

University of Engineering and Management



INSTITUTE OF ENGINEERING & MANAGEMENT, NEWTOWN
UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR



DEPARTMENT OF COMPUTER APPLICATIONS

DETAILED SYLLABUS BOOKLET

2ND SEM OF MCA-2024-26 BATCH

AND

4TH SEM OF MCA-2023-25 BATCH

UNIVERSITY OF ENGINEERING AND MANAGEMENT, KOLKATA

DEPARTMENT OF COMPUTER APPLICATIONS

MCA STRUCTURED SYLLABUS -UEMK & UEMJ - EVEN SEM 2024-25 - 2nd Semester

Course Code	Course Title	Total No. of Contact Hours				Total No. of Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
2 nd 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 Python	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
2 nd Semester (Practical)						
MCA291	Database Management System Laboratory	0	0	3	3	3
MCA292	Object-Oriented Programming with Java Laboratory	0	0	3	3	3
MCA294	Advanced Data Structures with Python Laboratory	0	0	3	3	3
Total of Practical					9	9
2 nd Semester (Sessional)						
MCA271	Basic Python Programming	0	0	2	2	1
IVC272	Economics, Finance and Entrepreneurship Skills - Intermediate	0	2	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					6	1.5
Total of Semester					33	27

UNIVERSITY OF ENGINEERING AND MANAGEMENT, KOLKATA

DEPARTMENT OF COMPUTER APPLICATIONS

MCA STRUCTURED SYLLABUS -UEMK & UEMJ - EVEN SEM 2024-25 - 4th Semester

Course Code	Course Title	Total No. of Contact Hours				Total No. of Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
4 th Semester (Theory)						
MCA401 A/B/C/D	Elective - I	3	1	0	4	3
MCA402 A/B/C	Elective - II	3	1	0	4	3
MCA403	Values and Ethics	2	0	0	2	1
MCA405	Management & Accounting	2	0	0	2	2
MCA(GS)401	General Studies & Current Affairs - IV	2	0	0	2	0.5
Total of Theory					14	9.5
4 th Semester (Practical)						
MCA491	Major Project	0	0	10	10	15
Total of Practical					10	15
4 th Semester (Sessional)						
MCA(GS)481	Competitive Aptitude Training - IV	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 Courses	0	0	0	0	0
Total of Sessional					2	0.5
Total of Semester					26	25
Elective - I		Elective - II				
Course Code	Topic	Course Code		Topic		
MCA401A	Distributed Database Management	MCA402A		Compiler Design		
MCA401B	Image Processing	MCA402B		Mobile Computing		
MCA401C	Parallel Programming	MCA402C		Embedded Systems		
MCA401D	Cloud Computing					



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: Database Management Systems

Credit: 4

Subject Code: MCA201

Lecture Hours: 40

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

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.	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	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.	Industry Mapping and Gap Analysis: 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	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-	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 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		
	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.			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/ Industry Mapping and Gap Analysis: e-Brochure (cdac.in) Industry requirement for full stack development, previously missing which is partially	8	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.			

			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);

Tttype 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.

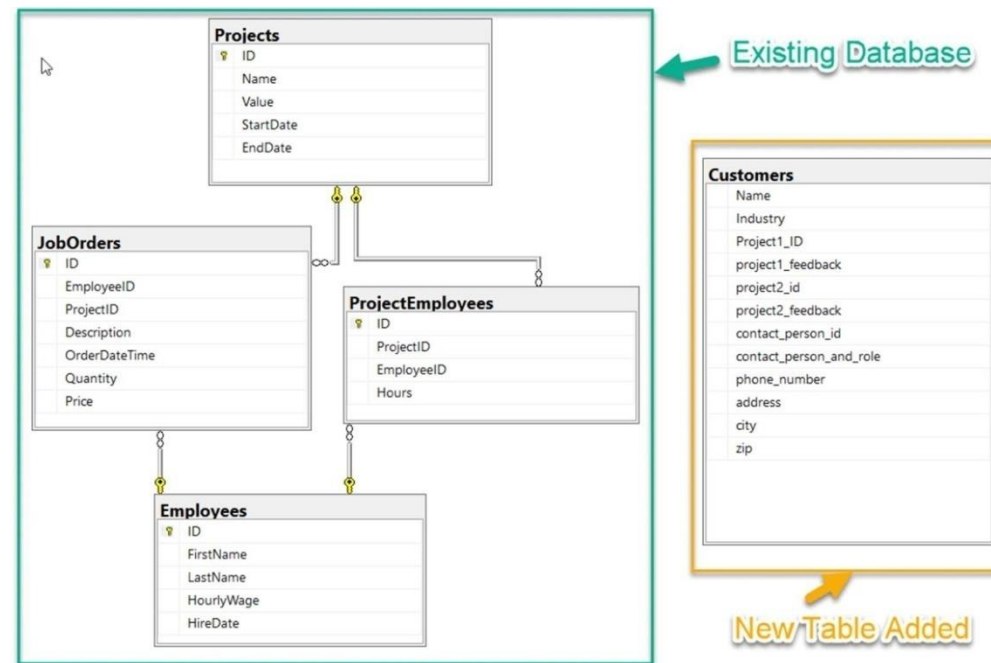
Question (G)

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

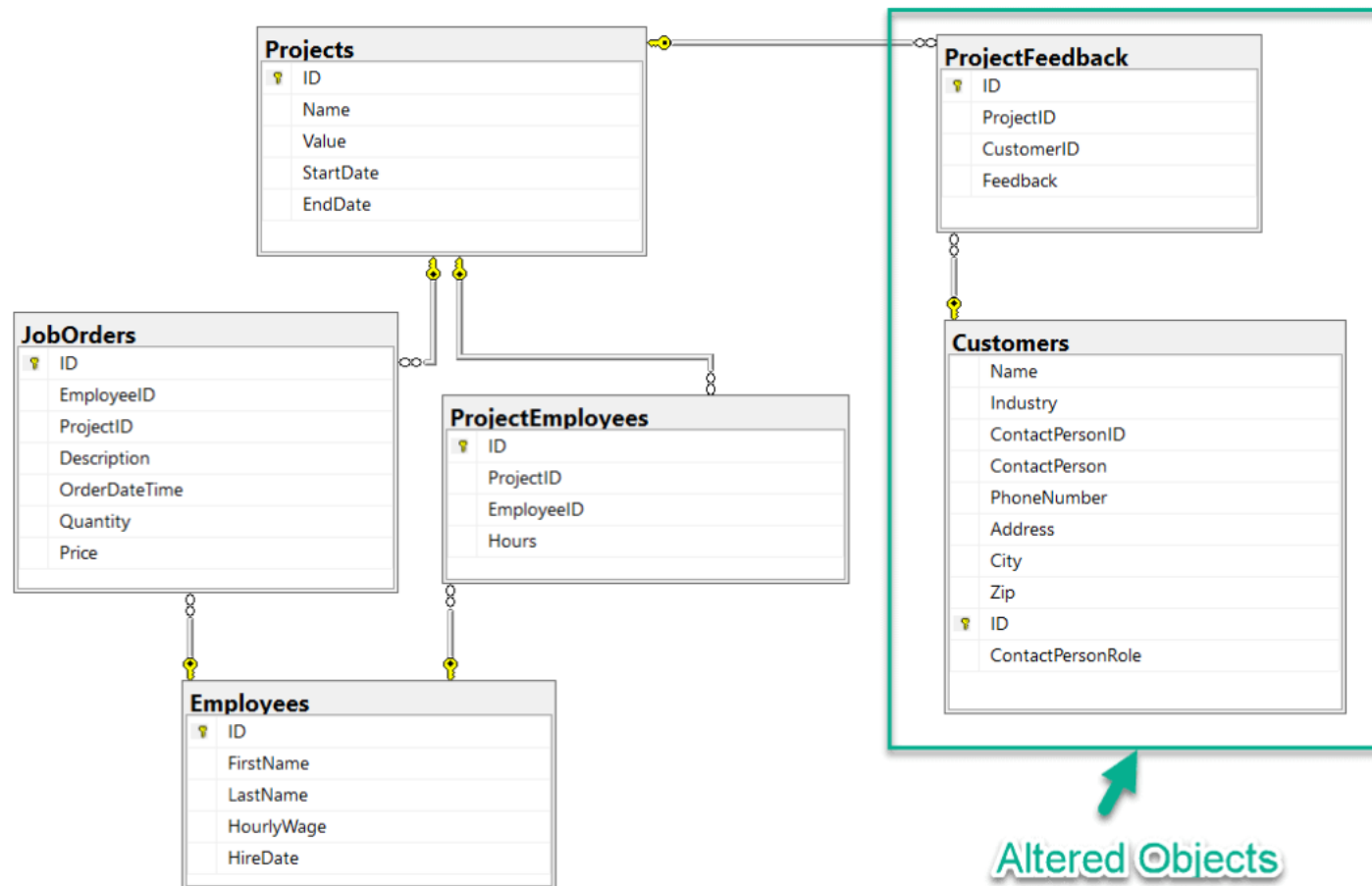
need to get these removed from this table.

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

- 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.
- split the column *ContactPersonAndRole* into two individual columns. This can be done in two steps as follows:
 - Rename the original column from *ContactPersonAndRole* to *ContactPerson*.
 - Add a new column for *ContactPersonRole*.
- 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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University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 2nd Semester



Subject Name: Object-Oriented Programming with Java

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: 100
Tutorial: 1	Continuous Assessment: 100
Practical: 3	Practical Sessional Internal continuous evaluation: 100
Credit: 4+2	Practical Sessional external examination: 100
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	International Academia: First Course in Java – EL ENG X429.9 UC Berkeley Extension AICTE-prescribed syllabus: MAKAUT – MCA 2ND SEM SYLLABUS 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.	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	International Academia: First Course in Java – EL ENG X429.9 UC Berkeley Extension AICTE-prescribed syllabus: MAKAUT – MCA 2ND SEM SYLLABUS 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.	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.	International Academia: CS – 108 – Object Oriented System Design Stanford University AICTE-prescribed syllabus: MAKAUT – MCA 2ND SEM SYLLABUS Industry Mapping and Gap Analysis: 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)	International Academia: 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	AICTE-prescribed syllabus: MAKAUT – MCA 2ND SEM SYLLABUS	2	Any one web-based project as per Annexure-II.
	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	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 End Of Java Applet Support	3	
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	International Academia & AICTE-prescribed syllabus: CSE IIT KGP Object Oriented Programming with JAVA Industry Mapping and Gap Analysis: 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
ReferenceBooks:			
Core Java An IntegratedApproach (BlackBook)	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:

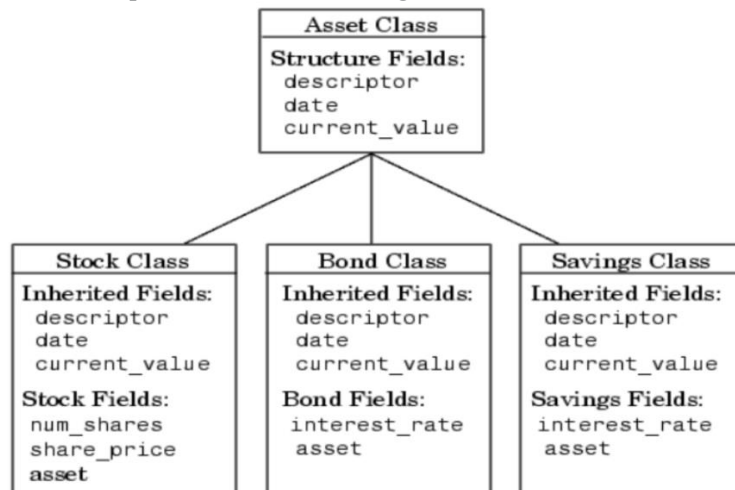
Data Members:

- (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: 2 nd
Duration: 40 Hrs.	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
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	Industry Mapping and Gap Analysis: 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.	
2	Physical Layer	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.	International Academia: https://online.stanford.edu/courses/cs144-introduction-computer-networking AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf Industry Mapping & Gap Analysis: 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.	6
3	Data Link Layer	Data link layer: Types of errors, framing [character and bit stuffing], error detection & correction methods; Flow control; Protocols: Stop & wait ARQ 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	International Academia: https://online.stanford.edu/courses/cs144-introduction-computer-networking AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf Industry Mapping and Gap Analysis: Needs to add practical exposure to design and implement various error detection and correction methods using any programming paradigm.	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.	International Academia: https://online.stanford.edu/courses/cs144-introduction-computer-networking AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/se m221.pdf Industry Mapping and Gap Analysis: Needs to incorporate hands-on training on network hardware devices and should have some programming knowledge on routing strategies as per industry requirement.	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]	International Academia: https://online.stanford.edu/courses/cs144-introduction-computer-networking AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/se m221.pdf Industry Mapping and Gap Analysis: 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.	6
6	Application Layer	Details of Application Layer protocols/services such as HTTP, FTP, Telnet, SMTP & WWW and other	International Academia: https://online.stanford.edu/courses/cs144-introduction-computer-networking AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/se m221.pdf	5

			Industry Mapping and Gap Analysis: Needs to introduce various application layer protocols using any programming paradigm which is the key requirement of IT industry as well as academia.	
7	Cryptography & Satellite Communication	Introduction to data security & cryptography (private key, public key, ISO standards), Digital Signature, Firewalls [technology & applications] Brief concepts of Satellite Communication such as LEO, GEO.	International Academia: https://online.stanford.edu/courses/soe-y0001-cryptography-i AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/se_m221.pdf Industry Mapping and Gap Analysis: 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.	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 Structures with Python

Credit: 4

Subject Code: MCA204

Lecture Hours: 40

Name of the Course: Advanced Data Structures with Python & Advanced Data Structures with Python Laboratory	
Course Code: MCA204 & MCA294	Semester: 2 nd
Duration: 40 Hrs.	Maximum Marks: 100 + 100
Teaching Scheme	Examination Scheme
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Practical: 2	Practical Sessional Internal continuous evaluation: 100
Credit: 4+2	Practical Sessional external examination: 100
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	

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	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	International Academia: https://web.stanford.edu/class/cs166/ AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf Industry Mapping: Unstructured Data [Trie (Prefix Tree), Splay Trees, Suffix Trees]	8	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-Efficient	Binary Search Tree (BST). Operations on BST, Threaded Binary Tree, AVL Tree, B Tree, B+Tree, Trie	International Academia: https://web.stanford.edu/class/cs97si/03-data-structures.pdf	8	1. Implementation of Binary Search Tree and its various operations in Python

	Binary Tree		AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf Industry Mapping: 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	International Academia: https://web.stanford.edu/class/cs166/ AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf Industry Mapping: 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,	International Academia: https://web.stanford.edu/class/cs166/	8	1. To write program to implement Minimum Spanning Tree (MSP) 7. To determine shortest path using

		Warshall's Algorithm, Modified Warshall's Algorithm	AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/se_m221.pdf Industry Mapping: Shortest Path Algorithms (Dijkstra's, Bellman-Ford)		Dijkstra's Algorithm
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	International Academia: https://web.stanford.edu/class/cs166/ AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/se_m221.pdf Industry Mapping: Universal Hashing, Cuckoo Hashing	8	1. To calculate Hash Functions using various techniques Functions (Division, Multiplication, Mid-Square, Folding) 2. 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: Basic Python Programming

Credit: 1

Lecture Hours: 20

Subject Code: MCA271

Name of the Course: Basic Python Programming	
Course Code: MCA271	Semester: 2
Duration: 20 Hrs.	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Practical: 2	End Semester Exam: 100
Credit: 1	Continuous Assessment: 100
Aim:	
Sl. No.	
1	To introduce students to the foundational concepts of Python programming.
2	To develop problem-solving skills through Python-based approaches.
3	To prepare students for advanced programming and data analytics courses.
Objective:	
Sl. No.	
1	Understand the syntax, structure, and basic data types of Python.
2	Implement control structures and modular programming using functions.
3	Apply Python libraries to solve computational problems.

4	Develop basic file handling and debugging skills in Python.
Pre-Requisite:	
Sl. No.	
1.	Basic understanding of programming concepts and logical reasoning.
Course Outcome:	
1.	Demonstrate proficiency in Python syntax and programming constructs.
2.	Design and implement solutions using Python's built-in data structures.
3.	Apply modular programming concepts using functions and libraries.
4.	Analyse and debug Python code effectively to ensure optimal performance.
Relevant Links:	
Python Study Material Python NPTEL LINK Python Coursera Link Python LinkedIn Learning Link	

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Variable and Expression	Variables as names for values; expressions (arithmetic and logical) and their evaluation (operators, associativity, precedence). Assignment operation; the difference between the left-hand side and right-hand side of an assignment, Console input/output: taking input from the user and printing user information	International Academia: Harvard University AICTE-prescribed syllabus: MAKAUT – MCA 1ST SEM SYLLABUS Industry Mapping and Gap Analysis:	2
	Control Statement and Iteration	If statement, else-if statement, multiple statements within if, multiple if statement. While Loop, For Loop, Nesting Loops, Controlling Loops using Break and Continue, Else Statement, Range Statement and Pass Statement in Loop.		3
2	Collections	Strings, List, Tuples, Dictionary, Set, Selection sort, Bubble sort	International Academia: Harvard University AICTE-prescribed syllabus: MAKAUT – MCA 1ST SEM SYLLABUS Industry Mapping and Gap Analysis:	2
	Function	Built-in function, user-defined function, function passing values, function returning values, default parameter values, Recursive function		2

			the industry standards.	
3	File Management	Operations on files (opening, modes, attributes, encoding, closing), read() & write() methods, tell() & seek() methods, renaming & deleting files and directories	International Academia: Harvard University AICTE-prescribed syllabus: MAKAUT – MCA 1ST SEM SYLLABUS Industry Mapping and Gap Analysis: Basic Python programming is available in the MCA syllabus of MAKAUT and is in sync with the syllabus of AICTE and the Harvard University. All the basic concepts are as per the industry standards.	2
4	Errors and Exception Handling	Dealing with syntax errors, Exceptions, Handling exceptions with try/except, Cleaning up with finally	International Academia: Harvard University AICTE-prescribed syllabus: MAKAUT – MCA 1ST SEM SYLLABUS Industry Mapping and Gap Analysis: Basic Python programming is available in the MCA syllabus of MAKAUT and is in sync with the syllabus of AICTE and the Harvard University. All the basic concepts are as per the industry standards.	2

5	Classes and Objects	Create a Class, Create Object, __Init__() Function, Methods, Self Parameter, Modification and Deletion of Object Parameter, Deletion of Object, Pass Statement, Inheritance and Polymorphism, Scope, Module, Built-In Math Function, Math Module, Module datetime and Date Objects, RegEx Module and RegEx Functions, Exception Handling.	International Academia: Harvard University AICTE-prescribed syllabus: MAKAUT – MCA 1ST SEM SYLLABUS Industry Mapping and Gap Analysis: Basic Python programming is available in the MCA syllabus of MAKAUT and is in sync with the syllabus of AICTE and the Harvard University. All the basic concepts are as per the industry standards.	2
6	Modules & Packages	Importing a module, Creating module, Function aliases, packages	International Academia: Harvard University AICTE-prescribed syllabus: MAKAUT – MCA 1ST SEM SYLLABUS Industry Mapping and Gap Analysis: Basic Python programming is available in the MCA syllabus of MAKAUT and is in sync with the syllabus of AICTE and the Harvard University. All the basic concepts are as per the industry standards.	2
	Numpy	ndArray, Pandas: reading files, exploratory data analysis, data preparation and processing, Matplotlib: Scatterplot, Line plot, Bar plot, Histogram, Box plot, Pair plot		3

List of Books Text Books:			
Name of Author	Title of the Book with Book Chapter	Edition/ISSN/ISBN	Name of the Publisher
Martin C Brown	The Complete Reference Python	Fourth Edition	Mc Graw Hill
Reference Books:			
David M Beazley	Python Essential Reference	Third Edition	Addison Wesley
Yashvant Kanetkar , Aditya Kanetkar	Let us Python	9355515413	Bpb



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: 40

Module number	Topic	Sub-topics	Mapping with International/ National/ State Level Exams	Lecture Hours	Corresponding Assignment
1	GK, Current Affairs and	GK and Current Affairs – Based on Monthly Magazines provided and	<i>International Exams</i> 1. GRE	40	1. Basic economics: Compose

	Economics recent news of national and international importance. Newspaper Reading: The Economic Times. 1. Basic economics -Types of Economy, Feature of Indian Economy (BECC-101, Block-1, Unit-1, Unit-2, Unit-3) 2. HDI (BECC-111, Block-2) http://egyankosh.ac.in/handle/123456789/81256 3. Sectors of the economy and their analysis: Primary (Agriculture, Mining, etc), Secondary (Industry, various policies), Tertiary (services, etc.) (Textbook: Indian Economy: Misra & Puri, Chapter- 30,32) 4. Liberalisation, Privatisation and Globalisation (LPG) (IGNOU, BECC-114, Block- 6) http://egyankosh.ac.in/handle/123456789/90547 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,	(https://www.ets.org/pdfs/gre/gre-math-review.pdf) 2. GMAT (https://downloads.mba.com/downloads/gmat-handbook.pdf) National Exams: 1. UPSC Civil Services Exam (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg. 25-26 2. UPSC Combined Defense Services (https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21 3. RBI Grade B (https://rbidocs.rbi.org.in/rdoc/Content/PDFs/DADVTGRB09052023FA65E4FB1C2CF473396B4FD7E5F69CDD E.PDF), pg 22-23 4. IBPS Probationary officer (https://www.ibps.in/w p-content/uploads/Detailed- Advt.- CRP-PO-XII.pdf), Pg 7. 5. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileSer	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. 2. 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 Prospects 3. RBI & Its Function: Group discussion on “Analyzing India’s Monetary Policy: Implication, Challenges and Economic Stability 4. Budget: An assignment on the “Understanding India’s Union Budget: A Comprehensive Analysis ** All the assignments are in line with entrance exams for premier B-Schools and
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		FERA, FEMA. (BECC-113, Unit-1) http://egyankosh.ac.in/handle/123456789/89589 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	ver/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22 6. Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf) 7. XAT (https://xat.org.in/xat-syllabus/) 8. GATE (https://gate2024.iisc.ac.in/papers-and-syllabus/) 9. CAT https://iimcat.ac.in/per/q01/pub/756/ASM/WebPortal/1/index.html?756@@1@@1 State Level Exams: 1. Civil Services Executive Exam (WBCS) (https://wbpsc.gov.in/Download)		GS Paper-I of UPSC CSE.
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References

1. Indian Economy-Ramesh Singh



University of Engineering and Management
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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: 40

Module number	Topic	Sub-topics	Mapping with International/ National/ State Level Exams	Lecture Hours	Corresponding Assignment
1	Quantitative Aptitude	Textbook: Quantitative Aptitude for Competitive Examination Author: R.S Agarwal Publishing House: S.Chand 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	International Exams 1. GRE (https://www.ets.org/pdfs/gre/q re-math-review.pdf) 2. GMAT (https://downloads.mba.com/downloads/gmat-handbook.pdf) National Exams: 1. UPSC Civil Services Exam (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26 UPSC Combined Defence Services (https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21 3. RBI Grade B (https://rbidocs.rbi.org.in/rdocs/Content/PDFs/DADVTGRB09052023FA65E4FB1C2C)	40	

		and Pipe & Cistern- Basic concept, Different problems & their shortcut tricks. Time, Speed & Distance Boat & Stream	F473396B4FD7E5F69CDDE.PDF), pg 22-23 4. IBPS Probationary officer(https://www.ibps.in/w p-content/uploads/Detailed- Advt.-CRP-PO-XII.pdf) , Pg 7. 5. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_0304_2023.pdf) pg. 20-22 6. Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/IB- ACIO-Recruitment-2023- Notification-Emp-News.pdf) 7. XAT (https://xat.org.in/xat-syllabus/) 8. GATE (https://gate2024.iisc.ac.in/papers-and-syllabus/) 9. CAT https://iimcat.ac.in/per/q01/public/756/ASM/WebPortal/1/index.html?756@@1@@1 State Level Exams: 1. Civil Services Executive Exam (WBCS) (https://wbpsc.gov.in/Download		
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4th Semester Syllabus for MCA Admission Batch 2023



University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2023, 4th Semester



Subject Name: Distributed Database Management

Credit: 03

Subject Code: MCA401A

Lecture Hours: 30 Hrs.

Name of the Course: Distributed Database Management	
Course Code: MCA401A	Semester:
Duration: 30 hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	
Aim:	
Sl. No.	
1	Develop a deep understanding of distributed database architecture and design principles.
2	Equip students with skills for optimizing distributed query processing and managing transactions.
3	Enable application of data warehousing, OLAP, and data mining techniques for real-world problem-solving.
Objective:	
Sl. No.	
1	Understand the architecture and design of distributed database systems.

2	Apply techniques for distributed query processing and optimization.
3	Master the concepts of distributed transaction processing and data warehousing.
4	Utilize data mining methods such as association analysis, classification, and clustering.
Pre-Requisite:	
Sl. No.	
1.	Fundamentals of Database Management Systems, Basic Knowledge of Computer Networks, Programming Skills & Operating systems
Course Outcome:	
1.	Understand and explain the architecture and design principles of distributed database systems.
2.	Apply methods and techniques for distributed query processing and optimization.
3.	Understand the concepts of distributed transaction processing, data warehousing, and OLAP technology.
4.	Apply methods and techniques for data association analysis, classification, and clustering.
Relevant Links:	
DDBMS Study Material DDBMS NPTEL LINK DDBMS Coursera Link DDBMS LinkedIn Learning Link	

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Introduction to Distributed Database Management System	Distributed DBMS features and needs. Reference architecture. Levels of distribution transparency, and replication. Distributed database design – fragmentation, allocation criteria. Storage mechanisms. Translation of global queries. / Global query optimization. Query execution and access plan. Concurrency control – 2 phases locks. Distributed deadlocks. Time-based and quorum-based protocols. Comparison. Reliability- non-blocking commitment protocols.	https://online.stanford.edu/courses/cs244b-distributed-systems	12
2	Partitioned Networks	Partitioned networks. Checkpoints and cold starts. Management of distributed transactions- 2-phase unit protocols. Architectural aspects. Node and link failure recoveries.	https://online.stanford.edu/courses/cs244b-distributed-systems	8
3	Distributed Database Administration	Distributed data dictionary management. Distributed database administration. Heterogeneous databases-federated database, reference architecture, loosely and tightly coupled. Alternative architecture. Development tasks, Operation- global task management. Client-server databases- SQL server, open database connectivity. Constructing an application.	https://online.stanford.edu/courses/cs244b-distributed-systems	10

List of Books Text Books:			
Name of Author	Title of the Book with Book Chapter	Edition/ISSN/ISBN	Name of the Publisher
Stefano Ceri & Giuseppe Pelagatti	Distributed Databases: Principles and Systems	978-0070265110	McGraw Hill Education



University of Engineering and Management
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University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2023, 4th Semester



Subject Name: Image Processing

Credit: 03

Subject Code: MCA401B

Lecture Hours: 30 Hrs.

Name of the Course: Image Processing	
Course Code: MCA401B	Semester:
Duration: 30 hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	
Aim:	
Sl. No.	
1	Equip students with a solid understanding of the core principles and techniques used in image processing.
2	Enable students to apply image processing methods to analyze, enhance, and manipulate digital images for various applications.
3	Prepare students to solve complex real-world problems related to image analysis, computer vision, and pattern recognition.

Objective:	
Sl. No.	
1	Understand the fundamental principles and techniques of image processing.
2	Apply methods to enhance and manipulate digital images.
3	Develop skills in image analysis and computer vision.
4	Solve real-world problems using image processing techniques.
Pre-Requisite:	
Sl. No.	
1.	Fundamentals of Database Management Systems, Basic Knowledge of Computer Networks, Programming Skills & Operating systems
Course Outcome:	
1.	To study the image fundamentals and mathematical transforms necessary for image processing.
2.	To study the image enhancement techniques
3.	To study image restoration procedures
4.	To study the image compression procedures
Relevant Links:	
Image Study Material Image NPTEL LINK Image Coursera Link Image LinkedIn Learning Link	

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Introduction and Digital Image Fundamentals Image enhancement in the Spatial domain	Digital Image Fundamentals, Human visual system, Image as a 2D data, Image representation – Grayscale and Colour images, image sampling and quantization Basic grey level Transformations, Histogram Processing Techniques, Spatial Filtering, Low pass filtering, High pass filtering	https://stanford.edu/class/ee368/	6
2	Filtering in the Frequency Domain Image Restoration and Reconstruction	Preliminary Concepts, Extension to functions of two variables, Image Smoothing, Image Sharpening, Homomorphic filtering. Noise Models, Noise Reduction, Inverse Filtering, MMSE (Wiener) Filtering	https://stanford.edu/class/ee368/	6
3	Colour Image Processing Image Compression	Colour Fundamentals, Color Models, Pseudo colour image processing Fundamentals of redundancies, Basic Compression Methods: Huffman coding, Arithmetic coding, LZW coding, JPEG Compression standard	https://stanford.edu/class/ee368/	6
4	Morphological Image Processing	Erosion, dilation, opening, closing, Basic Morphological Algorithms: hole filling, connected components, thinning, , skeletons	https://stanford.edu/class/ee368/	6
5	Image Segmentation Object Recognition and Case Studies Object Recognition	point, line and edge detection, Thresholding, Regions Based segmentation, Edge linking and boundary detection, Hough transform patterns and pattern classes, recognition based on decision-theoretic methods, structural methods, case studies – image analysis Application of Image processing in process industries	https://stanford.edu/class/ee368/	6

List of Books Text Books:			
Name of Author	Title of the Book with Book Chapter	Edition/ISSN/ISBN	Name of the Publisher
Chandra& Majumder	Digital Image Processing &Analysis	2 nd Edition	PHI
Anil K. Jain	Fundamentals of Digital Image Processing	1 st Edition	Pearson



University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2023, 4th Semester



Subject Name: Parallel Programming

Credit: 03

Subject Code: MCA401C

Lecture Hours: 30 Hrs.

Name of the Course: Parallel Programming	
Course Code: MCA401C	Semester:
Duration: 30 hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	
Aim:	
Sl. No.	
1	Equip students to write efficient parallel programs for faster computation.
2	Prepare students for industry applications in high-performance and big-data computing.
3	Foster critical thinking and innovation in solving computational challenges with parallel techniques.

Objective:	
Sl. No.	
1	Understand the fundamentals of parallel computing architectures and models.
2	Develop skills to design, implement, and debug parallel algorithms.
3	Gain proficiency in using parallel programming languages and tools.
4	Analyze the performance and scalability of parallel applications.
Pre-Requisite:	
Sl. No.	
1.	Basic knowledge of programming, data structures, and algorithms.
Course Outcome:	
1.	Understand the evolution of High-Performance Computing (HPC) with respect to laws and the contemporary notion that involves mobility for data, hardware devices and software agents
2.	Understand, appreciate and apply parallel and distributed algorithms in Problem Solving.
3.	Evaluate the impact of network topology on parallel/distributed algorithm formulations and traffic their performance.
4.	Gain hands-on experience with agent-based and Internet-based parallel and distributed programming techniques.
Relevant Links:	
PP Study Material PP NPTEL LINK PP Coursera Link PP LinkedIn Learning Link	

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Fundamentals of Parallel Programming	Processes and processors. Shared memory. Fork. Join constructs. Basic parallel programming techniques- loop splitting, spin locks, contention barriers and row conditions. Variations in splitting, self and indirect scheduling.	https://web.stanford.edu/class/cs315b/	10
2	Data Dependency and Scheduling Techniques	Data dependency-forward and backward block scheduling. Linear recurrence relations. Backward dependency.	https://web.stanford.edu/class/cs315b/	10
3	Advanced Performance Tuning and Parallel Programming Techniques	Performance tuning overhead with a number of processes, effective use of cache. Parallel programming examples: Average, mean squared deviation, curve fitting, numerical integration, travelling salesman problem, Gaussian elimination. Discrete event time simulation. Parallel Programming Constructs in HPF, FORTRAN 95. Parallel programming under Unix.	https://web.stanford.edu/class/cs315b/	10

List of Books Text Books:			
Name of Author	Title of the Book with Book Chapter	Edition/ISSN/ISBN	Name of the Publisher
Quinn	Parallel Computing	2 nd Edition	TMH



University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2023, 4th Semester



Subject Name: Cloud Computing

Credit: 03

Subject Code: MCA401D

Lecture Hours: 30 Hrs.

Name of the Course: Cloud Computing	
Course Code: MCA401D	Semester:
Duration: 30 hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	
Aim:	
Sl. No.	
1	Analyze the Evolution and Impact of Cloud Computing
2	Evaluate Cloud Computing Service Models and Deployment Strategies
3	Investigate Security Challenges and Solutions in Cloud Computing
Objective:	
Sl. No.	
1	To understand the fundamental concepts of cloud computing.

2	To explore different cloud service models and cloud deployment models.
3	To gain practical knowledge on cloud storage, virtualization, and cloud security.
4	To comprehend the economic, organizational, and technological aspects of cloud computing and development of applications leveraging cloud-based services and APIs.
Pre-Requisite:	
Sl. No.	
1.	Basic understanding of computer networks, operating systems, and internet technologies.
Course Outcome:	
1.	Understand and explain the key concepts and principles of cloud computing, including its architecture, components, and models.
2.	Differentiate between various cloud service models (IaaS, PaaS, SaaS) and deployment models (public, private, hybrid, community), and assess their suitability for different scenarios.
3.	Apply virtualization techniques and cloud storage solutions to design and manage scalable and efficient cloud-based systems.
4.	Analyse cloud security mechanisms and issues, and implement strategies to safeguard data and applications in the cloud environment.
Relevant Links:	
Cloud Study Material Cloud NPTEL LINK Cloud Coursera Link Cloud LinkedIn Learning Link	

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Introduction to Cloud Computing and Cloud Service Models	Definition and Essential Characteristics of Cloud Computing, History and Evolution of Cloud Computing, Benefits and Challenges of Cloud Computing, Cloud Computing Architecture, Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Function as a Service (FaaS)	MIT's "Cloud Computing" course, Stanford University's "CS240A: Cloud Computing and Big Data" course University of California Berkeley's "Cloud Computing Concepts" course	5
2	Cloud Deployment Models	Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud	Industry: IBM Cloud, AWS, Google Cloud Platform Academia: University of Illinois Urbana-Champaign's "CS498: Cloud Computing" course, Carnegie Mellon University's "Cloud Infrastructure" course	5
3	Virtualization	Concepts of Virtualization, Types of Virtualization (Server, Network, Storage), Virtual Machines (VMs), Containers and Docker	Industry: VMware, Docker, Kubernetes Academia: Stanford University's "CS240: Advanced Topics in Operating Systems" course, University of Washington's "CSE 599: Virtualization Technologies" course	5
4	Cloud Storage	Storage as a Service (STaaS), Cloud Storage Architectures, Storage Types: Block, File, and Object Storage, Examples: Amazon S3, Google Cloud Storage	Industry: Amazon S3, Google Cloud Storage, Microsoft Azure Blob Storage Academia: University of California Berkeley's "CS162: Operating Systems and Systems Programming" course, Princeton University's "COS 518: Advanced Operating Systems" course	5

5	Cloud Security and Cloud Networking	Security Issues in Cloud Computing, Identity and Access Management (IAM), Data Protection and Encryption, Regulatory and Compliance Issues, Networking Basics for Cloud, Software-Defined Networking (SDN), Network Function Virtualization (NFV), Cloud Load Balancing	Industry: AWS Security, Google Cloud Security, Microsoft Azure Security, Cisco, AWS VPC, Google Cloud VPC Academia: Georgia Tech's "CS 6262: Network Security" course, University of Maryland's "ENPM693: Cloud Security" course, Stanford University's "CS244: Advanced Topics in Networking" course, MIT's "6.829: Computer Networks" course	5
6	Cloud Application Development and Future Trends	Developing Cloud-Native Applications, Microservices Architecture, DevOps and CI/CD Pipelines, Example Platforms: AWS Lambda, Google Cloud Functions Edge Computing, Serverless Computing, Quantum Cloud Computing, AI and Machine Learning in the Cloud	Industry: AWS Lambda, Google Cloud Functions, Microsoft Azure DevOps, IBM Quantum Experience, AWS DeepRacer, Google AI Academia: UC Berkeley's "CS169: Software Engineering" course, University of Michigan's "EECS 485: Web Systems" course, MIT's "6.S191: Introduction to Deep Learning" course, Stanford's "CS221: Artificial Intelligence" course	5

List of Books Text Books:			
Name of Author	Title of the Book with Book Chapter	Edition/ISSN/ISBN	Name of the Publisher
Rajkumar Buyya, Christian Vecchiola, Sb Thamarai Selvi	Chapter 1: Introduction Mastering Cloud Computing	1 st / 978-1259029950	Mc Graw Hill
Rajkumar Buyya, Christian Vecchiola, Sb Thamarai Selvi	Chapter 3: Virtualization Mastering Cloud Computing	1 st / 978-1259029950	Mc Graw Hill
Rajkumar Buyya, Christian Vecchiola, Sb Thamarai Selvi	Chapter 4: Cloud Computing Architecture Mastering Cloud Computing	1 st / 978-1259029950	Mc Graw Hill
Rajkumar Buyya, Christian Vecchiola, Sb Thamarai Selvi	Chapter 9: Cloud Platforms in Industry Mastering Cloud Computing	1 st / 978-1259029950	Mc Graw Hill
Rajkumar Buyya, Christian Vecchiola, Sb Thamarai Selvi	Chapter 10: Cloud Applications Mastering Cloud Computing	1 st / 978-1259029950	Mc Graw Hill
Rajkumar Buyya, Christian Vecchiola, Sb Thamarai Selvi	Chapter 5: Virtual Machines Provisioning and Migration Services Mastering Cloud Computing	1 st / 978-1259029950	Mc Graw Hill
Arshdeep Bahga, Vijay Madiseti	Chapter 12: Cloud Security Cloud Computing A Hands-On Approach	1 st / 9788173719233	University Press
Reference Books:			
Thomas Erl, Zaigham Mahmood, Ricardo Puttini	Cloud Computing: Concepts, Technology & Architecture	1 st / 978-0133387520	Prentice Hall
Michael J. Kavis	Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS)	1 st / 978-1118617618	Wiley
Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi	Mastering Cloud Computing: Foundations and Applications Programming	1 st / 978-0124114548	Morgan Kaufmann



University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2023, 4th Semester



Subject Name: Compiler Design

Credit: 03

Subject Code: MCA402A

Lecture Hours: 30 Hrs.

Name of the Course: Compiler Design	
CourseCode: MCA402A	Semester: 4 th
Duration: 30 Hrs.	MaximumMarks: 100
Teaching Scheme	Examination Scheme
Theory:3	EndSemesterExam:100
Tutorial: 1	ContinuousAssessment:100
Practical:0	PracticalSessionalinternalcontinuousevaluation:0
Credit:3+0	PracticalSessionalexternalexamination:0
Aim:	
Sl.No.	
1	To gain Knowledge of Various aspects of a Compiler.
2	To enhance Ability to identify qualities of a good solution of NFA, DFA etc.
3	To implement NFA to DFA conversion techniques and different parsing methods to solve problems.

Objective:	
Sl.No.	
1	Provide you with the knowledge and expertise to become a proficient compiler design.
2	Demonstrate an understanding of parsing and polishing expression concepts that are vital for compiler design.
3	To produce DFA from an NFA to understand a basic compiler.
4	Critically evaluate NFA based on their design and create DFA from that.
Pre-Requisite:	
Sl.No.	
1.	Proficiency in data structure, graph theory, automata theory and C programming.
Course Outcome:	
1.	Understand fundamentals of compiler and identify the relationships among different phases of the compiler.
2.	Understand the application of finite state machines, recursive descent, production rules, parsing, and language semantics.
3.	Analyze & implement required module, which may include front-end, back-end, and a small set of middle-end optimizations.
4.	Use modern tools and technologies for designing new compiler.
RelevantLinks:	
Study Material	NPTELLINK Coursera Link LinkedIn Learning Link

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

Module number	Topic	Sub-topics	MappingwithIndustry and International Academia	Lecture Hours	CorrespondingLabAssignment
1	Context Free Grammars	Classification of grammars. Context free grammars. Deterministic finite state automata (DFA) Non-DFA Scanners. Top down parsing, LL grammars. Bottom up parsing.	International Academia: AICTE-prescribed syllabus: IndustryMapping: The concepts delivered are in sync with the industry standards	10	NA
2	Polishing Expressions	Polishing expressions, Operator precedence grammar, IR grammars, Comparison of parsing methods. Error handling.	International Academia: AICTE-prescribed syllabus: Industry Mapping: The concepts delivered are in sync with the industry standards	10	NA
3	Symbol table handling techniques	Symbol table handling techniques. Organization for non-block and block-structured languages. Run time storage administration. Static and dynamic allocation. Intermediate forms of source program. Polish N-tuple and syntax trees. Semantic analysis and code generation. Code optimization, folding, and redundant sub-expression evaluation. Optimization within iterative loops.	International Academia: AICTE-prescribed syllabus: Industry Mapping: The concepts delivered are in sync with the industry standards	10	NA

List of Books Text Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Aho, Lam, Sethi, Ullman	Compilers – Principles, Techniques & Tools	2 nd Edition	Pearson
Holub	Compiler Design in C	2 nd Edition	Prentice Hall
Mishra, Chandrasekaran	Theory of Computer Science: Automata, Languages and Computation	3 rd Edition	PHI



University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2023, 4th Semester



Subject Name: Mobile Computing

Credit: 03

Subject Code: MCA402B

Lecture Hours: 30 Hrs.

Name of the Course: Mobile Computing	
Course Code: MCA402B	Semester:
Duration: 30	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	
Aim:	
Sl. No.	
1	To understand the fundamental concepts and technologies driving mobile computing
2	To understand Mobile Networking and Connectivity
3	To address challenges in mobile security and optimization

Objective:	
Sl. No.	
1	Gain a foundational understanding of mobile communication systems, including cellular networks and their evolution.
2	Grasp the core concepts of mobile networking protocols, covering aspects like network layers and routing in unique mobile environments.
3	Explore the various mobile communication technologies and protocols.
4	Develop critical knowledge of security challenges and solutions for mobile computing devices and applications.
Pre-Requisite:	
Sl. No.	
1.	Knowledge of computer fundamentals and networking concepts.
Course Outcome:	
1.	Define mobile technologies in terms of hardware, software, and communications.
2.	Utilize mobile computing nomenclature to describe and analyze existing mobile computing frameworks and architectures.
3.	Evaluate the effectiveness of different mobile computing frameworks.
4.	Describe how mobile technology functions to enable other computing technologies.
Relevant Links:	
MC Study Material MC NPTEL LINK MC Coursera Link MC LinkedIn Learning Link	

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Introduction: Wireless Transmission: Access Control:	Introduction and Application of Mobile Computing Wireless Transmission: Frequency for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems, Medium Access Control: Motivation for a specialised MAC: Hidden and Exposed terminals. Near and Far terminals; SOMA, FOMA; TOMA: Fixed TOM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, PRMA packet reservation multiple access, reservation TOMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access	AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	4
2	CDMA: GSM:	CDMA: Spread Aloha multiple access Telecommunication Systems: GSM: Mobile Services, System Architecture, radio interface, Protocols, Localization and Calling, Handover, Security, New Data Services, DECT, Systems Architecture Protocol Architecture: TETRA I, UMTS and IMT-2000, UMTS Basic Architecture, UTRA FDD mode, UTRA TDD mode	AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	8

3	Satellite Systems: Wireless LAN: IEEE 802.11: Bluetooth:	Satellite Systems: History, Applications, Basics: GEO, LEO, MEO, Routing, Localization. Handover Examples: Broadcast Systems: Overview, Cyclic Repetition, Digital Audio; broadcasting: Multimedia object transfer Protocol; Digital Video Broadcasting Wireless LAN: Infrared vs. Radio Transmission, Infrastructure and Ad Hoc networks, IEEE 802.11: System Architecture, Protocol Architecture, Physical Layer, Medium Access Control Layer, MAC management, Future development; HIPERLAN: Protocol architecture, Physical Layer Channel access control. Sub layer, Medium Access control sub layer, Information bases and networking; Bluetooth: User Scenarios, Physical Layer, MAC layer, Networking, Security, Link management. Wireless ATM: Motivation for WATM, Wireless ATM working group, WATM services, Reference model: Example configurations, Generic reference model;	AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	7
4	Handover: Location management: Mobile Network Layer:	Handover: Handover reference model, Handover requirements, Types of handover, Handover scenarios, Backward handover, Forward handover; Location management: Requirements for location management, Procedures and Entities; Addressing, Mobile quality of service, Access point control protocol. Mobile Network Layer: Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration,	AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	

5		Tunneling and Encapsulation, Optimizations, Reverse Tunneling, Ipv6; Dynamic host configuration protocol, Ad hoc networks: Routing, Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics. Mobile Transport Layer: Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, mobile RCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP. Support for Mobility:	AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	5
6	File systems: Wireless application protocol:	File systems: Consistency, Examples; World Wide Web: Hypertext transfer protocol, Hypertext markup language, Some approaches that might help wireless access, System architectures; Wireless application protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language; WML script, Wireless telephony application, Examples "Stacks with WAP, Mobile databases, Mobile agents. Security and privacy aspects of Mobile	AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	6

List of Books Text Books:			
Name of Author	Title of the Book with Book Chapter	Edition/ISSN/ISBN	Name of the Publisher
Jochen Schiller	Mobile Communications (Chapters: 1, 2, 3, 4, 5, 7, 8, 9, 10)	2nd Edition	Pearson
Reference Books:			
William Stallings	Wireless Communications and Networks		PHI
Rappaport	Wireless Communications Principals and Practices	2nd Edition	Pearson
Ashoke Talukder	Mobile Computing	2nd Edition	TMH



University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2023, 4th Semester



Subject Name: Embedded Systems

Credit: 03

Subject Code: MCA402C

Lecture Hours: 30 Hrs.

Name of the Course: Embedded Systems	
Course Code: MCA402C	Semester:
Duration: 30	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	
Aim:	
Sl. No.	
1	To understand the fundamental concepts and technologies driving mobile computing
2	To understand Mobile Networking and Connectivity
3	To address challenges in mobile security and optimization

Objective:	
Sl. No.	
1	Gain a foundational understanding of mobile communication systems, including cellular networks and their evolution.
2	Grasp the core concepts of mobile networking protocols, covering aspects like network layers and routing in unique mobile environments.
3	Explore the various mobile communication technologies and protocols.
4	Develop critical knowledge of security challenges and solutions for mobile computing devices and applications.
Pre-Requisite:	
Sl. No.	
1.	Knowledge of computer fundamentals and networking concepts.
Course Outcome:	
1.	Understand the concept of embedded systems, microcontroller, different components of microcontroller and their interactions.
2.	Get familiarized with the programming environment to develop embedded solutions.
3.	Program ARM microcontroller to perform various tasks.
4.	Understand the key concepts of embedded systems such as I/O, timers, interrupts and interaction with peripheral devices.
Relevant Links:	
ES Study Material ES NPTEL LINK ES Coursera Link ES LinkedIn Learning Link	

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Introduction to Embedded Systems: Embedded Processors:	Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification of Embedded Systems, Relation between Microcontroller and Embedded System, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems Types of Embedded Processors, Microprocessors, Microcontrollers, DSP, Embedded Processors from Future Electronics, Applications for embedded processors, Choosing the Right Embedded Processor.	AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	4
2	Embedded Systems	Application- and Domain-Specific: Washing Machine-Application Specific Example of Embedded System, Automotive- Domain Specific Example of Embedded System. The core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Embedded	AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf Industry Mapping: The concepts	8

		Memories: Scratchpad Memories, Cache Memories, Flash Memories, Memory according to the type of Interface, Memory Shadowing and memory selection for Embedded Systems, Sensors and Actuators. Communication Interface: Onboard and External Communication Interfaces.	delivered are in sync with the industry standards	
3	Embedded Firmware: RTOS-Based Embedded System Design:	Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages. Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.	AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	8
4	Task Communication : Task Synchronization: Trends in Embedded Industry:	Shared Memory, Message Passing, Remote Procedure Call and Sockets Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS. Processor Trends in Embedded System, Embedded OS Trends, Development Language Trends	AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	10

List of Books Text Books:			
Name of Author	Title of the Book with Book Chapter	Edition/ISSN/ISBN	Name of the Publisher
Shibu K.V	Introduction to Embedded Systems	2nd Edition	Mc Graw Hill
Raj Kamal	Embedded Systems	4th Edition	TMH
Reference Books:			
Frank Vahid	Embedded System Design	1st Edition	John Wiley
Lyla B Das	Embedded Systems	1st Edition	Pearson
David E. Simon	An Embedded Software Primer	1st Edition	Pearson Education



University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2023, 4th Semester



Subject Name: Values and Ethics

Credit: 03

Subject Code: MCA403

Lecture Hours: 40 Hrs.

Name of the Course: Values and Ethics	
Course Code: MCACC403	Semester: 4th
Duration: 40 Hrs.	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 1	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 1	
Aim:	
Sl. No.	
1	To gain knowledge of various aspects general ethics and energy in life.
2	To get ability to identify relations among technology, engineering and human aspects
3	To implement values in various aspects of life with morality.

Objective:	
Sl. No.	
1	An ability to analyze a problem, then identify and formulate the computing requirements appropriate to its solution
2	Development of Solutions- An ability to design, implement and evaluate a Computer based problems with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
3	Conduct investigations of complex problem – An ability to design and conduct experiments, as well as to analyze and interpret data to reach valid conclusions.
Pre-Requisite:	
Sl. No.	
1.	Knowledge in General Studies, Fundamentals of Computers, Proficiency in Communication Skills.
Course Outcome:	
1.	Understanding the importance and role of science, technology and engineering as knowledge and social-professional world, know the technological growth
2.	To realize the importance of energy as resource and crisis in energy, understand the effect of degradation and pollution of environment, introduce eco-friendly technology.
3.	To choose the appropriate technology for development, understand the transfer, assessment and impact of technology, learn the role of human resource in engineering , man-machine interaction, impact of automation, introduce human-centric technology..
4.	To determine the relation between profession and human values like value crisis in society, life, personality and mental health. know the role/importance of values in law, justice in Indian perspective, know the aesthetic values, learning the relation between morality and ethics and virtue ethics.
Relevant Links:	
VE Study Material VE NPTEL LINK VE Coursera Link VE LinkedIn Learning Link	

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

Module number	Topic	Subtopics	Mapping with Industry and International Academia	Lecture Hours
1	Introduction and Relation with Energy	. Science, Technology and Engineering as Knowledge and as Social and Professional Activities Effects of Technological Growth Rapid Technological growth and depletion of resources. Reports of the Club of Rome. Limits of growth. Energy Crisis; Renewable Energy Resources	International Academia: (https://ocw.mit.edu/courses/21l-450-literature-and-ethical-values-fall-2002/pages/syllabus/) AICTE-prescribed syllabus: https://www.aicte-india.org/downloads/mcadegree.pdf Industry Mapping: Case Studies, Fieldwork	12
2	Human, Technology and Engineering Ethics	Environmental degradation. Technologies. Environmental Regulations. Environmental Ethics Appropriate Technology Movement of Schumacher Human Operator in Engineering projects and industries. Problems of man machine interaction. Impact of assembly line and automation. Engineering profession: Ethical issues in engineering practice. Conflicts between business demands and professional ideals. Social and ethical Responsibilities of Technologists	International Standards (https://ocw.mit.edu/courses/21l-450-literature-and-ethical-values-fall-2002/pages/syllabus/) AICTE prescribed syllabus: https://www.aicte-india.org/downloads/mcadegree.pdf	12

			Industry Mapping: Case Study based, Field analysis, CSR	
3	General Values	Nature of values: Value Spectrum of a 'good' life Psychological values: Integrated personality; mental health	International Standards : (https://ocw.mit.edu/courses/21l-450-literature-and-ethical-values-fall-2002/pages/syllabus/) AICTE prescribed syllabus: https://www.aicte-india.org/downloads/mcadegree.pdf Industry Mapping: Case studies, GAP analysis, Ethical audit	8
4	Other Types of Values and Morality	The modern search for a 'good' society, Moral and ethical values: Nature of moral judgments; canons of ethics; Ethics of virtue; ethics of duty; ethics of responsibility	International Standards: (https://ocw.mit.edu/courses/21l-450-literature-and-ethical-values-fall-2002/pages/syllabus/) AICTE prescribed syllabus: https://www.aicte-india.org/downloads/mcadegree.pdf Industry Mapping: Case study, organization visits, HR Policies.	8

List of Books Text Books:			
Name of Author	Title of the Book	Edition	Name of the Publisher
S.K. Sarangi	Values & Ethics of Profession & Business (Chapter No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 16)	2nd edn	Asian Books
Reference Books:			
Manna, Chakraborti	Values and Ethics in Business and Profession (Chapter No. 4, 5, 6)	1st edn	PHI
Chattopadhyay, Singh	Ethics & Values for Engineers & Managers (Chapter No. 3, 4)	1st edn	HPH



University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2023, 4th Semester



Subject Name: Management and Accounting

Credit: 03

Subject Code: MCA405

Lecture Hours: 30 Hrs.

Name of the Course: Management and Accounting	
Course Code: MCA405	Semester:
Duration: 30	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 2	End Semester Exam: 100
Tutorial:	Continuous Assessment: 100
Credit: 2	
Aim:	
Sl. No.	
1	To gain Knowledge of basic aspects of Management
2	To enhance Ability to identify qualities of a good Management Control and Strategy
3	To implement learned Concept of Financial and Cost Accounting to solve problems

Objective:	
Sl. No.	
1	The fundamental in basic in Management
2	Basic concepts in the Management control and strategy
3	Principles of Financial Accounting
4	Significance of Cost Accounting in the Accounting field
Pre-Requisite:	
Sl. No.	
1.	Proficiency in Basic of Management and Accounting
Course Outcome:	
1.	On completion of this course students are expected to learn various Concept of Planning, scheduling, organizing, staffing, directing, controlling Managerial economics
2.	On completion of this course students are expected to design Management Control system.
3.	On completion of this course students are expected to do a comparative analysis among different Financial statement and Financial accounting 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 Cost Volume Profit analysis and budgeting
Relevant Links:	
MA Study Material MA NPTEL LINK MA Coursera Link MA LinkedIn Learning Link	

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Basics of management	Planning, scheduling, organizing, staffing, directing, controlling Managerial economics and financial management, productivity management Human resource development and management, selection, training and role of IT	AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/em221.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	6
2	Management Control Systems	Introduction to management control systems: goals, strategies; Performance measures	AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/em221.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	6
3	Strategy	Firm and its environment, strategies and resources, industry structure and analysis, corporate strategies and its evaluation, strategies for growth and diversification, strategic planning	AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/em221.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	6
4	Financial Accounting	Financial statements and analysis Conceptual framework of cost accounting. Financial accounting computer packages.	AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/em221.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	6
5	Cost Accounting	Cost-volume profit (CVP) relationship, budgeting, cost accumulation system, variable and absorption costing system	AICTE-prescribed syllabus: https://makautexam.net/aicte_details/Syllabus/MCA/em221.pdf Industry Mapping: The concepts delivered are in sync with the industry standards	6

List of Books Text Books:			
Name of Author	Title of the Book with Book Chapter	Edition/ISSN/ISBN	Name of the Publisher
Khan & Jain	Management Accounting	8 th Edition	Mc Graw Hill
Harold Koontz	Essentials of Management	11 th Edition	Mc Graw Hill
Reference Books:			
Ramchandran	Accounting for Management (Management Accounting)	2 nd Edition	Scitech Publications

University of Engineering and Management

Institute of Engineering & Management, New Town Campus

University of Engineering & Management, Jaipur

Syllabus for MCA Admission Batch 2023, 4th Semester

Subject Name: General Studies & Current Affairs - IV

Credit: 0.5

Subject Code: MCA(GS)401

Lecture Hours: 40 Hrs.

Module number	Topic	Sub-topics	Mapping with International/National/ State Level Exams	Lecture Hours	Corresponding Assignment
1	GK, Current Affairs and Economics	Textbook: IGNOU 1. Balance Payment(BECC-106, Block-3, Unit-8) http://egyankosh.ac.in/handle/123456789/75074 2. Poverty (BECC-112, Block-3, Unit-9) http://egyankosh.ac.in/handle/123456789/83224 3. Unemployment- (related to schemes) (BECC-106, Block-2,	<i>International Exams</i> 1.GRE (https://www.ets.org/pdfs/gre/gre-math-review.pdf) 2.GMAT (https://downloads.mba.com/downloads/gmat-handbook.pdf) <i>National Exams:</i> 1.UPSC Civil Services Exam (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26 UPSC Combined Defence Services (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf)	40	1. Balance of Payments: Write a case study on the BoP crisis India faced in 1991.. 2.Poverty and Unemployment- Compare and contrast two major poverty alleviation schemes in India. Discuss their methodologies, target groups, and effectiveness in addressing poverty. 3.Different types of Goods Write an essay on the role of different types of goods in daily life. 4.Fiscal Policy of India. Research the fiscal policy measures taken by the Indian government during recent economic crises, such

		Unit-6) http://egyankosh.ac.in/handle/123456789/75067 4. Different types of Goods (BECC-101, Block-6, Unit-16) http://egyankosh.ac.in/handle/123456789/67496 5. Fiscal Policy of India.(BECC-109, Block-3, Unit-9) http://egyankosh.ac.in/handle/123456789/76562 GK and Current Affairs – Based on Monthly Magazines provided and recent news of national and international importance. Newspaper Reading: The Economic Times. Traditional GK and CA: Capitals of countries, currency of countries, important dates,	aulr/files/Notif-CDS-I_ Exam-2023-Engl-211222.pdf), pg 20-21 2.RBI Grade B (https://rbidocs.rbi.org.in/rdocs/Content/PDFs/DADVT/GRB09052023FA65E4FB1C2CF473396B4ED7E5F69CDDE.PDF), pg 22-23 3.IBPS Probationary officer(https://www.ibps.in/wp-content/uploads/Detailed-Advt.-CRP-PO-XII.pdf) , Pg 7. 4.Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22 5.Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/TB-ACIO-Recruitment-2023-Notification-Emp-News.pdf) 6.XAT (https://xat.org.in/xat-syllabus/)	as the 2008 global financial crisis or the COVID-19 pandemic. Analyze their effectiveness and impact on the economy. ** All the assignments are in line with entrance exams for premier B-Schools and GS Paper-I of UPSC CSE.
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		Sports football, hockey, recent events & awards etc. Important books & authors, Important Hydropower dams, atomic power plant s, important national parks,Minister & portfolio & constituencies, Population census, Persons in news -most famous,popular recent only, Important dances & festivals of Indian states,International Head Quarters & world organization, Important president & pm elected from various countries, Important about banks like payment banks, small banks& license system, Awards, Sports, Books & author, National & International affairs	7. GATE (https://gate2024.iisc.ac.in/apers-and-syllabus/) 8. CAT https://iimcat.ac.in/per/g01/pub/756/ASM/WebPortal/1/index.html?756@@1@@1 State Level Exams: 9. Civil Services Executive Exam (WBCS) (https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement_pg1) 10. Miscellaneous Services Recruitment Examination (file:///C:/Users/UEMK/Downloads/2707970_2019.pdf), pg 1		
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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 2023, 4th Semester

Subject Name: Competitive Aptitude Training - IV

Credit: 0.5

Subject Code: MCA(GS)481

Lecture Hours: 48 Hrs.

Module number	Topic	Sub-topics	Mapping with International/National/ State Level Exams	Lecture Hours	Corresponding Assignment
1	Quantitative Aptitude	Textbook: Quantitative Aptitude for Competitive Examination Author: R.S Agarwal Publishing House: S.Chand <u>Permutation & Combination:</u> Numbers, Alphabets, Linear arrangement, Circular arrangement, Repetition, Selection based <u>Probability:</u> Coins, Dices, Drawing of balls, Cards, Numbers, Miscellaneous.	International Exams 1. GRE (https://www.ets.org/pdfs/gre/gre-math-review.pdf) 2. GMAT (https://downloads.mba.com/downloads/gmat-handbook.pdf) National Exams: 1. UPSC Civil Services Exam (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26 2. UPSC Combined Defence Services	40	1. Permutation & Combination a. How to arrange different numbers in different sequences. b. Questions based on Alphabet arrangements. c. Problems based on linear and circular arrangements. d. Problems based on garlands and Necklaces. e. Problems based on selection of things and persons. 2. Probability a. Problems based on different numbers of coin tossed. b. Problems based on rolling dices.

		<u>Mensuration</u> – Rectangle, Square, Triangle, Rhombus, Parallelogram, Cylinder, Cone, Sphere, Hemisphere <u>Geometry</u>-. Lines, Angles, Triangles, Quadrilateral and circles.	(https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21 3. RBI Grade B (https://rbidocs.rbi.org.in/rdocs/Content/PDFs/DADVTGRB09052023FA65E4FB1C2CF473396B4FD7E5F69CDD_E.PDF), pg 22-23 4. IBPS Probationary officer(https://www.ibps.in/wp-content/uploads/Detailed-Advt.-CRP-PO-XII.pdf) , Pg7. 5. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22 Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf) 7. XAT (https://xat.org.in/xat-syllabus/) 8. GATE	c. Problems based on forming of committees based on selection. 3. Problems based on drawing of cards Mensuration. a. Problems based on 2D and 3D shapes. b. Finding area based on mixed shapes. c. Finding the volume based on different shapes. d. Problems based on Prism Pyramid. 4. Geometry: a. Problems based on Lines and Angles. b. Problems based on complementary, supplementary, corresponding, alternative angles. c. Problems based on acute, right, obtuse, scalene, equilateral, isosceles triangles. d. Basis problems based on Quadrilaterals. e. Basic Problems based on chords and tangents. d. ** All the assignments are in line of GSPaper I of UPSC CSE Mains Examination
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			(https://gate2024.iisc.ac.in/papers-and-syllabus/) CAT https://iimcat.ac.in/per/q01/public/756/ASM/WebPortal/1/index.html?756@@1@@1 State Level Exams: 1.Civil Services Executive Exam (WBCS) (https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1 2. Miscellaneous Services Recruitment Examination (file:///C:/Users/UEMK/Downloads/2707970_2019.pdf), pg 1		
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