

# **MASTER OF COMPUTER APPLICATIONS (MCA)**

**MCA/ASSIGN/SEMESTER-II**

**ASSIGNMENTS**

**(July - 2021 & January - 2022)**

**MCS-021, MCS-022, MCS-023, MCS-024, MCSL-025**



**SCHOOL OF COMPUTER AND INFORMATION SCIENCES  
INDIRA GANDHI NATIONAL OPEN UNIVERSITY  
MAIDAN GARHI, NEW DELHI – 110 068**

## CONTENTS

Course Code	Assignment No.	Submission-Schedule		Page No.
		For July-December Session	For January-June Session	
MCS-021	MCA(II)/021/Assignment/21-22	31 <sup>st</sup> October, 2021	15 <sup>th</sup> April, 2022	3
MCS-022	MCA(II)/022/Assignment/21-22	31 <sup>st</sup> October, 2021	15 <sup>th</sup> April, 2022	4
MCS-023	MCA(II)/023/Assignment/21-22	31 <sup>st</sup> October, 2021	15 <sup>th</sup> April, 2022	6
MCS-024	MCA(II)/024/Assignment/21-22	31 <sup>st</sup> October, 2021	15 <sup>th</sup> April, 2022	8
MCSL-025	MCA(II)/L-025/Assignment/21-22	31 <sup>st</sup> October, 2021	15 <sup>th</sup> April, 2022	10

### Important Notes

1. Submit your assignments to the Coordinator of your Study Centre on or before the due date.
2. Assignment submission before due dates is compulsory to become eligible for appearing in corresponding Term End Examinations. For further details, please refer to MCA Programme Guide.
3. To become eligible for appearing the Term End Practical Examination for the lab courses, it is essential to fulfill the minimum attendance requirements as well as submission of assignments (on or before the due date). For further details, please refer to the MCA Programme Guide.
4. The viva voce is compulsory for the assignments. For any course, if a student submitted the assignment and not attended the viva-voce, then the assignment is treated as not successfully completed and would be marked as ZERO.

**Course Code** : **MCS-021**  
**Course Title** : **Data and File Structures**  
**Assignment Number** : **MCA(II)/021/Assignment/2021-22**  
**Maximum Marks** : **100**  
**Weightage** : **25%**  
**Last Dates for Submission** : **31<sup>st</sup> October, 2021 (for July, 2021 session)**  
**15<sup>th</sup> April, 2022(for January, 2022 session)**

**This assignment has four questions which carry 80 marks. Answer all the questions. Each question carries 20 marks. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide. All the implementations should be in C programming language.**

**Question 1:**

Write an algorithm that accepts a Binary Tree as inputs and outputs the traversals of Inorder , Postorder and Preorder of it.

**Question 2:**

Is it possible to implement multiple queues in a Stack. Justify your answer.

**Question 3:**

List the names of all Sorting Algorithms along with their Complexities (Best case, Average case and Worst case). List as many names as possible along with their year of Invention and Inventor. Make necessary assumptions.

**Question 4:**

Show the effect of making the following insertions into a Binary Search Tree which is already having one node consisting of 91 (value):  
50,30,40,60,10,80,90,5,100

<b>Course Code</b>	:	<b>MCS-022</b>
<b>Course Title</b>	:	<b>Operating System Concepts and Networking Management</b>
<b>Assignment Number</b>	:	<b>MCA(II)/022/Assignment/2021-22</b>
<b>Maximum Marks</b>	:	<b>100</b>
<b>Weightage</b>	:	<b>25%</b>
<b>Last Dates for Submission</b>	:	<b>31<sup>st</sup> October, 2021 (For July, 2021 Session)</b>
	:	<b>15<sup>th</sup> April, 2022 (For January, 2022 Session)</b>

**Answer all the questions of the assignment having 80 marks in total. 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Answer of each part of the question should be confined to about 300 words.**

**Question 1:**

- (a) Discuss the two approaches which improves the performance of a system through overlapping of input, output and processing operations. **(5 Marks)**
- (b) Briefly explain the purpose of the following directories of Linux OS. **(3 Marks)**
  - (i) /usr/bin
  - (ii) /sbin
  - (iii) /mnt

**Question 2:**

What are the two modes in which windows 2000 OS works? Discuss its architecture with the help of a diagram. **(8 Marks)**

**Question 3:**

- (i) Explain the process used by Kerberos to authenticate network clients logging onto a windows 2000 domain. **(6 Marks)**
- (ii) What is meant by a trust relationship? Explain the importance of Kerberos and Domain controllers in maintaining trust relationship. **(6 Marks)**

**Question 4:**

- (i) What is a fire wall? How does It secure the system? Explain its limitations. **(6 Marks)**
- (ii) What are the security services provided by the Ip Sec? **(5 Marks)**

**Question 5:**

Explain the step by step processes of sharing files, folders and devices in windows XP. **(6 Marks)**

**Question 6:**

Write the purpose of VPN and list VPN technologies supported by windows 2000. **(5 Marks)**

**Question 7:**

Explain the followings with reference to “Hardening in windows 2000 OS.

**(6 Marks)**

- (i) Hardening the OS and application code
- (ii) Hardening the files system security

**Question 8:**

Explain the various components of Linux OS.

**(8 Marks)**

**Question 9:**

Explain the architecture of Simple Network Management Protocol (SNMP)

**(8 Marks)**

**Question 10:**

Describe the various file access control mechanisms provided by Linux OS with appropriate examples.

**(8 Marks)**

<b>Course Code</b>	:	<b>MCS-023</b>
<b>Course Title</b>	:	<b>Introduction to Database Management Systems</b>
<b>Assignment Number</b>	:	<b>MCA(II)/023/Assignment/2021-22</b>
<b>Maximum Marks</b>	:	<b>100</b>
<b>Weightage</b>	:	<b>25%</b>
<b>Last Date of Submission</b>	:	<b>31<sup>st</sup> October, 2021 (for July, 2021 session)</b> <b>15<sup>th</sup> April, 2022(for January, 2022 session)</b>

**This assignment has five questions. Answer all questions of total 80 marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Answer to each part of the question should be confined to about 300 words.**

**Question 1:** **(20 Marks)**

- a. What are the advantages of having three-level database architecture? How are they related to Data Independence? Explain with the help of an example.
- b. What are the different forms of integrity control in database management system? Describe with the help of examples.
- c. What is a Transaction? What are the problems of concurrent transactions? Describe with the help of examples.
- d. What is locking? How does it solve the problem of concurrent transaction execution? Describe with the help of examples.
- e. What is a distributed database management system? How is it different to that of client server database systems?

**Question 2:** **(10 Marks)**

Consider that a Departmental Store needs to maintain a database system for maintaining its inventory of items. The database is needed for the following requirements:

- To find out the item name, item-code, item description and present stock level of all or specified items.
- To find the information about various Vendors of the store. A vendor can supply all or some items only. Some of the information that is needed about vendor is: the Vendor Code, Vendor name, address, office phone etc.
- To find the information about various orders those are placed for various items to various vendors. It also keeps information about receipt of item/items and updates the inventory.
- To keep track of all the issues of the items to various users.

Draw an ER diagram for the departmental store. Specify key attributes and constraints of each entity type and on each relationship type. Note any unspecified requirements, and make appropriate assumptions to make the specification complete. Also design the normalized tables with required integrity and security constraints.

**Question 3:** **(20 Marks)**

Consider a “Software Management System” that maintains the database using the following tables:

**Project (p-id, p-title, start-date, duration, c-id)**

**Clients (c-id, c-name, c-address, c-phone)**

**Employee (e-id, e-name, e-address, e-phone)**

**Project-person (p-id,e-id)**

Please note that an employee may be working on more than one project in the organization at a time. Write and run the following SQL queries on the tables:

- a. Find the c-id and c-name of the clients who have offered maximum number of projects to the company.
- b. Find the list of all the employees and the projects they have worked from time to time.
- c. Find the employees who are working in more than 2 projects.
- d. Find the names of all those employees who have worked on all the projects of client whose c-name is "ABC University".
- e. Find the projects which will be completed by 31<sup>st</sup> Dec, 2022.
- f. Find all the clients who have not given any project. Also find the person who is not working on any project at all.
- g. List all the project titles along with their p\_id.
- h. List all the Clients along with their details.
- i. List all the project-persons along with their details.
- j. List all the employees whose name starts with "A".

*Note: Make suitable assumptions, if any.*

**Question 4:**

**(10 Marks)**

Consider the Relation  $R=\{A, B, C, D, E, F, G, H\}$  and the set of functional dependencies.

$A \rightarrow C$     $B \rightarrow CG$     $AD \rightarrow EH$     $C \rightarrow DF$     $A \rightarrow H$

What is the key for R? Decompose R into 2NF, 3NF and finally in BCNF relation.

**Question 5:**

**(20 Marks)**

Consider the ER diagram of **Q2** and tables designed. Implement this database using MS Access or any other similar RDBMS package. You must include the following details in your implementation:

- Normalized tables and table relationships
- Constraints on data values including referential Integrity constraints.
- Design minimum two forms and two reports.
- Also prepare the system catalog / data dictionary.

<b>Course Code</b>	<b>:</b>	<b>MCS-024</b>
<b>Course Title</b>	<b>:</b>	<b>Object Oriented Technologies and Java Programming</b>
<b>Assignment Number</b>	<b>:</b>	<b>MCA(II)/024/Assignment/2021-22</b>
<b>Maximum Marks</b>	<b>:</b>	<b>100%</b>
<b>Weightage</b>	<b>:</b>	<b>25%</b>
<b>Last Date of Submission</b>	<b>:</b>	<b>31<sup>st</sup> October, 2021 (for July, 2021 session) 15<sup>th</sup> April, 2022(for January, 2022 session)</b>

**There are eight questions in this assignment which carried 80 marks. Rest 20 marks are for viva-voce. Answer all the questions. Give appropriate comments in programs to increase understandability. Wherever required, you may write java program, run it on machine and take its output as part of solution. Please go through the guidelines regarding assignments given in the Program Guide for the format of presentation.**

**Question 1 :**

- (a) Explain basic concepts of Object Oriented Programming? Explain how data hiding is achieved in java. **(5 Marks)**
- (b) Explain different data types available in java. **(5 Marks)**

**Question 2 :**

- (a) Explain how class is defined in java with the help of a program. Also explain use of getter and setter methods. **(4 Marks)**
- (b) Explain use of static methods in java. **(2 Marks)**
- (c) Write a java program to add two matrices of 4X4 in java. **(4 Marks)**

**Question 3 :**

Write a java program to create an Account class and define constructors in it. Inherit Saving\_Bank\_Account class and Current\_Bank\_Account class from the Account class. Override constructors of Account class in Saving\_Bank\_Account and Current\_Bank\_Account classes. Define appropriate methods to operate these accounts. Make necessary assumptions. Give proper comment in your program to increase readability. **(10 Marks)**

**Question 4 :**

- (a) Explain uses of final and super keywords in java with the help of examples. **(4 Marks)**
- (b) What is a package in Java? Explain accessibility rules for packages. **(4 Marks)**
- (c) Explain advantages of polymorphism with the help of example. **(2 Marks)**

**Question 5:**

- (a) What is interface? Explain difference between abstract class and interface with the help of examples. Also write advantages of using interfaces in java programming. **(6 Marks)**
- (b) What is an exception? Explain various causes of exceptions. With the help of a program explain how exceptions are handled in java. **(4 Marks)**

**Question 6 :**

- (a) What is multithreading? Explain how threads are synchronized in java. Also explain various applications where multithreading may be used. Describe how interthread communications takes place in java. **(8 Marks)**
- (b) Create an Applet to draw circle on the basis of input given by user. **(2 Marks)**

**Question 7 :**

- (a) What is object serialization? Explain working and use of object serialization. **(3 Marks)**
- (b) What is layout manager? Explain different layouts available in java for GUI programming. What is default layout of an applet? Explain how to set the layout of an applet. **(7 Marks)**

**Question 8 :**

- (a) What is proxy server? Explain URL class and its methods in java. **(3 Marks)**
- (b) What is JDBC? Explain the advantages of JDBC. **(3 Marks)**
- (c) Explain use of GET and POST methods of Servlet with the help of examples. **(4 Marks)**

<b>Course Code</b>	<b>:</b>	<b>MCSL-025</b>
<b>Course Title</b>	<b>:</b>	<b>Lab Course</b>
<b>Assignment Number</b>	<b>:</b>	<b>MCA(II)/L-025/Assign/2021-22</b>
<b>Maximum Marks</b>	<b>:</b>	<b>100</b>
<b>Weightage</b>	<b>:</b>	<b>25%</b>
<b>Last Dates for Submission</b>	<b>:</b>	<b>31<sup>st</sup> October, 2021 (for July, 2021 session) 15<sup>th</sup> April, 2022(for January, 2022 session)</b>

**This assignment has four parts. Answer all questions of each part. Each part is of 10 marks. Lab records of each part will carry 10 marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.**

### **PART-1: MCS-021**

**Question 1:** **(5 marks)**

Write a program in C language for addition of two matrices using Pointers

**Question 2:** **(5 marks)**

Write a program in C language that will accept a Graph as input and will perform a Breadth First Search on it. Make necessary assumptions.

### **PART-2: MCS-022**

**Question 1:** **(5 marks)**

Write a shell script in Linux/Unix that accepts a text file as input and prints the frequency of each word in the file (ie. Number of times each word appears in the file)

**Question 2:** **(5 marks)**

Your PC is on a network. Make the printer that is connected to your machine as “shareable”

### **PART-3: MCS-023**

**Question 1:** **(10 marks)**

Create a database consisting of Name of University, Number of Affiliated Colleges, Number of students in each affiliated college, Number of students who passed from each affiliated college year wise during the last five years

After creating the database, perform the following tasks:

(i) List the names of all affiliated colleges during last five years from where less than 50% students passed in comparison to the number of students appeared from that college year wise. Make necessary assumptions.

**PART-4: MCS-024**

**Question 1:**

**(5 marks)**

Write a program in Java for multiplication of two matrices

**Question 2:**

**(5 Marks)**

Write a program in Java that connects to a database and generates a report that consists of the list of Vaccination Centers which are offering a specific Vaccine (Covishield or Covaxin). Some centers may offer both the vaccines. Input to the Java program will be name of Vaccine. Make assumptions wherever necessary

***Note: You must execute the program and submit the program logic, sample inputs and outputs along with the necessary documentation for this question. Assumptions can be made wherever necessary.***