop-and-wait, Go-back-N, Selective Repeat	
18	Media Access Control: Random Access-ALOHA, CSMA, CSMA/CD, Controlled Access	
19	Channelization-FDMA, TDMA, CDMA	
20	Network Layer: Services	
21	Routing Algorithms: Distance Vector	
22	Link State	
23	Path Vector	

24	Unicast Routing Algorithms.	
25	CAE2	
26	Multicasting Basics: Addresses	
27	Delivery at Data Link Layer,	
28	Multicast Forwarding, Two Approaches to Multicasting	
29	IP Addressing, Classes	
30	Subnetting	

Course Code: MCA105

Name of the course: Operating Systems with Linux as Case study

Course Facilitator: Dr. Jaya Vijayan

jaya@rajagiri.edu

9446944815

Course Details: MCA101

Course Code	MCA105	Course Title	Operating Systems with Linux as Case study
Course Type	Core	Contact Hours	4 Hours per Week
Credit	3	Domain	Professional Core

Syllabus

I	<p>File System concepts, Access methods, Allocation methods, Directory systems, File protection. Disk Management-Disk scheduling, Disk management, Disk reliability</p> <p>Linux: History of Linux: Linux Operating System Layers, The Linux Shell Process: (parent and child processes), Files and Directories (File Structure and directory structure), Linux Basic commands: pwd, cd, mkdir, rm, mv, touch, man, cp, locate, echo, cat, touch, ls, cut, paste and other basic shell management commands</p>
II	<p>Memory Management - Memory partitioning, Swapping, Paging, Segmentation, Virtual memory, Demand paging, Page replacement algorithms, Allocation algorithms</p> <p>Linux Commands: df, du, tar, zip, uname, chmod, head, tail, sort, grep, sudo privileges, top, free, vmstat, and other memory related commands. Installation of Linux OS</p>
III	<p>Process Management and Concurrency management Process and Thread Management, Concept of process and threads, Process states, Process management, Context switching, Multithreading, Concurrency Control,</p>

	<p>Concurrency and Race Conditions</p> <p>Linux: process related commands: fork, exec, ps, kill, nice, foreground process, background process</p>
IV	<p>Concurrency Management - Semaphores, Classical IPC problems and solutions. Deadlock, Characterization, Avoidance and Prevention, Detection, Recovery</p> <p>Linux: Shell variables, redirection, filters, Shell Scripting,</p>
V	<p>Protection and case study: LINUX - Access matrix, Implementation of access matrix, Revocation of access rights. Linux OS-Administering Users and Groups: Administering User Accounts, Working with Group Accounts, Understanding the Root Account, installing packages</p>

TEXT/REFERENCE BOOKS:

R	Silberschatz, Galvin, and Gagne, "Operating System Concepts", Eighth Edition, Wiley Publication, 2011
R	Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Pearson Education, 2004.
R	Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004
R	Harvey M. Deital, "Operating Systems", Third Edition, Pearson Education, 2004.
R	Milan Milenkovic, "Operating Systems: Concept and Design", 2nd Edition, 2001.
R	'Linux Command Line and Shell Scripting Bible (English) 2nd Edition', Wiley Publication.

MCA1 05.3		2	3													
MCA1 05.4			3													
MCA1 05.5			1		2											

Justification of CO- PO/ PSO Mapping

- MCA 105.1 By understanding the underlying principles, the students will be able to achieve a high-level view of how the Operating System functions.
- MCA105.2 By understanding the primary memory control and interaction, the learners will be able to achieve the knowledge on memory management in Operating System.
- MCA105.3 By understanding the basic principles of process management and inter-process communication they will be able to achieve knowledge on how the operating system manage a process and also the interaction between multiple processes.
- MCA105.4 Realizing the concept of security, the students will be able to understand how operating system protects and manages various resources.
- MCA105.5 By executing the basic commands in Linux, the students will be able to practically understand how to operate a Linux Operating System.

CO ASSESSMENT RUBRICS

Evaluation Criteria	CO
Written Assignment	MCA 105.1, MCA 105.2
CAE1	MCA 105.1, MCA 105.2
CAE2	MCA 105.3, MCA 105.4
Viva Voce	MCA 105.4, MCA 105.5

Session Plan

Session No	Topic Planned	Date/Remark
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1	Introduction to Operating Systems – Types, Components and Functions	
2	File System Concepts, Access Methods	
3	<i>Contd..</i>	
4	File Allocation Methods	
5	File Protection and Directory Systems	
6	Introduction to Linux Operating Systems, History and Layers, Processes in Linux	
7	Introduction to Disk Management and Disk Scheduling Concepts	
8	Disk Scheduling Algorithms	
9	<i>Contd..</i>	
10	<i>Contd..</i>	
11	Disk Management Concepts	
12	Basic Linux Commands - pwd, cd, mkdir, rm, mv, touch, man, cp, locate, echo, cat, touch, ls, cut, paste, etc.	
13	Introduction to Memory Management in OS, Memory Partitioning, Swapping	
14	Swapping <i>Contd..</i> , Paging, Segmentation and Virtual Memory	
15	Page Replacement Algorithms	

16	Page Replacement Algorithms <i>Contd.</i> , Allocation Algorithms,	
17	Linux Commands - df, du, tar, zip, uname, chmod, head, tail, sort, grep, sudo privileges, top, free, vmstat, and other memory related commands	
18	Concept of process and threads, Process States and Process Management	
19	Processing Scheduling Algorithms	
20	<i>Contd..</i>	
21	Context Switching, Threading and Multithreading, Concurrency Control	
22	Process management commands in Linux such as fork, exec, ps, kill,nice, foreground process, background process	
23	Concurrency Management and Control concepts, Semaphores	
24	Classical IPC Problems and Solutions	
25	Introduction to Deadlocks and Characterization	
26	Deadlock – Avoidance and Prevention	
27	Deadlock – Detection and Recovery	
28	Linux Shell variables, redirection, filters, Shell Scripting	
29	Access matrix, Implementation of access matrix, Revocation of access rights	

30	Linux - Administering User Accounts, Working with Group Accounts, Understanding the Root Account, installing packages	
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WRITTEN ASSIGNMENT

Questions

1. Explain different types of Operating Systems? List out the advantages and disadvantages of each.
2. What are the important memory management functionalities of an Operating System?
3. Explain virtual memory in an Operating System
4. What is the difference between Paging and segmentation?
5. Explain the memory related Linux commands.

Course Code: MCA106

Name of the course: Data Structures Lab

Course Facilitator:

Batch A	Fr. Angelo Baby frangelo@rajagiri.edu 8281371477
Batch B	Dr. Bindiya M Varghese bindiya@rajagiri.edu , 9846281188

Course Details: MCA106

Course Code	MCA106	Course Title	<i>Data Structure Lab</i>
Course Type	Core	Contact Hours	4 Hours per Week
Credit	2	Domain	Computing

Syllabus

I	<ol style="list-style-type: none"> 1. Program to represent Searching procedures (Linear search and Binary search) 2. Program to represent sorting procedures (Selection, Bubble , Insertion) 3. Polynomial addition using array 4. Polynomial multiplication using array 5. Program to represent sparse matrix manipulation using arrays. 6. Program to allocate two dimensional arrays dynamically. 7. Program to demonstrate the use of realloc(). 8. Represent Graph using array 9. Stack using array 10. Reverse a string using stack 11. Implement Queue using array 12. Circular Queue using array 13. Double ended queue using array
II	<ol style="list-style-type: none"> 1. Program to represent Singly Linked List. 2. Program to represent Doubly Linked List. 3. Program to represent Circular Linked List. 4. Polynomial addition using Linked List. 5. Polynomial multiplication using linked list. 6. Implement a linked stack 7. Program to represent Queue using linked list 8. Represent a graph using linked list. 9. Program for Conversion of infix to postfix. 10. Program for Evaluation of Expressions.

	11. Program for binary search tree using recursion. 12. Program to represent Binary search Tree Traversals without recursion
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REFERENCE BOOKS:

Fundamentals of Data Structures in C by Horowitz, Sahni and Anderson-Freed.

Data Structures Through C in Depth by S.K Srivastava, Deepali Srivastava.

Data Structures Using C Aaron M. Tenenbaum

Data Structures Using C, Reema Thareja

COURSE PRE-REQUISITES:

MCA102

COURSE OBJECTIVES:

1. To develop programs to implement the concept of data structures
2. To implement the concepts of data structures using arrays and linked list
3. To implement the concepts of advanced data structures

COURSE OUTCOMES:

CO. No	Course Outcome description														
MCA 106.1	To implement the linear data structures like arrays, linked list.														
MCA 106.2	To implement the various kinds of sorting and searching techniques.														
MCA 106.3	To implement the concept of stacks using arrays and linked list.														
MCA 106.4	To implement the concept of queues using arrays and linked list.														
MCA 106.5	To implement the concept of nonlinear data structures like graphs and trees.														
	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
MCA1 06.1	3		3				1				2	2		2	
MCA1 06.2	3		3				1				2	2		2	
MCA1 06.3	3		2				1				2	2		2	
MCA1 06.4	3		2				1				2	2		2	
MCA1 06.5			2				1				2	2		2	

Justification of CO- PO/ PSO Mapping

- MCA106.1 By implementing the various types of Data structures, the students will be able to extrapolate the concept to any programming language
- MCA 106.2 This course outcome ensures the student's capability of implementing various methods of sorting and searching.

- MCA 106.3 By Implementing various data structures using arrays, the students understand the concept of contiguous memory allocation
- MCA 106.4 By Implementing various data structures using linked lists, the students understand the concept of dynamic memory allocation
- MCA 106.5 By implementing graphs and trees, the students become capable of solving complex problems to a greater extent

Evaluation Criteria	CO
Lab Assessment and record	MCA106.1, MCA106.2, MCA106.3, MCA106.4, MCA106.5
CAEP	MCA106.1, MCA106.2, MCA106.3, MCA106.4,
Viva	MCA106.5

Session Plan

Session No	Topic Planned	Date/Remark
1.	Linear search	
2.	Binary search	
3.	Sorting- Selection, Bubble , Insertion	
4.	Dynamic Memory Allocation	
5.	Pointer to an array, array of pointers	
6.	Program to demonstrate the use of realloc().	
7.	Program to allocate two dimensional arrays dynamically.	
8.	Double pointer	
9.	Polynomial addition using array	
10.	Polynomial multiplication using array	
11.	Program to represent sparse matrix manipulation using arrays.	
12.	Stack using array	
13.	Reverse a string using stack	
14.	Implement Queue using array	

15.	Circular Queue using array	
16.	Double ended queue using array	
17.	Represent Graph using array	
18.	Program to represent Singly Linked List.	
19.	Program to represent Doubly Linked List.	
20.	Program to represent Circular Linked List.	
21.	Polynomial addition using Linked List.	
22.	Polynomial multiplication using linked list.	
23.	Implement a linked stack	
24.	Program to represent Queue using linked list	
25.	Represent a graph using linked list.	
26.	Program for Conversion of infix to postfix.	
27.	Program for Evaluation of Expressions.	
28.	Implement BST	
29.	Program for binary search tree using recursion.	
30.	Program to represent Binary search Tree Traversals without recursion	

Course Code: MCA107

Name of the course: DBMS LAB

Course Facilitators

Batch A	Dr. Ann Baby ann@rajagiri.edu 9895012317
Batch B	Mr. George Joseph georgejoseph@rajagiri.edu 94477 49517

Course Details: MCA107

Course Code	MCA107	Course Title	DBMS Lab
Course Type	Core	Contact Hours	4 Hours per Week
Credit	2	Domain	Core

Syllabus

Course Code	MCA107	Course Title	DBMS Lab
Course Type	Core	Contact Hours	4 Hours per Week
Credit	2	Domain	Computing

Syllabus

1. Oracle Installation.
2. Table Design- Using foreign key and Normalization
3. Practice SQL Data Definition Language (DDL) commands
 - a. Table creation and alteration (include integrity constraints such as primary key, Referential integrity constraints, check, unique and null constraints both column and table level.
 - b. Other database objects such as view, index, cluster, sequence, synonym etc.
4. Practice SQL Data Manipulation Language (DML) commands
 - a. Row insertion, deletion and updating
 - b. Retrieval of data
 - i. Simple select query
 - ii. Select with where options (include all relational and logical operators)
 - c. Functions: Numeric, Date, Character, Conversion and Group functions with having clause.

d. Set operators
e. Sorting data
f. Sub query (returning single row, multiple rows, more than one column, correlated sub query)
g. Joining tables (single join, self join, outer join)
5. Practice Transaction Control Language (TCL) commands (Grant, revoke, commit and save point options)
6. Usage of triggers, functions and procedures
7. Cursors

REFERENCE BOOKS:

<ul style="list-style-type: none"> Database Management Systems – Raghu Ramakrishnan and Johannes Gehrke, Third Edition, McGraw Hill, 2003
<ul style="list-style-type: none"> Database Systems: Design ,Implementaion and Management, Peter Rob, Thomson Learning, 7Edn.
<ul style="list-style-type: none"> The Complete Reference SQL – James R Groff and Paul N Weinberg, Second
<ul style="list-style-type: none"> Concept of Database Management, Pratt, Thomson Learning, 5Edn.
<ul style="list-style-type: none"> Database System Concepts – Silberchatz, Korth and Sudarsan, Fifth Edition, McGraw Hill, 2006

COURSE PRE-REQUISITES:

Introductory concepts of DBMS

COURSE OBJECTIVES:

5. To introduce the practical concepts including the structure and operation of the relational data mode, with the Oracle Database.
6. To implement and successfully apply logical database design principles
7. Construct a simple and moderately advanced database queries using Structured Query Language (SQL).
8. Implement the concept of a database transaction and related database facilities

COURSE OUTCOMES:

CO. No	Course Outcome description
MCA107.1	Have good understanding of the relational data model.
MCA 107.2	Understand and successfully apply logical database design principles
MCA 107.3	Understand normalizing database
MCA 107.4	Gain ability to write database queries using SQL.
MCA 107.5	Understand the concept of database transactions

CO-PO AND CO-PSO MAPPING

	PO 1	PO2	PO3	PO 4	PO5	PO6	PO7	PO 8	PO9	P010	PSO1
MCA 107.1	3						1				

MCA 107.2			3				1				
MCA 107.3	3		2				1				
MCA 107.4			3				1				
MCA107.5			2				1				

Justification of CO- PO/ PSO Mapping

- MCA107.1 By understanding different types of data models, students will be able to apply them to the real life situations.
- MCA107.2 By applying logical database design principles, database normalization can be used for database design.
- MCA107.3 By understanding dynamic data structures.
- MCA107.4 By implementing the Structured Query Language (SQL), effective solutions for database querying and retrieving can be achieved.
- MCA107.5 Realizing the concept of a database transaction and related database facilities

CO ASSESSMENT RUBRICS

Evaluation Criteria	CO
Written/Lab Test	MCA107.1,MCA107.2, MCA107.3, MCA107.4, MCA 107.5
Lab Involvement and Record	MCA107.1, MCA107.2,MCA 107.5
Viva	MCA107.3, MCA107.4

Session Plan

Session No	Topic Planned	Date/Remark
1	Oracle Installation.	
2	Numeric and String Functions in Oracle	
3	Date Functions in Oracle	
4	Table Design- Using foreign key and Normalization	

5	Practice SQL Data Definition Language (DDL) commands	
6	Table creation	
7	<i>Table alteration</i>	
8	Integrity constraints such as primary key	
9	Referential integrity	
10	Constraints, check, unique and null constraints both column level.	
11	Constraints, check, unique and null constraints both table level.	
12	Other database objects such as view, index	
13	Cluster, sequence, synonym etc.	
14	Practice SQL Data Manipulation Language (DML) commands - Row insertion, deletion and updating	
15	Retrieval of data - Simple select query , Select with where options (include all relational and logical operators)	
16	Group functions with having clause.	
17	Set operators	
18	Sorting data	
19	Sub queries	

20	Returning single row, multiple rows	
21	Returning more than one column,	
22	Correlated sub queries	
23	Joining tables(single join)	
24	Joining tables (self join, outer join)	
25	Practice Transaction Control Language (TCL) commands (Grant, revoke, commit and save point options)	
26	Usage of Triggers	
27	Usage of Functions	
28	Usage of Procedures	
29	Usage of Cursors	
30	Revision	

DBMS Lab Programs

1.Installation and configuration of Oracle Database

- Write the steps with screenshots(print-outs)

2.Table Design- Using foreign key and Normalization

- E-R Diagram and reducing to tables
- Table descriptions and the process of normalization
- Final Table descriptions with data

Table name: Cust_Master

Description: Used to store Client Information

Column name	Data Type	Size	Default	Attributes
Clientno	Varchar2	6		Primary Key/ first letter must start with 'C'

Name	Varchar2	20		Not Null
City	Varchar2	15		
Pincode	Number	8		
State	Varchar2	15		
BalDue	Number	10,2		

Table name: Prod_Master**Description: Used to store Product Information**

Column name	Data Type	Size	Default	Attributes
Productno	Varchar2	6		Primary Key/ first letter must start with 'P'
Description	Varchar2	15		Not Null
Profitpercent	Number	4,2		Not Null
Unitmeasure	Varchar2	10		Not Null
Qtyonhand	Number	8		Not Null
Reorderlvl	Number	8		Not Null
Sellprice	Number	8,2		Not Null, cannot be 0
Costprice	Number	8,2		Not Null, cannot be 0

Table name: Sales_Order**Description: Used to store clients orders**

Column name	Data Type	Size	Default	Attributes
Orderno	Varchar2	6		Primary Key/ first letter must start with 'O'
Clientno	Varchar2	6		Foreign Key Refernces Clientno of
				Cust_Master table
Orderdate	Date			Not Null
Delytype	Char	1	F	Delivery:part(P)/full(F)
Billyn	Char	1		
Payment_mode	Varchar2	15		Values('COD', 'Net Banking', Credit Card', 'Debit Card')
Delydate	Date			Cannot be less than Order date
Orderstatus	Varchar2	10		Values('In Process', 'Fulfilled', 'BackOrder', 'Cancelled')

Table name: Order_Details**Description: Used to store clients orders with details of each product**

Column name	Data Type	Size	Default	Attributes
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Orderno	Varchar2	6		Refernces Foreign Key Orderno of Sales_order table
Productno	Varchar2	6		Key Refernces Foreign ProductNo of Prod_Master table
Qtyordered	Number	8		
Qtydisp	Number	8		

Data

Cust_Master:

ClientNo	Name	City	Pincode	State	BalDue
C00001	Rahul Sharma	Mumbai	400054	Maharashtra	15000
C00002	Eric Sheldon	Madras	780001	TamilNadu	0
C00003	Rama Krishnan	Mumbai	400057	Maharashtra	5000
C00004	Evonne Eric	Bangalore	560001	Karnataka	0
C00005	Manasa Binu	Mumbai	400060	Maharashtra	2000
C00006	Ani Rose	Mangalore	560050	Karnataka	0

Prod_Master

Product No	Description	Profit Percent	Unit Measure	QtyOn Hand	ReorderLvl	SellPrice	CostPrice
P00001	T-Shirts	5	Piece	200	50	350	250
P03453	Shirts	6	Piece	150	50	500	350
P06734	Cotton Jeans	5	Piece	100	20	600	450
P07865	Jeans	5	Piece	100	20	750	500
P07868	Trousers	2	Piece	150	50	850	550
P07885	Pull Overs	2.5	Piece	80	30	700	450
P07965	Denim Shirts	4	Piece	100	40	350	250
P07975	Lycra Tops	5	Piece	70	30	300	175
P08865	Skirts	5	Piece	75	30	450	300

Sales_Order:

Orderno	Clientno	Orderdate	Deltype	Billyn	Payment_Mode	Deldate	Orderstatus
O19001	C00001	12-June-14	F	N	COD	20-July-14	In Process
O19002	C00002	25-June-14	P	N	COD	27-June-14	Cancelled

O46865	C00003	18-Feb-14	F	Y	Net	20-Feb-14	Fullfilled
					Banking		
O19003	C00001	03-Apr-14	F	Y	Credit	07-Apr-14	Fullfilled
					card		
O46866	C00004	20-May-14	P	N	Debit	22-May-14	Cancelled
					Card		
O19008	C00005	24-May-14	F	N	Net	26-July-14	In Process
					Banking		

Order_Details Table

Orderno	Productno	QtyOrdered	QtyDisp
O19001	P00001	4	4
O19001	P07965	2	1
O19001	P07885	2	1
O19002	P00001	10	0
O46865	P07868	3	3
O46865	P07885	3	1
O46865	P00001	10	10
O46865	P03453	4	4
O19003	P03453	2	2
O19003	P06734	1	1
O46866	P07965	1	0
O46866	P07975	1	0
O19008	P00001	10	5
O19008	P07975	5	3

3.Practice SQL Data Definition Language(DDL) commands

3.1 Table creation and alteration

- Create the tables based on the above description .
- Add a column called 'Telephone' of data type 'number' and size= '10' to Cust_Master table
- Change the size of SellPrice column in Prod_Master to 10,2.
- Change the attribute name QtyOrdered of Order_Details table to QtyOrd
- Destroy the table Order_details and recreate it again .

- Include integrity constraints such as primary key, referential integrity constraints, check, unique and null constraints both column and table level based on the constraints given in the above table descriptions

4.Practice SQL Data Manipulation Language (DML) commands

4.1Row insertion, deletion and updating

o Insertion

- o Insert the data generated for Cust_Master, Prod_Master and Sales_order table and Order_Details tables with data given above.
- o Create a new table cust_temp (Client_Name, State, BalDue) having records from Cust_master whose balDue>Rs. 1500/-

o Updation

- o Change the city of Client No 'C00005' to 'Bangalore'.
- o Change BalDue of ClientNo 'C00001' to Rs.1000.
- o Change the cost price of 'Trousers' to Rs.950

o Deletion

- o Delete all products from Product_master table where quantity on hand is equal to 100
- oDelete from Cust_temp where column state holds the value 'Karnataka'

o Renaming

- oChange the name of the cust_temp table to c_mast.

4.2 Retrieval of data

o Simple select query

- o Find out the names of all clients.
- o Retrieve the entire contents of Client_Master table
- oRetrieve the list of names, city and state of all clients
- oList the various products available from the Product_Master table.

O Select with where options (include all relational and logical operators)

- o List all the clients who are located in Mumbai.
- o List the names of all clients having 'a' as the second letter in their names.
- o List the clients who stay in a city whose first letter is 'M'.
- oList all the clients who stay in ' Bangalore' or 'Mangalore'.
- oList all the products whose product name has 'shirts'.
- o List all clients whose BalDue is greater than value 10000.
- oList the products whose selling price is greater than 500 and less than or equal to 750
- oList products whose selling price is more than 500. Calculate a new selling price as original selling price*2. Rename the new column in the output of the above query as new_price.
- o List all the products whose QtyOnHand is less than the reorder level.
- oList the order information for ClientNo 'C00001' and 'C00002'.

- o List the names, city and state of clients who are not in the state of Maharashtra;

4.3 Functions: Numeric Data, Character Conversion and Group functions

- o Illustrate the different numeric functions using dual table (power, round, ceil, floor, abs, exp, greatest, least, mod, trunc, round, sign, sqrt etc)

- o Illustrate the character functions (upper, lower, initcap, length, concat, ascii, substr, ltrim, rtrim, trim, translate, instr, chr, Lpad, Rpad etc) using the table Cust_Master.

- o Illustration of conversion functions- to_number, to_char(number conversion), to_char(date conversion)

- o Count the total no. of Orders.

- o Calculate the average price of all products.

- o Determine the maximum and minimum product prices. Rename the output as max_price and min_price respectively

- o Count the number of products having price less than or equal to 500.

4.4 Data manipulations using date functions

- o List the order number and day on which clients placed their order.

- o List the month in alphabets and date when the orders must be delivered.

- o List the orderDate in the format 'DD-Month-YY'.

- o List the date, 15 days after today's date.

- o List all information from Sales_Order table for orders placed in the month of June.

- o Illustrate the different date functions using dual table (to_date, Add_months, last_day, months_between, next_day, round etc.)

- o Illustration of special date formats using to_char function (use of th, sp, spth)

4.5 Set operators (Create a table for sales persons Sales_Person(sid, sname, city, state) and insert data into the table)

- o Retrieve the names of all clients and salespersons residing in the city of Mumbai

- o Retrieve the names of salespersons who are also clients.

- o Retrieve the names of all clients who are not salespersons

- o (Destroy the table after use)

4.6 Sorting data

- o Retrieve all the clients in the descending order.

4.7 Group by Having clause

- o Print the description and total quantity sold for each product.

- o Find the value of each product sold

- o Calculate the average qty sold for each client that has a maximum order value of Rs.15000/-

- o Find out the total of all the billed orders for the month of June.

4.8 Sub query (returning single row, multiple rows, more than one column, Correlated sub query)

- o Find the Productno and description of non-moving products i.e products not being sold.
- o List the customer name, City and Pincode for the client who has placed Order no 'O19001'.
- o List the client names that have placed orders before the month of May 02.
- o List if the product 'Lycra Top' has been ordered by any client and print the clientno, name to whom it was sold.
- o List the names of clients who have placed orders worth Rs.10000 or more
- o List the names of clients whose total sales value is greater than Rs.10,000/-
- o Find out the products which have been sold to 'Manasa Binu'
- o Find out the products and their quantities that will have to be delivered in the current month.
- o List the product no. and description of constantly sold (ie. rapidly moving products).
- o Find the names of clients who have purchased 'Trousers'.
- o List the products and orders from customers who have ordered less than 5 units of 'Pull Overs'.
- o Find the products and their quantities for the orders placed by 'Rahul Sharma' and 'Manasa Binu'.
- o Find the products and their quantities for the orders placed by Client No 'C00001' and 'C00002'.

4.9 Joining tables (single join, self-join, outer join)

o Illustrate the variations of join on Sales_Order and Order_Details tables (inner join, natural, left outer join, right outer join, full outer join)

5.PL/SQL

5.1 Introduction

• Write a PL/SQL block of code to achieve the following: If the price of product 'P0001' is less than 4000, then change the price to 4000. The price change is to be recorded in the old_price_table along with product_no and the date on which the price was last changed.

Old_price_table(Product_no, date_change_old_price)

• Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the radius and corresponding values of calculated area in an empty table named **Circle**, consisting of two columns **Radius** and **Area**.

- Write a PL/SQL block of code that reduces the price of T-shirt by 10%. Then check to see that total T-shirts sold in 2014 is more than 100. If its more than 100, then undo the updates made to price of T- shirt. (Use savepoint, rollback and commit).

5.2 Using Cursors

- Illustration of implicit cursor.** It was decided to raise the price of products with profit percentage > 3% by 0.15%. Write a cursor to update price of products. Display appropriate message based on the existence of the record in the product table.

- Illustration of explicit cursor.** It was decided to raise the price of products with profit percentage > 3% by 0.15%. Whenever any such product price raise happens to the products, a record for the same is maintained in the prod_raise table. It includes the productno, the date when the raise happened and actual raise. Write a PL/SQL block to update the price of products and insert a record in the prod_raise table.

5.3 Illustration of Procedures

- Write a PL/SQL block which makes use of a stored procedure Sales_order_det (OrderNo varchar2(50)) which lists the details of the products in the given order no.

- Write a procedure to check whether a string is a palindrome . Call the procedure to list all the palindrome names in the Cust_Master table.

- Write a PL/SQL block which retrieve all the Orders into a cursor and display the details of products for each Order using the stored procedure Sales_order_det (OrderNo varchar2(50))

5.4 Illustration of functions

- Write a function to find the reverse of ClientNo in CustMaster table and display the ClientNo and Reversed(ClientNo) for all customers using an SQL Query.

- Write a function that would check for the existence of an employee in the employee table given an EmpNo. If existing employee, check whether he is the manager of any department and display messages accordingly.

- Write a PL/SQL block that will make use of a function called Check_Sales(). The function receives a parameter Sales_date and will display all the sales made on that date. The result include description of items sold and the quantity sold.

5.5 Illustration of Triggers

- Consider the table **Product**. Write PL/SQL statements to create a trigger when fired checks the operation performed on a table and based on the operation, a variable is assigned the value 'update' or 'delete'. Previous values of the modified record of the table **Product** are stored into the appropriate variables declared and inserted to the audit table **AuditProduct**.
- Write PL/SQL statements to create a trigger which updates the balance stock each time a product is purchased for an order and generate an error messages if the balance stock is less than the reorder level. The triggering events are update and insert.
- Write PL/SQL statements to create a trigger that limits the DML actions to the **Order** table to weekdays from 8.30am to 6.30pm. If a user tries to insert/update/delete a row in the **Order** table, a warning message will be prompted.

6. Advanced SQL

6.1 Illustration of other Database Objects

- Create simple index idx_Prod on product cost price from the Product_Master table
- Create view on OrderNo, OrderDate, OrderStatus of the Sales_Order table and ProductNo, ProductRate and QtyOrdered of Sales_Order_Details.
- Create a cluster clstr1 emp_dep with deptno as the cluster key for the tables department(deptno, deptname, address), employee (empno, name, deptno)
- Create sequence inv_seq with the following parameters, increment by 3 and which will generate numbers from 1 to 9999 in ascending order. Use the above sequence to insert employee numbers of employees into employee(empno, name, deptno)
- Create a table with an attribute following the above sequence and insert data to it.
- Create a synonym for the employee table.

6.2 Practice Transaction Control Language (TCL) commands (syntaxes should be included) Grant

- Give the user Ivan permission only to view records in the tables Sales_Order and Sales_Order_Details, along with an option to further grant permission on these tables to other users.
 - Give the user Ivan permission all data manipulation privileges on the table Client_Master without an option to further grant permission on this tables to other users.
- Revoke
- Take back all privileges given to the user Ivan on the table Client_Master

