

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for MCA III Semester under Regulations 2018**  
**Branch: Master of Computer Applications**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
<b>Theory</b>						
1	P18MCA301	Object Oriented Programming in Java	3	0	0	3
2	P18MCA302	Operating Systems	3	0	0	3
3	P18MCA303	Data Base Design and Programming with SQL	3	0	0	3
4	P18MCA304	Advanced Data Structures, Algorithms, and Analysis	3	0	0	3
5	P18MCA305	Data Communication and Networking	3	0	0	3
<b>Practical</b>						
6	P18MCA306	Java Programming Laboratory	0	0	4	2
7	P18MCA307	Data Base Design and Programming with SQL Laboratory	0	0	4	2
8	P18MCA308	Advanced Data Structures, Algorithms Laboratory	0	0	4	2
9	P18MCA309	Soft Skill Development Laboratory - III	0	0	2	1
<b>Total Credits</b>						<b>22</b>

Approved by

**Chairman, MCA BOS**  
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Copy to:-  
 Director, ThirdSemester MCA Students and Staff, COE

## P18MCA301 - OBJECT ORIENTED PROGRAMMING IN JAVA

L	T	P	C	M
3	0	0	3	100

### COURSE OBJECTIVES

This course will enable the student to:

- Understand the fundamentals of OOPS programming and Java Programming.
- Be familiar with the fundamental programming of java.
- Gain knowledge on the implementation of OOP with Java.
- Appraise the programming techniques of Java.
- Acquire knowledge in Java utilities.

### UNIT I - INTRODUCTION

9

Introduction to OOP concept - Evolution of Higher Level Languages - The General Topology of Object Based and Objects Oriented Language - Complexity of Software and Their Attributes - Object Orientated Programming Paradigm- Basic Principles of Object Oriented Programming- Advantages of Object Oriented Programming - Applications of Object Oriented Programming - Object Oriented Programming Languages- Introduction to Core Java - Evolution of Java - Salient Features of Java Language- JAVA, Internet and World Wide Web- The Java Environment.

### UNIT II - JAVA FUNDAMENTAL PROGRAMMING

9

Java Language Preliminaries - Keywords and Identifiers - Constants- Numeric Constants - Character Constants-Variables- Data Types- Console I/O- Structure of a Java Program-Sample Program-Executing a Java program- Operators and Expressions - Selection - The Simple if Statement- The If-Else Statement-The nested if-else Statement-The else-if Ladder - The Switch Statement -Nested Switch Statement-Iteration - The while loop- The for loop- Variations of for Loop- The Do-While loop- Which loop to use when?- Jumps in loops- Nesting of Loops- Jumps in Nested Loops- Labeled Loops.

### UNIT III - OOP USING JAVA

9

Classes, Objects and Methods - Declaration and Creation of Objects, Accessing Members- Classification of Member Methods- Constructors- Constructors with and without Arguments-Copy Constructors- The this keyword - Passing Objects to Methods as Arguments-Methods Returning an Object - Static Member Data- Static Member Methods- Static Blocks-Nesting of Member Methods- Recursion- Nested Classes- Non-static Nested Classes or Inner Classes -Static Nested Classes- Local Classes-Anonymous Classes- Final members- Variable Arguments- Objects of one class as instance variables of another class (Containment)- Garbage Collection and Finalize Method- Inheritance - Interfaces - Packages - Classification of Packages - Creating and Using a Package - Access Control

### UNIT IV - JAVA PROGRAMMING TECHNIQUES

9

Arrays - One-dimensional Arrays - Multi-dimensional Arrays- Two-dimensional Arrays (2-D arrays)- Arrays and Methods- Arrays as Arguments to Methods- String Handling - The String Class - The StringBuffer Class- Exception Handling - Multithreaded Programming - The Life Cycle of a Thread - The Thread Class -Thread Priorities - Synchronisation- Deadlock-File Handling- I/O Stream Classes related to File Handling- The Character Stream Classes- The Byte Stream Classes-Mixed Data I/O Streams- Object I/O Streams- Random Access File

### UNIT V - JAVA UTILITIES

9

Applets - The Life Cycle of an Applet- Creating and Executing an Applet-Introduction to

AWT - AWT Hierarchy -- Event Handling- AWT Controls- AWT Window-Level Controls- Windows- Handling Keyboard Events- Handling Mouse Events-Inner Classes-Anonymous Inner Classes- Basic Utility Classes - The Wrapper Classes - The Number Class- The Byte Class- The Short Class- The Integer Class-The Long Class-The Float Class- The Double Class-The Character Class- The Boolean Class

**TOTAL = 45 Hours**

### **COURSE OUTCOMES:**

**At the end of the course the student should be able to:**

- Discuss the fundamentals concepts of OOPS and Java Programming
- Create simple programs that illustrate the fundamental programming of JAVA.
- Demonstrate programs in java that uses OOP.
- Develop programs that illustrates various programming techniques of JAVA.
- Apply Java utilities in the given scenario.

### **REFERENCES**

1. **M. T. Somashekara, D. S. Guru,"Object oriented programming with Java" , PHI Learning (2017)(Unit 1,2,3,4,5)**
2. Raj Buyya," Object oriented programming with Java", McGraw Hill Education,2009
3. D.Lee, Danny C.CPoo, Derek B K Kiong," Object-Oriented Programming and Java ",Springer, 1998
4. Herbert Schildt, "Java A Beginner's Guide- Create, Compile and Run Java Programs Today", Sixth Edition, Oracle Press, 2014.
5. Paul Deitel, Harvey Deitel, "Java How to Program", 9thEdition, Prentice Hall, 2012.
6. Ken Arnold, James Gosling, "The Java Programming Language", Fourth Edition, Addison Wesley, 2005.
7. "Java 6 Programming Black Book", Kogent Solution Inc, Dreamtech Press, 2007.
8. Cay S. Horstmann, Gary Cornell, "Core Java Volume I - Fundamentals", 9<sup>th</sup> Edition, PHI, 2008.
9. E. Balagurusamy, "Programming with Java 3e - A Primer", Tata McGraw Hill, 3<sup>rd</sup> Edition, 2007.
10. Herbert Schildt, "The complete Reference Java", 7<sup>th</sup> Edition, Tata McGraw Hill, 2007.

## P18MCA302 - OPERATING SYSTEMS

L	T	P	C	M
3	0	0	3	100

### COURSE OBJECTIVES:

This course will enable the student to:

- Describe the basic organization of computer systems.
- Understand inter process communication using shared memory and message passing.
- Gain knowledge about CPU scheduling and the basis for multi programmed operating systems.
- Provide a detailed description of various ways of organizing memory hardware.
- Know the performance and characteristics of mass-storage devices

### UNIT I - INTRODUCTION & SYSTEM STRUCTURES

9

What Operating Systems Do - Computer System Organization- Computer System Architecture: Operating System Services- System Calls - Types of System Calls - System Programs - Operating System Structure - System Boot.

### UNIT II - PROCESS MANAGEMENT

9

Process Concept- Process Scheduling- Operations on Processes- Inter process Communication- Multicore Programming- Multithreading Models- Implicit Threading- Threading Issues- The Critical Section Problem- Semaphores- Classic Problems of Synchronization.

### UNIT III - CPU SCHEDULING & DEADLOCKS

9

CPU Scheduling: Basic Concepts - Scheduling Criteria- Scheduling Algorithms- Thread Scheduling- Multiple Processor Scheduling- Real-Time CPU Scheduling. Deadlocks: System Model- Deadlock Characterization- Methods for Handling Deadlocks- Deadlock Prevention- Deadlock Avoidance- Deadlock Detection- Recovery from Deadlock.

### UNIT IV - MEMORY MANAGEMENT

9

Main Memory: Background- Swapping- Contiguous Memory Allocation- Segmentation- Paging. Virtual memory : Background- Demand Paging- Copy-on-Write- Page Replacement- Allocation of Frames- Thrashing.

### UNIT V - STORAGE MANAGEMENT

9

Mass-Storage Structure: Overview of Mass Storage Structure- Disk Structure- Disk Attachment- Disk Scheduling- Disk Management- Swap-Space Management- RAID Structure. File System Interface:File Concept- Access Methods- Directory and Disk Structure- File System Mounting- File Sharing- Protection. File System Implementation:File System Structure- File System Implementation- Directory Implementation- Allocation Methods - Free Space Management- Efficiency and Performance- Recovery.

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**COURSE OUTCOMES:**

**At the end of the course the student should be able to:**

- Explain the fundamental concepts of operating system services and system calls
- Analyze the issues and use of locks, semaphores and monitors for synchronizing multithreaded systems and implement them in multithreaded programs.
- Describe the concepts of deadlock in operating systems and how they can be managed / avoided.
- Implement memory management techniques.
- Apply the algorithms in secondary storage and file management techniques

**REFERENCES**

1. **Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012. (All five units)**
2. G. Coulouris, J. Dollimore, and T. Kindberg, "Distributed Systems: Concepts & Design", Fifth edition, Addison-Wesley, 2012.
3. William Stallings, "Operating Systems: Internals and Design Principles", Prentice Hall, 7<sup>th</sup> Edition, 2011.
4. Andrew S. Tanenbaum & Maarten van Steen, "Distributed Systems: Principles and Paradigms", Prentice-Hall, Second Edition, 2006.
5. MukeshSinghal and N. G. Shivaratri, "Advanced Concepts in Operating Systems", McGraw-Hill, 1<sup>st</sup> Edition, 2001.

## P18MCA303 - DATABASE DESIGN AND PROGRAMMING WITH SQL

L	T	P	C	M
3	0	0	3	100

### COURSE OBJECTIVES:

**This course will enable the student to:**

- Understand the basis of relational databases and learn how to retrieve and manipulate data from one or more tables.
- Manipulate data with subqueries and aggregate functions.
- Apply views and joins to manage database.
- Demonstrate stored procedures and triggers
- Work with various databases and create reports

### UNIT I - DESIGNING AND CONSTRUCTING A DATABASE 9

**Database design:** database structure, design process, pre-design phase of design, organizing your data, functional dependency and candidate keys, entity-relational modeling, normalization.

**Creating databases:** creating a database, choosing which database to access, creating a table, relational data types, specifying keys, column constraints, default values, Design of the movie info database, indexes.

**Creating, changing and removing records:** preparing data, INSERT statement, SELECT and INSERT together, DELETE statement, UPDATE statement, TRUNCATE statement, DROP statement, ALTER statement.

### UNIT II - RETRIEVING DATA FROM A DATABASE 9

**SELECT statement:** anatomy of a SELECT statement, specifying columns to retrieve, performing calculations on selected data, Using AS to name columns and expressions, Filtering query results using the WHERE clause, dealing with Null Values, Sorting Query Results, how the equality of string is determined.

**Using WHERE Clause:** using logical operators in the WHERE clause, the IN clause, The BETWEEN Clause, Matching parts of strings using LIKE, useful functions for WHERE clauses. **Aggregating query results:** Selecting Unique values using DISTINCT, aggregate functions, COUNT() function, SUM() and AVG() function, dividing aggregates into categories, Filtering query results using HAVING.

**combining Tables using Joins:** joins and Normalization, what is a Join, Using Joins, Types of joins, Joining More than two tables, Outer Joins, UNION Joins, SQL -92 Join Syntax. **Subqueries:** What Is a subquery, Types of Subqueries, subqueries that return a list of values, subqueries that return a single value, writing complex queries, using subqueries in UPDATE and DELETE statement, using subqueries with INSERT

### UNIT III - DATABASE MANAGEMENT 9

**Using Views:** Creating Views, Advantages of Using Views, Creating Column Aliases, Single - Table Views, Views that Use Joins, Creating Views with Subqueries, Using Other Join Operations in views, Nesting Views, Updating Views, tasks you can accomplish with views.

**The SQL Security Model:** Overview of Database Security, Creating Database Users, database elements, Using GRANT and REVOKE, Security Roles, Views and Database Security.

**Real-World Issues Handling Specific Types of Data:** Numeric Data Types, String Data Types,

dealing with Dates, Converting Data Between Types.

**Database Performance and Integrity:** Improving Database Performance, Performance Measurement Tools, Indexes, The Query Optimizer, Data Integrity, Integrity Versus Performance. **Transactions and Cursors:** Transactions, Using Transactions in Oracle, Using Transactions in Transact -SQL, Database Locks, The Transaction Log, Cursors, Using Cursors in Transact -SQL, Using Cursors in Oracle PL/SQL

#### **UNIT IV - STORED PROCEDURES**

**9**

**Writing Stored Procedures:** Writing a Stored Procedure, working with Variables, Defining Blocks of Code, Conditional Statements Using IF, using Loops, Looping Over a Cursor, Triggers.

**More on Transact - SQL Stored Procedures:** General Transact - SQL Programming Information, Global Variables, Using RETURN to Leave Stored Procedures, Handling Errors, Using Temporary Objects, WAITFOR, Advanced Trigger -Writing Techniques.

**Writing Oracle PL/SQL stored Procedures:** The Declaration Section, The Executable Section, Exception Handling, Writing Stored Procedures, Creating and Using Custom Functions, Bundling Procedures and Functions in Packages, Debugging PL/SQL Queries, Triggers.

#### **UNIT V - SPECIFIC DATABASES**

**9**

**Oracle:** SQL\*PLUS, Creating Reports in SQL\*PLUS, Oracle System Views, Sequences, Synonyms, Oracle Data Types, Oracle Resources on the Web

**Microsoft Access:** Microsoft Database Files, ODBC, The Access Interface, Objects in Microsoft Access, Creating Tables, Data types, Creating and Running Queries, Creating an ODBC Datasource, Microsoft Access Resources

**MySQL:** Obtaining MySQL and MSQL, Contrasting MySQL and MSQL, Using MySQL, MySQL Features, MySQL Limitations, MySQL Data Types, MySQL Syntax, MSQL, String Comparisons in MSQL and MySQL.

**TOTAL = 45 Hours**

#### **COURSE OUTCOMES:**

**At the end of the course the student should be able to:**

- Illustrate database design and execute various DDL and DML queries.
- Retrieve data using subqueries and combine tables using Joins.
- Execute various advanced SQL queries related to Transaction Processing & Locking using concept of Concurrency control.
- Execute SQL queries related to data control language to enforce security in a multi user database environment.
- Create simple and advanced PL/SQL code blocks for stored procedures, cursors and triggers.

#### **REFERENCES**

1. **Special Edition Using SQL Paperback, Rafe Colburn, Paperback, 1<sup>st</sup> edition 1999. (Units-I-V)**
2. "Sams Teach Yourself SQL in 10 Minutes" By Ben Forta, sams, 2012
3. "Learning SQL" By Alan Beaulieu, O'Reilly Media, 2014
4. "SQL: The Ultimate Beginners Guide: Learn SQL Today" By Steve Tale, wizeduck.com, 2016.
5. "SQL: QuickStart Guide - The Simplified Beginner's Guide To SQL" By Clydebank Technology, EPUB, 2015.

## P18MCA304 - ADVANCED DATA STRUCTURES, ALGORITHMS, AND ANALYSIS

L	T	P	C	M
3	0	0	3	100

### COURSE OBJECTIVES

This course will enable the student to:

- Acquire the knowledge of linear data structures and its applications.
- Learn to implement non-linear data structures are tree and graph.
- Use search and sorting techniques in various structures.
- Apply right algorithm designing techniques to solve real-time problems.
- Describe the advanced techniques to design and implement data structures.

### UNIT I - LINEAR DATA STRUCTURES 9

Lists, Stacks, and Queues: Abstract Data Types - The List ADT - Array Implementation of Lists - Linked Lists - Doubly Linked Lists - Circularly Linked Lists - Stack ADT - Queue ADT.

### UNIT II - NON-LINEAR DATA STRUCTURES 9

Trees: Binary Trees - Binary Search Trees - AVL Trees - B-Trees - Graph Algorithms: Topological Sort - Shortest Path Algorithms - Minimum Spanning Tree - Introduction to NP-Completeness.

### UNIT III - HASH, HEAP, SORTING TECHNIQUES 9

Hashing: Hash function - Open Addressing - Priority Queues: Binary heap - Binomial Queues - Sorting - Merge Sort - Quick Sort - Bucket Sort - External Sorting.

### UNIT IV - ALGORITHM DESIGNING TECHNIQUES 9

Algorithm Design Techniques: Greedy Algorithms - A Simple Scheduling Problem - Huffman Codes - Divide-and-conquer - Closest-Points Problem - The Selection Problem - Dynamic Programming - Optimal Binary Search Tree - All-Pairs Shortest Path - Randomized Algorithm - Random Number Generators - Backtracking Algorithms - Games.

### UNIT V - ADVANCED DATA STRUCTURES AND IMPLEMENTATIONS 9

Amortized Analysis -Fibonacci Heaps - Splay Trees - Top-down Splay Trees - Red-Black Trees - Deterministic Skip Lists - AA-Trees - Treaps - k-d trees - Pairing Heaps.

**TOTAL = 45 Hours**

### COURSE OUTCOMES:

At the end of the course the student should be able to:

- Design ADT in various applications to solve computing problems.
- Depict tree and graph structures in non-linear manner and organize the structures.
- Apply Hash, Heap and sorting techniques in data structures.
- Implement algorithm designing techniques to solve real-time problems.
- Design data structures with advancement techniques.



## REFERENCES

1. **Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Twenty Fifth Impression, Pearson,2002 (Unit I - V).**
2. Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, Clifford Stein,"Introduction to Algorithm", Second Edition, PHI.
3. NarasimhaKarumanchi, "Data Structures and Algorithms Made Easy", 5<sup>th</sup> Edition, CarrerMonk Publication, 2017.
4. Michael T.Goodrich, Roberto Tamassia, Michael H.Goldwasser, "Data Structures & Algorithms in Java", 6<sup>th</sup> edition, Wiley, 2014.
5. Anany Levitin, "Introduction to The Design and Analysis of Algorithms", 3<sup>rd</sup> Edition, 2012.
6. Thomas H.Cormen,"Algorithms Unlocked", MIT Press, 2013.
7. Peter Brass, "Advanced Data Structures", Cambridge University Press, 2008.

## P18MCA305 - DATA COMMUNICATION AND NETWORKING

L	T	P	C	M
3	0	0	3	100

### COURSE OBJECTIVES:

**This course will enable the student to:**

- To construct an understanding of the fundamental concepts of computer networking.
- To acquire the knowledge of layered approach that makes design, implementation and operation of extensive networks possible.
- To allow the student to gain expertise in WWW.
- Understand the services of TCP and UDP Protocols.
- To provide the Internet trend and applications.

### UNIT I - INTRODUCTION 9

Communication model - Data communications and networks - Topologies - Transmission Media - Protocol architecture: OSI - TCP/IP - Data encoding techniques - Modems.

### UNIT II - DATA LINK LAYER 9

**Data link control protocols:** flow control and error control - HDLC - Error detection and Error correction - **Wired LANs:** MAC- Ethernet-Token ring - **wireless LANs:** 802.11 - Wi-Fi - Bluetooth - WiMAX.

### UNIT III - NETWORK LAYER 9

**Switching concepts:** Circuit switching - Packet switching - **IP addresses:** IPV4 Addresses-IPV6 Addresses - ICMP - Routing Protocols: Distance vector - Link state - BGP.

### UNIT IV - TRANSPORT LAYER 9

Transport layer services - User Datagram Protocol (UDP) - Transmission Control Protocol (TCP) - Connection establishment and termination - Congestion control and avoidance - Queuing disciplines.

### UNIT V - APPLICATION LAYER 9

Domain Name Space (DNS) - rlogin - Telnet-Electronic Mail: SMTP, MIME, And IMAP - FTP - WWW-HTTP-SNMP

**TOTAL = 45 Hours**

## **COURSE OUTCOMES:**

**At the end of the course the student should be able to:**

- Understand the fundamental concepts of data communications and networking
- Identify the different components and their respective roles in a computer communication system.
- Apply the knowledge, concepts and terms related to data communication and networking.
- Identify the different types of network topologies and protocols.
- Familiar with http protocol and World Wide Web.

## **REFERENCES**

1. Behrouz A. Forouzan, "Data communication and Networking", 5<sup>th</sup> Edition, Tata McGraw-Hill, 2012.
2. William Stallings, "Data and Computer Communication", 9<sup>th</sup> Edition, Pearson Education, 2011.
3. Larry L.Peterson& Bruce S.Davie, "Computer Networks - A systems approach", 5<sup>th</sup>Edition, Morgan Kaufmann Publishers, 2012.
4. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Pearson Education, 2003.
5. Andrew S. Tanenbaum, "Computer Networks", PHI, 4<sup>th</sup> Edition, 2003.

## P18MCA306 -JAVA PROGRAMMING LABORATORY

L	T	P	C	M
0	0	4	2	100

### COURSE OBJECTIVES:

**This course will enable the student to:**

- Gain knowledge on the basic programming skills in Java
- Understand inheritance, packages and interfaces in Java
- Interpret the need of OOP in Java
- Perceive the significance of programming techniques of Java
- Acknowledge the significance of Database connectivity in Java

### LIST OF EXPERIMENTS

1. Create an application that demonstrates Class, Methods and Objects in Java.
2. Create an application that demonstrates Inheritance and Interfaces.
3. Create an application that demonstrates Packages.
4. Implement an application that illustrates the methods of the STRING class.
5. Implement an application in OOP that illustrates the File handling.
6. Implement Multi-threading concepts in Java.
7. Implement the scenarios to handle exceptions in Java.
8. Implement the scenarios to play around with Arrays in Java.
9. Develop an application that uses AWT controls.
10. Develop an application using Applet and MySQL to demonstrate DB connectivity in Java.

**Total - 45 Hours**

### COURSE OUTCOMES:

**At the end of the course the student should be able to:**

- Demonstrate applications that implements various programming techniques and multi-threading.
- Design an application in Java based on the requirements for file handling and AWT controls.
- Create an application in Java that demonstrate Database connectivity

## P18MCA307 - DATA BASE DESIGN AND PROGRAMMING WITH SQL LABORATORY

L	T	P	C	M
0	0	4	2	100

### COURSE OBJECTIVES:

**This course will enable the student to:**

- Describe, define and apply the major components of the relational database model to database design
- Learn and apply the Structured Query Language (SQL) for database definition and manipulation
- Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
- design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

### LIST OF EXPERIMENTS

1) Consider the following schema for a Library Database:

BOOK (Book\_id, Title, Publisher\_Name, Pub\_Year)

BOOK\_AUTHORS (Book\_id, Author\_Name)

PUBLISHER (Name, Address, Phone)

BOOK\_COPIES (Book\_id, Branch\_id, No-of\_Copies)

BOOK\_LENDING (Book\_id, Branch\_id, Card\_No, Date\_Out, Due\_Date)

LIBRARY\_BRANCH (Branch\_id, Branch\_Name, Address)

Write SQL queries to

1. Retrieve details of all books in the library - id, title, name of publisher, authors, number of copies in each branch, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
5. Create a view of all books and its number of copies that are currently available in the Library.

2) Consider the following schema for Order Database:

SALESMAN (Salesman\_id, Name, City, Commission)

CUSTOMER (Customer\_id, Cust\_Name, City, Grade, Salesman\_id)

ORDERS (Ord\_No, Purchase\_Amt, Ord\_Date, Customer\_id, Salesman\_id)

Write SQL queries to

1. Count the customers with grades above Bangalore's average.
2. Find the name and numbers of all salesmen who had more than one customer.
3. List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.)
4. Create a view that finds the salesman who has the customer with the highest order of a day.

5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.

3) Consider the schema for Movie Database:

ACTOR (Act\_id, Act\_Name, Act\_Gender)

DIRECTOR (Dir\_id, Dir\_Name, Dir\_Phone)

MOVIES (Mov\_id, Mov\_Title, Mov\_Year, Mov\_Lang, Dir\_id)

MOVIE\_CAST (Act\_id, Mov\_id, Role)

RATING (Mov\_id, Rev\_Stars)

Write SQL queries to

1. List the titles of all movies directed by 'Hitchcock'.
2. Find the movie names where one or more actors acted in two or more movies.
3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).
4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.
5. Update rating of all movies directed by 'Steven Spielberg' to 5.

4) Consider the schema for College Database:

STUDENT (USN, SName, Address, Phone, Gender)

SEMSEC (SSID, Sem, Sec)

CLASS (USN, SSID)

SUBJECT (Subcode, Title, Sem, Credits)

IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)

Write SQL queries to

1. List all the student details studying in fourth semester 'C' section.
2. Compute the total number of male and female students in each semester and in each section.
3. Create a view of Test1 marks of student USN '1BI15CS101' in all subjects.
4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.
5. Categorize students based on the following criterion: If FinalIA = 17 to 20 then CAT = 'Outstanding' If FinalIA = 12 to 16 then CAT = 'Average' If FinalIA < 12 then CAT = 'Weak' Give these details only for 8th semester A, B, and C section students.

5) Consider the schema for Company Database:

EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)

DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)

DLOCATION (DNo, DLoc)

PROJECT (PNo, PName, PLocation, DNo)

WORKS\_ON (SSN, PNo, Hours)

Write SQL queries to

1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.
2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10

percent raise. 3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department

4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator). For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.

6) Consider the database for a college and design an ER diagram. Write the query for the following.

1. Create the tables:

- a. Student (sid, sname, sex, dob,dno)
- b. Department (dno, dname)
- c. Faculty (F\_id, fname, designation, salary,dno)
- d. Course (cid, cname, credits,dno)
- e. Register (sid,cid,sem )
- f. Teaching (f\_id,cid,sem)
- g. Hostel (hid,hname,seats,)

2. Include the necessary constraints NOT NULL, DEFAULT, CHECK, and PRIMARY KEY, UNIQUE.

3. Create a database college

4. Use college as the current database

5. Display all the tables in college database

6. Describe the structure of all tables

7. Modify the student table to add a new field 'grade'

8. Insert at least 5 tuples into each table.

9. List the details of students in the ascending order of date of birth

10. Display the details of students from computer department

11. List the faculties in the descending order of salary

12. Display the total number of students in each department

13. Display the total number of faculties in each department with salary greater than 25000

14. List out the ID, Name and Date of Birth of students registered for a specific course.

15. List out the ID, Name and Date of Birth of students registered for a specific course, staying in a specific Hostel.

16. List the names of faculties who teach for a specific course.

17. Display the student details by implementing left inner join

18. Display the student details by implementing a right outer join

19. Write a procedure which accepts the student number and displays the department in which he belongs to.

20. Create a cursor to modify the salary of 'Professors' belonging to all departments by 150%.

21. Consider the college database. Retrieve all students who have registered for a specific course and store their details into another table using cursors.

22. Write a before delete trigger on student table.

7) Consider the database for a banking enterprise. Write the queries for the below questions.

1. Create the following tables

Table	Attributes
customer	cid, cname, loc, sex, dob
Bank_brn	bcode, bloc, bsate
Deposit	Dacno, dtype, ddate, damt
Loan	Lacno, ltype, ldate, lamt
Accounts_in	Bcode, cid
depositor	cid, dacno
borrower	cid, lacno

2. Include necessary constraints such as NOT NULL, DEFAULT, CHECK, and PRIMARY KEY, UNIQUE.
3. Tables are created under the database 'bank'. Display all the tables in bank database. Describe the structure of all tables. Insert at least 5 tuples in each table
4. Display the branch details
5. List the customers of 'Mumbai' city
6. List the male customers of 'Kolkata' city
7. List the state having more than one branch.
8. List the deposit schemes provided by the bank to the customers
9. Delete the entire content of any table
10. List the deposit account number and amount in which the deposit scheme having maximum deposit is opened
11. List the account number and amount of that savings bank deposit scheme in which minimum amount is deposited.
12. List the customers having accounts in 'Chennai' branch
13. List the customers having more than one account
14. List the customers having same name but different account numbers.
15. List the customer name that is having maximum deposit account in bank
16. List the customer who has borrowed highest amount of home loan
17. Display the customer details by implementing left inner join
18. Display the customer details by implementing a right outer join
19. Write a procedure which accept the account number of a customer and retrieve the balance.
20. Consider the bank database. Retrieve all customers who have loan at a particular branch using cursor.
21. Write an update trigger on Account table. The system should keep track of the records that are being updated.

#### 8) Mini project

For any problem selected, write the ER Diagram, apply ER mapping rules, normalize the relations, and follow the application development process.

Make sure that the application should have five or more tables, at least one trigger and one stored procedure, using suitable frontend tool.

Indicative areas include; Health care, Agriculture, Industry, Transport, Supply chain, etc.

**Total - 45 Hours**



## **COURSE OUTCOMES:**

At the end of the course the student should be able to:

- Create database with different types of integrity constraints and use the SQL commands such as DDL, DML, DCL, and TCL to access data from database objects along with security.
- *identify* the basic concepts and various data model used in database design and ER modelling concepts and architecture use and *design* ER-models to represent simple database application scenarios.
- design, implement and demonstrate a database solution for real database applications.

## P18MCA308 - ADVANCED DATA STRUCTURES, ALGORITHMSLABORATORY

L	T	P	C	M
0	0	4	2	100

### COURSE OBJECTIVES:

**This course will enable the student to:**

- Write C program to design linear data structures and implement its operations.
- Write C program to design, arrange and apply searching techniques in non-linear data structures.
- Write C program to design algorithm techniques to solve real-time problems and implement data structures.

### LIST OF EXPERIMENTS

1. Stack and Queue implementation using array.
2. Singly linked list and its operations.
3. Implement stack and its application using linked list.
4. Implement queue using linked list.
5. Doubly linked list and its operations.
6. Circular linked list and its operations.
7. Apply tree traversals to visit n nodes in a tree.
8. Sort n numbers using Merge and Quick sort techniques.
9. Find the shortest path in a graph using Dijkstra algorithm.
10. Generate random numbers.

**Total - 45 Hours**

### COURSE OUTCOMES:

**At the end of the course the student should be able to:**

- Design List ADTs.
- Implement searching, sorting techniques in trees and graphs.
- Apply suitable designing algorithm in data structures that solve real-time problems.

## P18MCA309 - SOFT SKILL DEVELOPMENT LABORATORY-III

L	T	P	C	M
0	0	2	1	100

- **Focus on Language-** suffix, prefix, error detection, compound noun, countable / uncountable nouns, collocations, phrasal verbs, idioms and phrases, link expressions, question tags
- **Reading** - Reading comprehension, understanding notices, messages, timetables, advertisements, graphs, etc. reading passages for specific information transfer
- **Writing** - Report writing, proposal writing
- **Speaking** - Self introduction, personal information, name, home background, study details, area of interest, hobbies, strengths and weaknesses, projects and paper presentations, likes and dislikes in food, travel, clothes, special features of home town, Introduction to articulation skills, mini presentation, situational role play

**Total - 30 Hours**

### **COURSE OUTCOMES:**

**At the end of the course the student should be able to:**

- Exhibit good understanding of the basic grammar of the language
- Prepare reports and proposals
- Introduce themselves in a formal situation
- Read and interpret timetables, graphs, etc.

### **References**

- English and Soft Skills, Dhanavel, S.P. Hyderabad: Orient Black Swan Ltd. 2010.
- Fundamentals of Business English- Infosys Campus Connect
- Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Norman Whitby Cambridge University Press, 2006.
- Common Mistakes at Intermediate- Liz Driscoll