

University of Engineering and Management



INSTITUTE OF ENGINEERING & MANAGEMENT, NEWTOWN

DEPARTMENT OF COMPUTER APPLICATIONS

DETAILED SYLLABUS BOOKLET –

2ND SEMESTER – MCA – 2025-2027 BATCH



Syllabus Structure

1st Year 2nd Semester

Course Code	Course Title	Total No. of Contact Hours				Total No. of Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
2nd Semester (Theory)						
MCA201	Database Management System	3	1	0	4	4
MCA202	Object-Oriented Programming with Java	3	1	0	4	4
MCA203	Data Communication & Computer Networks	3	1	0	4	4
MCA204	Advanced-Data Structures with C	3	1	0	4	4
MCA(GS)201	General Studies & Current Affairs-II	2	0	0	2	0.5
Total of Theory					18	16.5
2nd Semester (Practical)						
MCAC291	Database Management System Laboratory	0	0	3	3	3
MCAC292	Object-Oriented Programming with Java Laboratory	0	0	3	3	3
MCAC294	Advanced-Data Structures with C Laboratory	0	0	3	3	3
Total of Practical					9	9
2nd Semester (Sessional)						
IVC282	Economics, Finance and Entrepreneurship Skills - Intermediate	0	0	0	2	0
MCA(GS)281	Competitive Aptitude Training - II	2	0	0	2	0.5
IFC	Industry and Foreign Certification	0	0	0	0	0
MAR	Mandatory Additional Requirements	0	0	0	0	0
MOOCs	Massive Open Online Course	0	0	0	0	0
Total of Sessional					2	0.5
Total of Semester					29	26



**University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
2nd Semester Syllabus for MCA Admission Batch 2025**





University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2025, 2nd Semester



Subject Name: Database Management Systems

Credit: 4

Subject Code: MCA201

Lecture Hours: 40

Name of the Course: Database Management Systems	
Course Code: MCA201& MCA291	Semester: 2 nd
Duration: 40 Hrs.	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 3	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 2	Practical Sessional Internal continuous evaluation: 40
Credit: 4+2	Practical Sessional external examination: 60

Aim:	
1.	To gain Knowledge of technology used to manage data from a database
2.	To enhance Ability to identify Data into information, Information into knowledge and Knowledge to the action
3.	To gain Understanding of ORACLE software
Objective:	
1.	This course introduces the core principles and techniques required in the design and implementation of database systems.
2.	This course focus on relational database management systems, including database design theory: E-R modeling, data definition and manipulation languages, database security and administration.
3.	It covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery
4.	It provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.
Pre-Requisite:	
1.	Concepts of computer programming (like programming in C --Files concepts).
Course Outcome:	
1.	Understand the basic concepts and the applications of database systems.
2.	Master the basics of SQL and construct queries using SQL.
3.	Understand the relational database design principles.
4.	Familiar with the basic issues of transaction processing and concurrency control.
Relevant Links:	
DBMS Study Material DBMS NPTEL Link DBMS Coursera Link DBMS Linkedin Learning Link	

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1:	3	2	2	1	1	1	0	0	0	1	0	2	2	3	1
CO2:	3	3	2	2	3	1	0	0	0	1	0	2	3	3	1
CO3:	3	3	3	1	3	1	0	0	0	1	0	2	3	3	1
CO4:	3	3	3	2	3	1	0	0	0	1	0	2	3	3	1

Module Number	Topic	Sub-Topics	Mapping with Industry & Academia	Lecture Hours	Corresponding Lab Assignment
1	Introduction: Database System Applications	Database System Applications, Purpose of Database Systems, View of Data, Database Languages – DDL, DML, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators, History of Database Systems. Introduction to Data base design: Database Design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.	<i>International Academia:</i> https://ocw.mit.edu/course/s/1-264j-database-internet-and-systems-integration-technologies-fall-2013/pages/syllabus/ <i>AICTE-prescribed syllabus:</i> https://www.aicte-india.org/sites/default/files/Model_Curriculum/flipbook/CSE(UG)/index.html#p=123	3	Annexure – I (SQL Query based Lab – Assignments) Assignment – 1: Design E-R Diagrams for Different case studies
	Relational Model	Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational, Introduction to Views, Destroying /Altering Tables and Views.	Basic DBMS was previously available in the MCA syllabus and is in sync with the syllabus of AICTE and the University of Berkeley. All the basic concepts are as per the industry standards.	5	Assignment – 2: Case Studies using basic SQL Relational Algebra Operations
2	Relational Algebra and Calculus	Preliminaries, Relational Algebra, Relational calculus – Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus. SQL: Queries, Constraints, Triggers: Form of Basic SQL Query, UNION, INTERSECT, and EXCEPT, Nested Queries, Aggregate Operators, NULL values Complex Integrity All JNTU World Constraints in SQL, Triggers and	<i>International Academia:</i> https://ocw.mit.edu/course/s/1-264j-database-internet-and-systems-integration-technologies-fall-2013/pages/syllabus/ <i>AICTE-prescribed syllabus:</i> https://www.aicte-	10	Assignment – 3: Case Studies using basic SQL Relational Algebra Operations

		Active Data bases, Designing Active Databases.	india.org/sites/default/files/Model_Curriculum/flipbook/CSE(UG)/index.html#p=123 Industry Mapping and Gap Analysis: Basic Java programming was previously available in the MCA syllabus and is in sync with the syllabus of AICTE and the University of Berkeley. All the basic concepts are as per the industry standards.		
3	Schema Refinement and Normal Forms	Introduction to Schema Refinement, Functional Dependencies - Reasoning about FDs, Normal Forms, Properties of Decompositions, Normalization, Schema Refinement in Database Design, Other Kinds of Dependencies.	International Academia: https://ocw.mit.edu/course/s/1-264j-database-internet-and-systems-integration-technologies-fall-2013/pages/syllabus/AICTE-prescribed-syllabus/ https://www.aicte-india.org/sites/default/files/Model_Curriculum/flipbook/CSE(UG)/index.html#p=123 Industry Mapping and Gap Analysis: Collection Class is incorporated as per international standards.	6	Assignment – 4: SQL based assignment on different normalforms
4	Transaction Management	Transactions, Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation,	International Academia: https://ocw.mit.edu/course/s/1-264j-database-internet-and-systems-integration-	8	Assignment – 5: SQL-based assignment on Transaction Management

		Serializability, Transaction Isolation and Atomicity Transaction Isolation Levels, Implementation of Isolation Levels.	technologies-fall-2013/pages/syllabus/AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/flipbook/CSE(UG)/index.html#p=123		
	Concurrency Control	Lock-Based Protocols, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multiversion Schemes. Recovery System-Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with loss of nonvolatile storage, Early Lock Release and Logical Undo Operations, Remote Backup systems.	Industry Mapping and Gap Analysis: Java applets were deprecated by Java 9 in 2017. Thus, only the basics of the applet are included and Swings, AWT and event handling are taught in detail. Oracle Announces EndOf Java Applet Support		Assignment – 6: SQL-based assignment on Transaction Management
5	Storage and Indexing	Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index Data Structures, Comparison of File Organizations. Tree-Structured Indexing: Intuition for tree Indexes, Indexed Sequential Access Method (ISAM)	International Academia & AICTE-prescribed syllabus: https://ocw.mit.edu/course/s/1-264j-database-internet-and-systems-integration-technologies-fall-2013/pages/syllabus/	6	Assignment – 6: Implement B+ tree in Python
	B+ Trees	A Dynamic Index Structure, Search, Insert, Delete. Hash- Based Indexing: Static Hashing, Extendible hashing, Linear Hashing, Extendible vs. Linear Hashing.	Industry Mapping and Gap Analysis: e-Brochure (cdac.in) Industry requirement for full stack development, previously missing which is partially		

			incorporated.		
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List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Abraham Silberschatz, Henry F. Korth, et al.	Database System Concepts	Seventh Edition	McGraw-Hill
Reference Books:			
Raghu Ramakrishnan and Johannes Gehrke	Database Management Systems (McGraw-Hill International Editions: Computer Science Series)	ISE	Dreamtech Press

Annexure – I (SQL based Lab – Assignments)

Assignment – 1:

Consider the following relational schema for the Office of the Controller of Examinations Application. Student (Rollno, Name, Dob, Gender, Doa, Bcode);
Implement a check constraint for Gender

Date of Admission

Branch (Bcode, Bname, Dno); Department (Dno, Dname);

Course (Ccode, Cname, Credits, Dno); Branch_Course (Bcode, Ccode, Semester);

Enrolls (Rollno, Ccode, Sess, Grade);

For Example,

SESS can take values ‘APRIL 2013’, ‘NOV 2013’

Implement a check constraint for grade Value Set (‘S’, ‘A’, ‘B’, ‘C’, ‘D’, ‘E’, ‘U’);

Students are admitted to Branches and they are offered by Departments. A branch is offered by only one department.

Each branch has a set of Courses (Subjects). Each student must enroll during a semester. Courses are offered by Departments. A course is offered only by one department. If a student is unsuccessful in a course he/she must enroll for the course during next session. A student has successfully completed a course if the grade obtained by is from the list (A, B, C, D, and E).

A student is unsuccessful if he/she have grade 'U' in a course. Primary Keys are underlined.

Questions

These are questions for assignment 1

Question (A)

Develop a SQL query to list details of Departments that offer more than 3 branches.

Question (B)

Develop a SQL query to list the details of Departments that offer more than 6 courses.

Question (C)

Develop a SQL query to list the details of courses that are common for more than 3 branches.

Question (D)

Develop a SQL query to list students who got 'S' in more than 2 courses during single enrollment.

Question (E)

Create a view that will keep track of the roll number, name and number of courses, a student has completed successfully.

Assignment – 2:

Consider the following relations for an Order Processing Database application in a Company.

Customer (Customerno varchar2 (5), Cname varchar2 (50)); Implement check constraints to check Customerno starts with 'C'.

Cust_Order (Orderno varchar2(5), Odate Date, Customerno references Customer, Ord_amt number(8)); Implement check constraints to check Orderno starts with 'O'.

Ord_amt is derived attribute (default value is 0);

Item (Itemno varchar2 (5), Item_name varchar2 (30), unit_price number (5)); Implement check constraint to check Itemno starts with 'I'.

Order_item (Orderno references Cust_order, Itemno references item, qty number (3));

Primary Key is underlined. Questions

These are questions for assignment 2. The solution is available after the last question.

Question (A)

Develop DDL to implement above schema enforcing primary key, check constraints and foreign key constraints.

Question (B)

Populate Database with rich data set.

Question (C)

Develop SQL query to list the details of customers who have placed more than 3 orders.

Question (D)

Develop a SQL query to list details of items whose price is less than the average price of all items in each order.

Question (E)

Develop a SQL query to list the orderno and number of items in each order.

Question (F)

Develop a SQL query to list the details of items that are present in 25% of the orders.

Question (G)

Develop an update statement to update the value of Ord_amt.

Question (H)

Create a view that keeps track of detail of each customer and number of Order placed.

Assignment – 3:

Q3: Consider the following relational schema

Staff (Staffno number (5), Name varchar2 (30), Dob Date, Gender Char (2), Doj Date, Designation varchar2 (30), Basic_pay number (6), Deptno varchar2 (5));

Gender must take value 'M' or 'F'.

Dept (Deptno varchar2 (5), Name varchar2 (30));

Skill (Skill_code varchar2 (5), Description varchar2 (30), Charge_Outrage number (3)); Staff_skill (Staffno number (5), Skill_code varchar2 (5));

Project (Projectno varchar2 (5), Pname varchar2 (5), Start_Date Date, End_Date Date, Project_Manager_Staffno number (5)); Project Number must start with 'P'.

Works (Staffno number (5), Projectno varchar2 (5), Date_Worked_On Date, Intime Timestamp, Outtime Timestamp);

Primary Key is underlined. Questions

These are questions for assignment 3. The solution is available after the last question.

Question (A)

Develop DDL to implement the above schema specifying appropriate data types for each attributes and enforcing primary key, check constraints and foreign key constraints.

Question (B)

Populate the database with rich data set.

Question (C)

Develop a SQL query to list the departmentno and number of staff in each department,

Question (D)

Develop a SQL query to list the details of staff who earn the AVG basic pay of all staff.

Question (E)

Develop a SQL query to list the details of staff who have more than 3 skills.

Question (F)

Develop a SQL query to list the details of staff who have skills with a charge outrate greater than 60 per hour.

Question (G)

Create a view that will keep track of the department number, department name, the number of employees in the department and total basic pay expenditure for the department.

Question (H)

Develop a SQL query to list the details of Depts which has more than 5 staff working in it.

Question (I)

Develop a SQL query to list the details of staff who have more than 3 skills.

Assignment – 4:

Consider the following relational schema for a banking database application. Customer (Cid, Cname);

Branch (Bcode, Bname);

Account (Ano, Atype, Balance, Cid, Bcode);

An account can be a saving account or a current account. Check Atype in 'S' or 'C'. A customer can have both types of accounts. Transaction (Tid, Ano, Tttype, Tdate, Tamount);

Ttype can be 'D' or 'W'.

D – Deposit, W – Withdrawal Primary Key is underlined. Questions

These are questions for assignment 4. The solution is available after the last question.

Question (A)

Develop DDL to implement the above schema specifying an appropriate data type for each attribute enforcing primary key, check constraints and foreign key constraints.

Question (B)

Populate the database with a rich data set.

Question (C)

Develop a SQL query to list the details of customers who have a saving account and a current account.

Question (D)

Develop a SQL query to list the details of branches and the number of accounts in each branch.

Question (E)

Develop a SQL query to list the details of branches where the number of accounts is less than the average number of accounts in all branches.

Question (F)

Develop a SQL query to list the details of customers who have performed three transaction on a day.

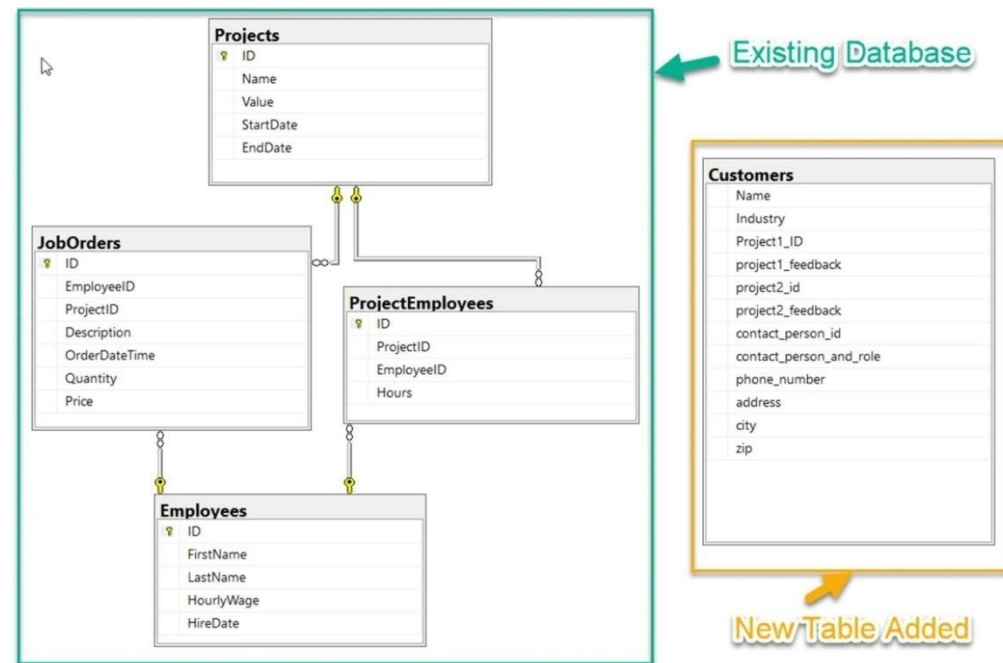
Question (G)

Create a view that will keep track of branch details and the number of accounts in each branch.

Assignment – 5 :

Let us consider the following database schema. As you can see in below figure, there are four tables (Existing Database)

- Projects, Employees, ProjectEmployees, and JobOrders. Recently, the Customers table has also been added to the database to store the customers' information. As you can see in the diagram below, the Customers table has not been designed in a proper way to support the normal forms, let's go ahead and fix it.



The Customers table in the diagram violates all the three rules of the first normal form.

We do not see any Primary Key in the table.

The data is not found in its most reduced form. For example, the column ContactPersonAndRole can be divided further into two individual columns

- ContactPerson and ContactPersonRole.

Also, we can see there are two repeating groups of columns in this table - (Project1_ID, Project1_FeedBack) and (Project2_ID, Project2_Feedback). We

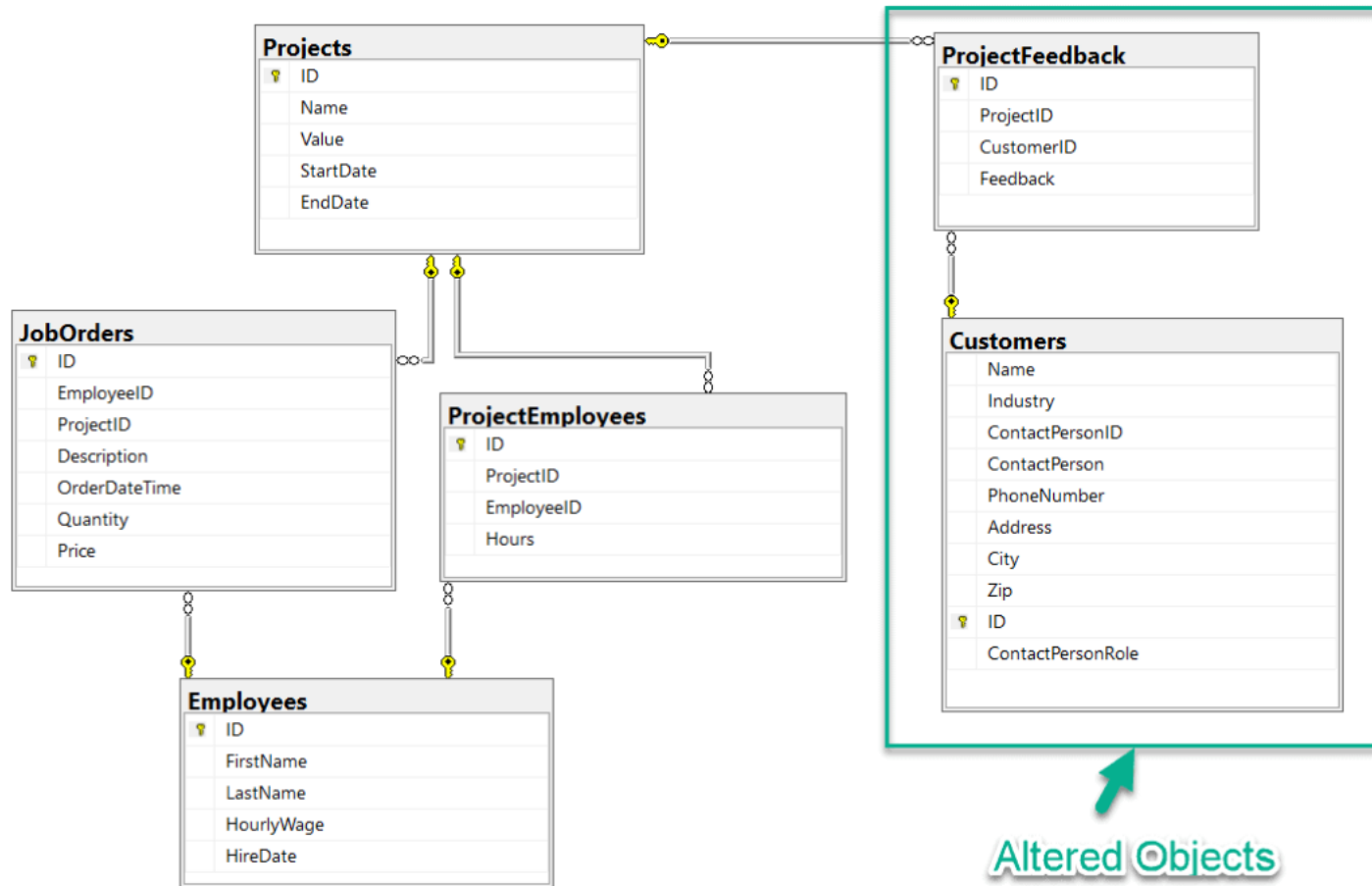
need to get these removed from this table.

The diagram below shows dummy data stored in the Customers table.

Name	Industry	Project1_ID	Project1_Feedback	Project2_ID	Project2_Feedback	ContactPersonID	ContactPersonAndRole	PhoneNumber	Address	City	Zip
Zydus Cadilla	Pharma	2455	Amazing Work!			133	Dave, HoD	555-55-5555	1, Landing Street	York	23456
HDFC	Finance	9855	Nice job!	4924	Fantastic!	146	Mark, Ops Lead	222-22-2222	2, Times Square	London	86421
ICICI	Finance	3965	Well done.			122	Peter, Analyst	444-44-4444	3, Garden Street	Brussels	53864

- a. Add a primary key to this table. For this, add a new column *ID* with datatype as *INT* and also assign it as an *Identity* column.
- b. split the column *ContactPersonAndRole* into two individual columns. This can be done in two steps as follows:
 - i. Rename the original column from *ContactPersonAndRole* to *ContactPerson*.
 - ii. Add a new column for *ContactPersonRole*.
- c. Finally, in order to satisfy the third rule of the First Normal Form, move the columns *Project1_ID*, *Project1_Feedback*, *Project2_ID*, and *Project2_Feedback* into a new table. This can be done by creating a new table *ProjectFeedbacks* and link it back with the *Customers* and the *Projects* table which remove the above-mentioned columns from the *Customers* table and create a new table *ProjectFeedbacks* with Foreign Key references to the *Customers* and *Projects* table.

The database schema after applying all the rules of the first normal form should be as below.



if you see the database schema diagram above, you can see that the *ContactPerson*, *ContactPersonRole* and the *PhoneNumber* do not directly relate to the *ID* of the *Customers* table. That is because the primary key refers to a customer and not to any person or role or the phone number of the contact person.

1. Remove all these columns from the *Customers* table which do not relate to the primary key of the table directly.

2. Once, the columns are removed from the *Customers* table, now create a new table that'll store the data for the contact persons. Let us create a new table *ContactPersons* and relate it to the *Customers* table with a foreign key relation

Assignment – 6:

Implement B+ tree using any Programming Language.

List of Minor Projects Based on SQL

1. Blood Donation Management System
2. Cooking Recipe Website
3. Library Database Management System
4. Online Retail Database Software
5. Inventory Management System
6. Voice Commands Transport Enquiry System
7. Carbon-Emission Calculator
8. Railway Control System Database
9. Student Database Management
10. Hospital Management System
11. Payroll Management System
12. Grocery Store Sales



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Syllabus for MCA Admission Batch 2025, 2nd Semester



Subject Name: Object-Oriented Programming

Credit: 4

Subject Code: MCA202

Lecture Hours: 40

Name of the Course: Object-Oriented Programming with Java & Object-Oriented Programming with Java Laboratory	
Course Code: MCA202 and MCA292	Semester: 2 nd
Duration: 40 Hrs.	Maximum Marks: 100 + 100
Teaching Scheme	Examination Scheme
Theory: 3	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 2	Practical Sessional Internal continuous evaluation: 40
Credit: 4+2	Practical Sessional external examination: 60
AIM:	
Sl. No.	
1.	To gain the knowledge of basic object-oriented programming techniques.
2.	Learning the underlying concepts of Java Programming.
3.	Get industry ready with the coding skills.

Course Objectives:			
Sl. No.			
1.	To understand the basic concepts and fundamentals of platform independent object-oriented language.		
2.	To demonstrate skills in writing programs using exception handling techniques and multithreading.		
3.	To understand streams and efficient user interface design techniques.		
Pre-Requisite:			
Sl. No.			
1.	Basics of programming language.		
2.	Logic building skills.		
Course Outcome:			
Sl. No.			
1.	Students should have an idea of how to work with different datatypes, operators, conditional statements and iterative statements in Java.		
2.	Students should have an idea of how to work with strings, arrays, and different collection interfaces.		
3.	Students should be able to use and design programs using their advanced data structures, I-O Streams, AWT, and GUI Programming using Applets and Swings.		
4.	Students will learn to work with object-oriented programming constructs in Java using JDBC, JSP, Servlets and Databases and make small projects based on them.		
Relevant Links:			
JAVA Course Material	JAVA NPTEL Link	JAVA Coursera Link	JAVA LinkedIn Learning

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1:	3	2	2	1	1	1	0	0	0	1	0	2	2	3	1
CO2:	3	3	2	2	3	1	0	0	0	1	0	2	3	3	1
CO3:	3	3	3	1	3	1	0	0	0	1	0	2	3	3	1
CO4:	3	3	3	2	3	1	0	0	0	1	0	2	3	3	1

Module Number	Topic	Sub-Topics	Mapping with Industry and Academia	Lecture Hours	Corresponding Lab Assignment
1	OOPs Concept	Object, Class, Data abstraction, Data encapsulation, Inheritance, Polymorphism, Dynamic binding	<i>International Academia:</i> First Course in Java – EL ENG X429.9 UC Berkeley Extension <i>AICTE-prescribed syllabus:</i> MAKAUT – MCA 2ND SEM SYLLABUS <i>Industry Mapping and Gap Analysis:</i> Basic Java programming was previously available in the MCA syllabus and is in sync with the syllabus of AICTE and the University of Berkeley. All the basic concepts are as per the industry standards.	1	Annexure – I (Programming based Lab – Assignments) Assignment – 1: Basic Programming and Command Line Arguments
	An overview of Java	History of Java, Java features, JVM, Comparison between Java and C++, Idea of Java Development Kit (JDK), learn to run Java program through the command line.		1	
	Data Concept	Data Types, Variables, Arrays and constants Tokens in Java (Identifiers, Literals, Keywords, Operator)		2	
	Control Statements	Simple if statement, if-else statement, Nesting of if-else statement, switch statement		2	Assignment – 2: Constructors & Inheritance
	Iteration Statement	for loop, while loop, do-while loop		1	Assignment – 3: Flow Control
	Classes and Objects	Creating main() in a separate class, Methods with parameters, Methods with a return type, Method overloading, Passing Objects as Parameters, Passing Values to methods and Constructor, Abstract classes		3	

2	String and String Buffer	Use of different functions	<i>International Academia:</i> First Course in Java – EL ENG X429.9 UC Berkeley Extension <i>AICTE-prescribed syllabus:</i> MAKAUT – MCA 2ND SEM SYLLABUS <i>Industry Mapping and Gap Analysis:</i> Basic Java programming was previously available in the MCA syllabus and is in sync with the syllabus of AICTE and the University of Berkeley. All the basic concepts are as per the industry standards.	2	Assignment – 4: Inheritance and Dynamic Polymorphism
	Inheritance	Basic concepts, types of inheritance, use of super keyword, overriding methods.		2	
	Packages, Interfaces	User-defined package, standard packages, import package, Class path, how to create interface, use and extend interface		3	Assignment – 5: Abstract class & Interface in Java.
	Multithreaded Programming	Overview, Thread Life cycle, Advantages of multithreading over multitasking, Thread Creation, Synchronized threads, Synchronized Methods		3	Assignment – 6: Threads, Multithreading & Thread Synchronization
3	Exception Handling	Overview of exception, Compile time errors Run time errors, try-catch, use of multiple catch Blocks, finally block, throwing an exception, using the throw and throws statement.	<i>International Academia:</i> CS – 108 – Object Oriented System Design Stanford University <i>AICTE-prescribed syllabus:</i> MAKAUT – MCA 2ND SEM SYLLABUS <i>Industry Mapping and Gap Analysis:</i> Collection Class is incorporated as per international standards.	3	Assignment – 7: Exception Handling & Collections
	Collections	Collections, Iteration, Set and SortedSet, List, Map and SortedMap, Legacy Collection Types		3	
4	Stream	Byte Streams, Input Stream, Output Stream Character Streams (Reader, Writer), How Files and Streams Work, Working with Reader classes (InputStreamReader, BufferedReader)	<i>International Academia:</i> CS – 108 – Object Oriented System Design Stanford University	3	Assignment – 8: Keyboard input and string handling in Java

	Applets	Applet vs. Application, Applet class, Advantages of Applet, Applet	<i>AICTE-prescribed syllabus:</i> MAKAUT – MCA 2ND SEM SYLLABUS	2	
	Abstract Window Toolkit	GUI Components, Interface and Classes of AWT Package, Swings, Labels, Buttons, Check Boxes, Radio button, Text Area, Text Field, Scrollbar, Panels, Layout managers, Simple event-driven programming with Text Field and Button	<i>Industry Mapping and Gap Analysis:</i> Java applets were deprecated by Java 9 in 2017. Thus, only the basics of the applet are included and Swings, AWT and event handling are taught in detail. Oracle Announces End Of Java Applet Support	3	Any one web-based project as per Annexure-II.
5	JDBC and Web Application Development	Generic Servlet, HTTP Servlet, Server-Side Include, Overview of JSP, JSP Components, Bean, Session Tracking, Accessing Database with JDBC, Basics, Manipulating Databases with JDBC	<i>International Academia & AICTE-prescribed syllabus:</i> CSE IIT KGP Object Oriented Programming with JAVA <i>Industry Mapping and Gap Analysis:</i> e-Brochure (cdac.in) Industry requirement for full stack development, previously missing which is partially incorporated.	6	

List of Books			
Text Books			
Name of Author	Title of the book	Edition/ISSN/ISBN	Name of the Publisher
Herbert Schildt	Java: The Complete Reference	Eleventh Edition	McGraw-Hill
Ken Arnold, David Holmes, James Gosling, Prakash Goteti	The Java Programming Language	Third Edition	Pearson Education
E. Balagurusamy	Programming with Java	Fourth Edition	McGraw-Hill
Reference Books:			
Core Java An Integrated Approach (Black Book)	Core Java An Integrated Approach (Black Book)	First Edition	Dreamtech Press
Kogent Learning Solutions	Web Technologies, Black Book	First Edition	Dreamtech Press
Paul Deitel, Harvey Deitel	Java How to Program: Early Objects	Eleventh Edition	Pearson Education
Kathy Sierra, Bert Bates, Trisha Gee	Head First Java: A Brain-Friendly Guide	Third Edition	Shroff/O'Reilly

Annexure – I (Programming based Lab – Assignments)

Assignment – 1: Basic Programming and Command Line Arguments

1. Write a Java Program to print your Name entered through the command line as an argument.
2. Write a Java program to convert Temperature from Fahrenheit to Celsius and vice versa.
3. Write a Java program to add two numbers.
4. Write a Java Program to find the area and Perimeter of a rectangle.
5. Write a program in Java to find the maximum of three numbers.
6. Write a Java Program to check whether a given year is a leap year.
7. Create four different classes with three of them containing the function main. Save the file with a different name than that of the class name and run each of the classes with the main function.
8. Write a Java program to reverse a number entered as a command line argument.
9. Write a Java program to count the number of digits entered through the command line argument.
10. Write a Java program to find all the multiples of 3 within a given range where the starting and ending values are entered through a command line argument.

Assignment – 2: Constructors & Inheritance

1. Write a class, Grader, which has an instance variable, score, an appropriate constructor and appropriate methods. A method, lettergrade (), that returns the letter grade as O/E/A/B/C/F. Now write a demo class to test the Grader class by reading a score from the user, using it to create a Grader object after validating that the value is not negative and is not greater than 100. Finally, call the letterGrade() method to get and print the grade.
2. Write a class, Commission, which has an instance variable, sales; an appropriate constructor; and a method, commission() that returns the commission. Now write a demo class to test the Commissionclass by reading a sale from the user, using it to create aCommission object after validating that the value is not negative. Finally, call the commission() method to get and print the commission. If the sales are negative, your demo should print the message “Invalid Input”.
3. For a Mobile Shop project, create a “Telephone” class with details like mobile_id, model_name and available_quantity in “Phone” package. Inherit from this class and create a class for “smart_phone” with necessary information like enabled_5G, foldable and dual_screen in package “Smart”. The customer executive tries to display all smart_phone details (mobile_id, model_name, available_quantity, enabled_5G, foldable and dual_screen) and updates the quantity information, whenever the customer purchases the smart_phone. Write the necessary java programs to implement this scenario and test with user inputs.
 4. An educational institution maintains a database of its employees. The database is divided into a number of classes whose hierarchical relationships are shown below. Write all the classes and define the methods to create the database and retrieve individual information as and when needed. Write a driver program to test the classes. Staff (code, name), Teacher (subject, publication) is a Staff, Officer (grade) is a Staff, Typist (speed) is a Staff RegularTypist (remuneration) is a Typist, and CasualTypist (daily wages) is a Typist.

Assignment – 3: Flow Control

1. The process of finding the largest value (i.e., the maximum of a group of values) is used frequently in computer applications. For example, a program that determines the winner of a sales contest would input the number of units sold by each salesperson. The salesperson who sells the most units wins the contest. Build a Java application that inputs a series of 10 integers and determines and prints the largest integer. Your program should use at least the following three variables:
 - a. counter: A counter to count to 10 (i.e. to keep track of how many numbers have been input and to determine when all 10 numbers have been processed).
 - b. number: The inter most recently input by the user.
 - c. largest: The largest number found so far.

Note: Every time the sales figure of one employee is entered, the application should ask the user if they want to enter any more sales figures of a salesperson!

2. Write an application that prompts the user to enter the size of the side of a square, and then displays a hollow square of that size made of asterisks. Your program should work for squares of all side lengths between 1 and 20.
3. Write a program to compute the following formula.
$$e = 1/0! + 1/1! + 1/2! + 1/3! + \dots + 1/n!$$
4. Using an enhanced for (for-each) loop, copy the content of one 3-dimensional array to another 3-dimensional array and display its contents.
5. Create the following vase pattern using a loop:

```
*****  
 \      /  
 /      \  
 \      /  
 /      \  
 \      /  
 /      \  
*****
```

Assignment – 4: Inheritance and Dynamic Polymorphism

1. Create a general class ThreeDObject and derive the classes Box, Cube, Cylinder and Cone from it. The class ThreeDObject has methods wholeSurfaceArea() and volume(). Override these two methods in each of the derived classes to calculate the volume and whole surface area of each type of three-dimensional object. The dimensions of the objects are to be taken from the users and passed through the respective constructors of each derived class. Write a main method to test these classes.
2. Create a base class Building that stores the number of floors of a building, the number of rooms and its total footage. Create a derived class House that inherits the Building and also stores the number of bedrooms and bathrooms. Demonstrate the working of the classes.
3. In the earlier program, create a second derived class Office that inherits the Building and stores the number of telephones and tables. Now demonstrate the working of all three classes.
4. Create a base class Distance which stores the distance between two locations in miles and a method travelTime(). The method prints the time taken to cover the distance when the speed is 60 miles per hour. Now in a derived class DistanceMKS, override travelTime() so that it prints the time assuming the distance is in kilometres and the speed is 100 km per second. Demonstrate the working of the classes.
5. Create a base class called “vehicle” that stores the number of wheels and speed. Create the following derived classes –“car” that inherits “vehicle” and also stores the number of passengers.

“truck” that inherits “vehicle” and also stores the load limit.

Write a main function to create objects of these two derived classes and display all the information about “car” and “truck”. Also, compare the speed of these two vehicles - car and truck and display which one is faster.

Assignment – 5: Abstract class & Interface in Java.

1. Design an abstract class having two methods. Create Rectangle and Triangle classes by inheriting the shape class and override the above methods to suitably implement for Rectangle and Triangle class.
2. Write a program to create a class named Vehicle having protected instance variables regnNumber, speed, colour, ownerName and a method showData() to show “This is a vehicle class”. Inherit the Vehicle class into subclasses named Bus and Car having individual private instance variables route Number in Bus and manufacturer Name in Car and both of them having showData() method showing all details of Bus and Car respectively with the content of the super class’s showData() method.
3. Create an interface Department containing attributes deptName and deptHead. It also has abstract methods for printing the attributes. Create a class hostel containing hostelName, hostelLocation and numberOfRooms. The class contains methods for getting and printing the attributes. Then write a Student class extending the Hostel class and implementing the Department interface. This class contains attributes studentName, regdNo, electiveSubject and avgMarks. Write suitable getData and printData methods for this class. Also, implement the abstract methods of the department interface. Write a driver class to test the Student class. The program will be menu driven containing the options:
 - i) Admit new student
 - ii) Migrate a student
 - iii) Display details of a student

For the third option, a search is to be made on the basis of the entered registration number.

4. Create an abstract class Accounts with the following details:

Data Members:

- (a) Balance
- (b) accountNumber
- (c) accountHoldersName
- (d) address

Methods:

- (a) withdrawl()- abstract
- (b) deposit()- abstract
- (c) display() to show the balance of the account number

Create a subclass of this class SavingsAccount and add the following details:

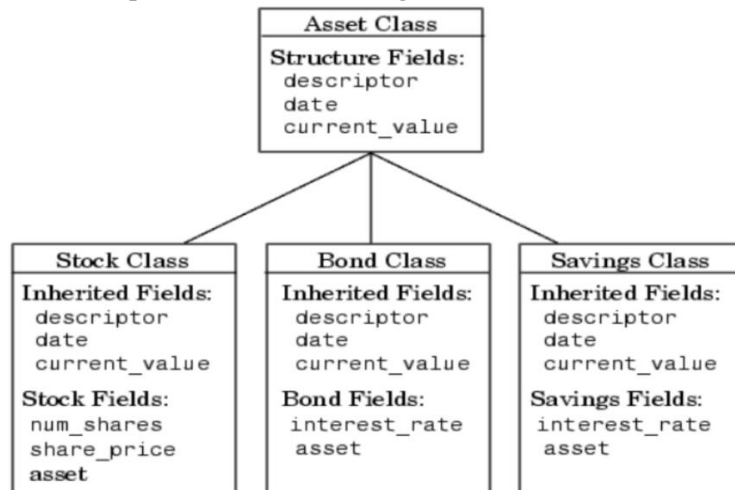
Data Members:

- (a) rateOfInterest

Methods:

- (a) calculateAount()

5. Implement the below Diagram.



Here, Asset class is an abstract class containing an abstract method displayDetails() method. Stock, bond and Savings class inherit the Asset class and displayDetails() method is defined in every class.

Assignment – 6: Threads, Multithreading & Thread Synchronization

1. Write a Java program in which a total of 4 threads should run. Set different priorities for the thread.
2. Write a Java Program to Create a Thread that Implements the Runnable Interface.
3. Write a Java Program to Check the Priority Level of a Thread.
4. Write a Java Program Defining Thread by Extending the Thread class.
5. Write a Java Program to Get the Name of a Running Thread.
6. Write a Java Program to Stop a Thread.
7. Write a Java Program to Check Whether Define a Thread Class Without Defining run() Method in the Class.
8. Write a Java Program to Show that Method Will be Verified Whether it is Synchronized or Not.
9. Create 4 threads with priority 1,3,5,7 respectively. Update a counter in each of the threads for 10 ms. Print the final value of the count for each thread.
10. Write a Java Program to Use Method Level Synchronization.

Assignment – 7: Exception Handling& Collections

1. Write a Java program using try and catch to generate Array Index Out of Bound Exception and Arithmetic Exception.
2. Write a class that keeps a running total of all characters passed to it(one at a time) and throws an exception if it is passed a non-alphabetic character.
3. Write a program that takes a value at the command line for which the factorial is to be computed. The program must convert the string to its integer equivalent. Three possible user input errors can prevent the program from executing normally.
 - The first error occurs when the user provides no argument while executing the program, and an arrayIndexOutOfBoundsException is raised. You must write a catch block for this.
 - The second error is NumberFormatException which is raised in case the user provides a non-integer (float double) value at the command line.
 - The third error is IllegalArgumentException. This needs to be thrown manually if the value at the command line is 0.
4. Create a user-defined exception named CheckArgument to check the number of arguments passed through the command line. If the number of arguments is less than 5, throw the CheckArgumentexception, and print the addition of all the five numbers.
5. Write a Java program to create a custom Exception that would handle at least 2 kinds of Arithmetic Exceptions while calculating a given equation (e.g. $X+Y*(P/Q)Z-I$).
6. Given an element write a program to check if an element(value) exists in ArrayList.
7. Write a program to convert LinkedList to ArrayList.
8. Write a program to iterate TreeMap in java.

Assignment 8: Keyboard input and string handling in Java

1. Write a Java program for calculating Factorial. Number should be taken through user input (Using Scanner, BufferedReader both).
2. Write a Java program to reverse a string. (String will be taken as user input through the console).
3. Write a Java Program to Find the Length of the String.
4. Write a Java Program to Remove the White Spaces from a String.
5. Write a Java Program to Use the Equals Method In a String Class.
6. Write a Java Program to Count and Replace the First Occurrence of a String.
7. Write a Java Program to Validate an Email Address Format.
8. Write a Java Program to Access the Index of the Character or String.
9. Write a Java Program to Find First and Last Occurrence of a given character in a String.
10. Write a Java Program to Store String Literals Using String Buffer.

Annexure – II (Java based minor project – As per Software Development Life Cycle)

1. E-commerce project in java using JDBC and MYSQL
2. Online Pharmacy Management System using JDBC and MYSQL
3. Home Improvement System Using JDBC and MYSQL
4. Jewellery Shop Management Using JDBC and MYSQL
5. Student Management System Using JDBC and MYSQL
6. Hotel Management Project Using JDBC and MYSQL
7. Hospital Management System Using JDBC and MYSQL
8. Online Bike Service Booking Using JDBC and MYSQL
9. Online Food Delivery Using JDBC and MYSQL
10. Online Movie Ticket Booking Using JDBC and MYSQL
11. Bank management system Using JDBC and MYSQL



University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 2nd Semester



Subject Name: Data Communication & Computer Networks

Credit: 4

Subject Code: MCA203

Lecture Hours: 40

Name of the Course: Data Communication & Computer Networks	
Course Code: MCA203	Semester: 2nd
Duration: 40 Hrs.	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 3	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 0	Practical Sessional Internal Continuous Evaluation: NA
Credit: 4	Practical Sessional External Examination: NA

Aim:	
Sl. No.	
1	To gain Knowledge of uses and services of Computer Network
2	To enhance Ability to identify types and topologies of network.
3	To gain Understanding of analog and digital transmission of data.
Objective:	
Sl. No.	
1	To deliver comprehensive view of Computer Network.
2	To enable the students to understand the Network Architecture, Network type and topologies
3	To understand the design issues and working of each layer of OSI model.
4	To familiarize with the benefits and issues regarding Network Security.
Pre-Requisite:	
Sl. No.	
1.	Knowledge of basic data communication & network security.

Course Outcome:	
1.	Identify the different components in a Communication System and their respective roles.
2.	Describe the technical issues related to the Networks
3.	Defining the standard model and protocols of networking
4.	Understand the basics of data communication, networking, internet and their importance.
Relevant Links:	
DCCN Study Material DCCN NPTEL LINK DCCN Coursera Link DCCN LinkedIn Learning Link	

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	0	0	2	1	0	0	0	1	0	1	2	1	0
CO2	2	3	2	2	2	1	0	0	0	1	0	1	2	2	1
CO3	3	3	2	1	3	1	0	0	0	1	0	2	3	2	1
CO4	3	2	1	0	2	1	0	0	0	1	0	2	2	2	0

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Introduction to Networks & Network Model	Introduction to communication systems, components, Transmission Impairments, Performance criteria of a communication system. Goals of computer Network, Networks:Classification, Components and Topology, categories of network[LAN, MAN,WAN];Internet: brief history, internet today;	International Academia: https://online.stanford.edu/courses/cs144-introduction-computer-networking AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/se m221.pdf	7

		Protocols and standards; OSI and TCP/IP model	<p>Industry Mapping and Gap Analysis:</p> <p>Basic data communication & network system was previously available in the MCA syllabus and is in sync with the syllabus of AICTE and the Stanford University. All the basic concepts are as per the industry standards.</p>	
2	Physical Layer	<p>Data, signal and Transmission: Analog and Digital, Transmission modes, Overview of data [analog & digital], signal [analog & digital], transmission [analog & digital] & transmission media [guided & unguided]; Circuit switching: time division & space division switch, TDM bus; Telephone Network.</p>	<p>International Academia: https://online.stanford.edu/courses/cs144-introduction-computer-networking</p> <p>AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf</p> <p>Industry Mapping & Gap Analysis:</p> <p>Practical knowledge on digital electronics circuit related to signal oscillation and transmission as well as various types of transmission media should be incorporated as per industry standard.</p>	6
3	Data Link Layer	<p>Data link layer: Types of errors, framing [character and bit stuffing], error detection & correction methods; Flow control; Protocols: Stop & wait ARQ</p> <p>Medium access sub layer: Point to point protocol, FDDI, token bus, token ring; Reservation, polling, concentration; Multiple access protocols: ALOHA, CSMA, FDMA, TDMA, CDMA; Ethernet</p>	<p>International Academia: https://online.stanford.edu/courses/cs144-introduction-computer-networking</p> <p>AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf</p> <p>Industry Mapping and Gap Analysis:</p> <p>Needs to add practical exposure to design and implement various error detection and correction methods using any programming paradigm.</p>	6

4	Network Layer	Concepts of Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing: Internet address, classful address, Routing: techniques, static vs. dynamic routing Protocols: IP, IPV6.	<p>International Academia: https://online.stanford.edu/courses/cs144-introduction-computer-networking</p> <p>AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/se m221.pdf</p> <p>Industry Mapping and Gap Analysis:</p> <p>Needs to incorporate hands-on training on network hardware devices and should have some programming knowledge on routing strategies as per industry requirement.</p>	6
5	Transport Layer	Process to process delivery; Details of UDP; Details of TCP; Congestion control algorithm: Leaky bucket algorithm, Tokenbucket algorithm, Quality of services [QoS]	<p>International Academia: https://online.stanford.edu/courses/cs144-introduction-computer-networking</p> <p>AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/se m221.pdf</p> <p>Industry Mapping and Gap Analysis:</p> <p>Needs to add practical exposure to design and implement various transport layer protocols using any programming paradigm which is the key requirement of IT industry.</p>	6
6	Application Layer	Details of Application Layer protocols/services such as HTTP, FTP, Telnet, SMTP & WWW and other	<p>International Academia: https://online.stanford.edu/courses/cs144-introduction-computer-networking</p> <p>AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/se m221.pdf</p>	5

			<p>Industry Mapping and Gap Analysis:</p> <p>Needs to introduce various application layer protocols using any programming paradigm which is the key requirement of IT industry as well as academia.</p>	
7	Cryptography & Satellite Communication	<p>Introduction to data security & cryptography (private key, public key, ISO standards), Digital Signature, Firewalls [technology & applications]</p> <p>Brief concepts of Satellite Communication such as LEO, GEO.</p>	<p>International Academia: https://online.stanford.edu/courses/soe-y0001-cryptography-i</p> <p>AICTE-prescribed syllabus: https://makauteam.net/aicte_details/Syllabus/MCA/sem221.pdf</p> <p>Industry Mapping and Gap Analysis:</p> <p>Needs to incorporate in-depth details of cryptography and related algorithms and should facilitate such programming environment to implement these algorithms as per industry requirements.</p>	4

List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Behrouz A Forouzan	Data Communication & Networking	4 th Ed	TMH
Andrew S. Tannenbaum	Computer Networks	6 th Ed	PHI
Reference Books:			
William Stallings	Data & Computer Communications	10 th Ed	PHI
Douglas E. Comer	Computer Networks and Internets with Internet Applications	4 th Ed	Pearson
Jean Warland	Communication Networks: A First Course	2 nd Ed	TMH
Ed Title	Schaum's Outline of Computer Networking	2 nd Ed	TMH



University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 2nd Semester



Subject Name: Advanced Data Structure

Credit: 4

Subject Code: MCA204

Lecture Hours: 36

Name of the Course: Advanced Data Structure	
Course Code: MCA204 & MCA294	Semester: 2 nd
Duration: 40 Hrs.	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 3	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 2	Practical Sessional Internal continuous evaluation: 40
Credit: 4+2	Practical Sessional external examination: 60
Aim:	
Sl. No.	
1	To gain Knowledge of Various aspects of algorithm development
2	To enhance Ability to identify qualities of a good solution
3	To implement learned algorithm design techniques and data structures to solve problems.

Objective:	
Sl. No.	
1	The fundamental design, analysis, and implementation of basic data structures.
2	Basic concepts in the specification and analysis of programs.
3	Principles for good program design, especially the uses of data abstraction.
4	Significance of algorithms in the computer field
Pre-Requisite:	
Sl. No.	
1.	Proficiency in one high level programming language
Course Outcome:	
1.	On completion of this course students are expected to learn various data structures, their usages, merits and limitations.
2.	On completion of this course students are expected to design and analyze various algorithms.
3.	On completion of this course students are expected to do a comparative analysis among different data structures and decide on the appropriate data structure to be used in a given scenario.
4.	On completion of this course students are expected to acquire adequate knowledge and skills to solve a real life software problem.
Relevant Links:	
Adv. DS Study Material Adv. DS NPTEL LINK Adv. DS Coursera Link Adv. DS Linkedin Learning Link	

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	-	-	-	-	-	-	1	1	2	2
CO2	3	3	1	2	1	-	-	-	-	-	-	2	3	2	1
CO3	3	2	2	3	2	-	-	-	-	-	-	1	3	2	1
CO4	2	2	3	2	2	-	-	-	-	-	-	2	3	2	2

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	Non-Linear Data Structure-Tree	<p>Basic Tree Terminologies. Different types of Trees: General Trees, Forests, Binary Tree, Binary Search Tree, Expression Tree. Tree operations on each of the trees and their algorithms with complexity analysis. Tree traversal algorithms (pre-order, post-order, in-order, level-order). Constructing a Binary Tree from traversal results. Huffman's Tree Applications of Tree</p>	<p>International Academia: https://web.stanford.edu/class/cs166/</p> <p>AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf</p> <p>Industry Mapping: Unstructured Data [Trie (Prefix Tree), Splay Trees, Suffix Trees]</p>	8	<ol style="list-style-type: none"> 1. Implementation of Binary Tree and its various operations in Python 2. Traversing a Tree using pre-order, post-order, in-order traversal 3. Implementing Huffman tree in Python
2	Non-Linear Data Structure-	<p>Binary Search Tree (BST). Operations on BST, Threaded Binary Tree, AVL Tree, B Tree, B+Tree,</p>	<p>International Academia: https://web.stanford.edu/class/cs97si/03-data-</p>	6	<ol style="list-style-type: none"> 1. Implementation of Binary Search Tree and its various operations in Python

	Efficient Binary Tree	Trie	structures.pdf <i>AICTE-prescribed syllabus:</i> https://makauteexam.net/aicte_details/Syllabus/MCA/sem221.pdf <i>Industry Mapping:</i> Unstructured Data [Trie (Prefix Tree), Splay Trees, Suffix Trees]		2. Implementation of AL Tree in Python 3. Implementation of B Tree/B+ Tree in Python
3	Non-Linear Data Structure-Graph	Graph Terminology, Types of Graphs (Undirected, Directed), Representation of graphs (Adjacency Matrix, Adjacency List), Graph Traversal Algorithms (BFS-Breadth First Search, DFS-Depth First Search), Application of Graphs	<i>International Academia:</i> https://web.stanford.edu/class/cs166/ <i>AICTE-prescribed syllabus:</i> https://makauteexam.net/aicte_details/Syllabus/MCA/sem221.pdf <i>Industry Mapping:</i> Shortest Path Algorithms (Dijkstra's, Bellman-Ford)	8	1. For a given graph, to identify all simple paths from one vertex to another vertex 2. Calculate the degree of a given node in a graph 3. From a given Adjacency matrix, to construct the weighted or unweighted graph (as the case may be) 4. From a given Adjacency list, to construct the weighted or unweighted graph (as the case may be) 5. To write program to implement BFS-Breadth First Search 6. To write program to implement DFS-Depth First Search
4	Shortest path Algorithms	Shortest Path Algorithms-Minimum Spanning Tree (MSP), Kruskal's Algorithm, Prim's Algorithm, Dijkstra's Algorithm,	<i>International Academia:</i> https://web.stanford.edu/class/cs166/	8	1. To write program to implement Minimum Spanning Tree (MSP) 2. To determine shortest path using Dijkstra's Algorithm

		Warshall's Algorithm, Modified Warshal's Algorithm	<p>AICTE-prescribed syllabus: https://makauteexam.net/aicte_details/Syllabus/MCA/sem221.pdf</p> <p>Industry Mapping: Shortest Path Algorithms (Dijkstra's, Bellman-Ford)</p>		
5	Hashing	Hashing- definition, Hash Tables, Different Hash Functions (Division, Multiplication, Mid-Square, Folding), Collision, Collision Resolution Techniques in Hashing by Open Addressing (Linear Probing, Quadratic Probing, Double Hashing, Rehashing), Chaining, Application of Hashing	<p>International Academia: https://web.stanford.edu/class/cs166/</p> <p>AICTE-prescribed syllabus: https://makauteexam.net/aicte_details/Syllabus/MCA/sem221.pdf</p> <p>Industry Mapping: Universal Hashing, Cuckoo Hashing</p>	6	<ol style="list-style-type: none"> To calculate Hash Functions using various techniques Functions (Division, Multiplication, Mid-Square, Folding) To resolve Collision using various Open Addressing techniques (Linear Probing, Quadratic Probing, Double Hashing, Rehashing),

List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Tenenbaum	Data Structure Using C & C++	2 nd Ed	PEI
Reference Books:			
Kruse, Tondo & Leung	Data Structures & Program Design in C	2 nd Ed	PHI
Loudan	Mastering Algorithms With C		SPD/O'REILLY
Radhaganesan	C and Data Structures		Scitech Publications
Reema Thareja	Data Structure Using C	s2 nd Ed	Oxford



University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 2nd Semester



Subject Name: General Studies & Current Affairs – II

Credit: 0.5

Subject Code: MCA(GS)201

Lecture Hours: 48

Module number	Topic	Sub-topics	Mapping with International/ National/ State Level Exams	Lecture Hours	Corresponding Assignment
1	GK, Current Affairs and Economics	<p>GK and Current Affairs – Based on Monthly Magazines provided and recent news of national and international importance. Newspaper Reading: The Economic Times.</p> <ol style="list-style-type: none"> Basic economics -Types of Economy, Feature of Indian Economy (BECC-101, Block-1, Unit-1,Unit-2, Unit-3) HDI(BECC111, Block-2 http://egyankosh.ac.in/handle/123456789/81256) Sectors of the economy and their analysis: Primary (Agriculture, Mining, etc), Secondary 	<p><i>International Exams</i></p> <ol style="list-style-type: none"> GRE (https://www.ets.org/pdfs/gre/gre-math-review.pdf) GMAT (https://downloads.mba.com/downloads/gmat-handbook.pdf) <p><i>National Exams:</i></p> <ol style="list-style-type: none"> UPSC Civil Services Exam (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg. 25-26 UPSC Combined Defense Services (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf) 	48	<ol style="list-style-type: none"> Basic economics: Compose an assignment on “Impact of COVID-19 Pandemic on Human Development in India”- analyze how the pandemic has affected healthcare, education, employment and socioeconomic disparities in the country. Sectors of the economy and their analysis: Group Discussion on “ Impact of LPG Reforms and FDI on Indian Industrial Sector: Economic Transformation, Challenges and Growth

		<p>(Industry, various policies), Tertiary (services, etc.) (Textbook: Indian Economy: Misra & Puri, Chapter- 30,32)</p> <p>4. Liberalisation, Privatisation and Globalisation (LPG)(IGNOU, BECC-114, Block- 6) http://egyankosh.ac.in/handle/123456789/90547</p> <p>5. RBI & Its Function- Board of Governance, Operation. Credit control policies- CRR, SLR, Bank rate, Repo rate, Reverse Repo rate, Prime lending rate, MSF, LAF, FERA, FEMA. (BECC-113, Unit-1) http://egyankosh.ac.in/handle/123456789/89589</p> <p>6. Budget (Union, Railway), Concept of revenue, expenditure & different types of deficit. (BECC-109, Block- 3, Unit-9) http://egyankosh.ac.in/handle/123456789/76561</p>	<p>ult/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21</p> <p>3. RBI Grade B (https://rbidocs.rbi.org.in/rdocs/Content/PDFs/DADVTGRB09052023FA65E4FB1C2CF473396B4FD7E5F69CDD.E.PDF), pg 22-23</p> <p>4. IBPS Probationary officer(https://www.ibps.in/wp-content/uploads/Detailed-Advt.-CRP-PO-XII.pdf), Pg 7.</p> <p>5. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22</p> <p>6. Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/TB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)</p> <p>7. XAT (https://xat.org.in/xat-syllabus/)</p> <p>8. GATE (https://gate2024.iisc.ac.in/papers-and-syllabus/)</p> <p>9. CAT</p>	<p>Prospects</p> <p>3. <u>RBI & Its Function:</u> Group discussion on “Analyzing India’s Monetary Policy: Implication, Challenges and Economic Stability</p> <p>4. <u>Budget:</u> An assignment on the “Understanding India’s Union Budget: A Comprehensive Analysis</p> <p>** All the assignments are in line with entrance exams for premier B-Schools and GS Paper-I of UPSC CSE.</p>
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			<p>https://iimcat.ac.in/per/g01/pub/756/ASM/WebPortal/1/index.html?756@@1@@1</p> <p><i>State Level Exams:</i></p> <p>1. <i>Civil Services Executive Exam (WBCS)</i> (https://wbpsc.gov.in/Download)</p>		
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References

1. Indian Economy-Ramesh Singh



University of Engineering and Management

Institute of Engineering & Management, New Town Campus

University of Engineering & Management, Jaipur

Syllabus for MCA Admission Batch 2024, 2nd Semester



Subject Name: Competitive Aptitude Training – II

Credit: 0.5

Subject Code: MCA(GS)281

Lecture Hours: 48

Module number	Topic	Sub-topics	Mapping with International/ National/ State Level Exams	Lecture Hours	Corresponding Assignment
1	Quantitative Aptitude	<p>Textbook: Quantitative Aptitude for Competitive Examination Author: R.S Agarwal Publishing House: S.Chand</p> <p>Average- Concept on average, different missing numbers in average estimation, shortcuts & their application. Mixture & Allegation – Proportion & mixtures in percentages, populations & liquids, shortcuts & their application. Number System- concept of different numbers, remainder theorem, factors. Time & Work</p>	<p>International Exams</p> <p>1. GRE (https://www.ets.org/pdfs/gre/gre-math-review.pdf)</p> <p>2. GMAT (https://downloads.mba.com/downloads/gmat-handbook.pdf)</p> <p>National Exams:</p> <p>1. UPSC Civil Services Exam (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26</p> <p>UPSC Combined Defence Services I-Exam- 2023-Engl-211222.pdf), pg 20-21</p> <p>3. RBI Grade B (https://rbidocs.rbi.org.in/rdocs/Content/PDFs/DADVTGRB09052023FA65E4FB1C2C)</p>	12	

		<p>and Pipe & Cistern- Basic concept, Different problems & their shortcut tricks. Time, Speed & Distance Boat & Stream</p>	<p>F473396B4FD7E5F69CDDE.PDF), pg 22-23</p> <p>4. IBPS Probationary officer(https://www.ibps.in/wp-content/uploads/Detailed-Advt.-CRP-PO-XII.pdf) , Pg 7.</p> <p>5. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_0304_2023.pdf) pg. 20-22</p> <p>6. Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)</p> <p>7. XAT (https://xat.org.in/xat-syllabus/)</p> <p>8. GATE (https://gate2024.iisc.ac.in/papers-and-syllabus/)</p> <p>9. CAT https://iimcat.ac.in/per/g01/pu/b/756/ASM/WebPortal/1/index.html?756@@1@@1</p> <p>State Level Exams:</p> <p>1. Civil Services Executive Exam (WBCS) (https://wbpsc.gov.in/Downlo</p>		
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