

BACHELOR OF COMPUTER APPLICATIONS (BCA)

(Revised Syllabus)

BCA(Revised Syllabus)/ASSIGN/SEMESTER-III

ASSIGNMENTS

(July - 2021& January - 2022)

MCS-021, MCS-023, MCS-014, BCS-031, BCSL-032, BCSL-033, BCSL-034,



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

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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 BCA 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 BCA Programme Guide.

Course Code : **MCS-021**
Course Title : **Data and File Structures**
Assignment Number : **BCA(3)/021/Assignment/2021-22**
Maximum Marks : **100**
Weightage : **25%**
Last Dates for Submission : **31st October, 2021 (For July Session)**
: **15th April, 2022 (For January 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: (20 Marks)

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

Question 2: (20 Marks)

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

Question 3: (20 Marks)

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: (20 Marks)

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

Course Code	:	MCS-023
Course Title	:	Introduction to Database Management Systems
Assignment Number	:	BCA(3)/023/Assignment/2021-22
Maximum Marks	:	100
Weightage	:	25%
Last Date of Submission	:	31st October, 2021 (For July Session) 15th April, 2022 (For January Session)

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 31st 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.

Course Code : **MCS-014**
Course Title : **Systems Analysis and Design**
Assignment Number : **BCA(3)/014/Assignment/2021-22**
Maximum Marks : **100**
Weightage : **25%**
Last Dates for Submission : **31st October, 2021 (For July Session)**
15th April, 2022 (For January Session)

This assignment has three questions of 80 marks. Rest 20 marks are for viva voce. Answer all questions. 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.

Question 1: (30 Marks)

Develop SRS for an **Online Vaccination Management System**. SRS should be as per IEEE standard SRS template. Make necessary assumptions.

Question 2: (30 Marks)

Draw the DFDs upto 3rd level for **Online Vaccination Management System**.

Question 3: (20 Marks)

Draw ERD for an **Online Vaccination Management System**. Make necessary assumptions.

Course Code	:	BCS-031
Course Title	:	Programming in C++
Assignment Number	:	BCA(3)031/Assignment/2021-22
Maximum Marks	:	100
Weightage	:	25%
Last Date of Submission	:	31st October, 2021(for July session) 15th April, 2022 (for January session)

This assignment has five questions carrying a total of 80 marks. Answer all the questions. 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. Wherever required, you may write C++ program and take its output as part of solution.

Question 1:

- (a) What is Object Oriented Programming (OOP) approach? Explain advantages of OOP. **(6 Marks)**
- (b) Briefly explain different operators of C++. **(6 Marks)**
- (c) Explain use of followings in C++ programming, with an example program for each. **(4 Marks)**
 - (a) for loop
 - (b) while loop

Question 2:

- (a) What is a class? Explain how a class is created in C++, with the help of an example. **(5 Marks)**
- (b) Explain the following in detail, in context of C++ programming. **(6 Marks)**
 - i. Access specifier
 - ii. Friend Function
- (c) Write a C++ program to explain how an object can be passed as a parameter to a function. **(5 Marks)**

Question 3:

- (a) What are containers? Explain use of List container class, with the help of an example. **(5 Marks)**
- (b) What is inheritance? What are different types of inheritance? Explain how multiple inheritance is implemented in C++, with the help of a program. **(5 Marks)**
- (c) Write a C++ program to overload '+' operator in such a way that it return the sum of lengths of two strings (Note: if S1 and S2 are two strings then S1+S2 or S2 + S1 should give the sum of lengths of S1 and S2). **(6 Marks)**

Question 4:

- (a) Explain the following in detail with the help of examples, in context of C++ programming **(9 Marks)**
- i. Destructor
 - ii. Virtual Function
 - iii. Inline function
- (b) What is template? Write appropriate statements to create a template class for Stack data Structure in C++. **(7 Marks)**

Question 5:

- (a) What is exception? How exceptions are handled in C++? Write program to handle stack overflow as exception. **(7 Marks)**
- (b) What is function overloading? Write a C++ program to explain concept of function overloading. **(5 Marks)**
- (c) Explain use of any two I/O formatting flags in C++ with example. **(4 Marks)**

Course Code : **BCSL-032**
Title : **C++ Programming Lab**
Assignment Number : **BCA (3)/ L-032/Assignment/2021-22**
Maximum Marks : **50**
Weightage : **25%**
Last date of Submission : **31st October, 2021(for July session)**
15th April, 2022 (for January session)

This assignment has two questions. Answer both the questions. These questions carry 40 marks. Rest 10 marks are for viva-voce. Write C++ program and take its output as part of solution. Please go through the guidelines regarding the assignments given in the programme guide for the format of presentation.

Question 1(a):

Write a C++ program to demonstrate us of all the arithmetic and logical operators in C++.

(10 Marks)

Question 1(b):

Write a C++ program to create shape class which is having abstract method area(). Derive classes circle and rectangle from shape class. Override area method in circle and rectangle class to find the area of the respective shape. Make necessary assumptions id any.

(10 Marks)

Question 2(a):

Write a C++ program to demonstrate exception handling by writing a program for matrix addition, which add two matrices and display the resultant matrix. Matrix addition function should notify if the order of the matrix is invalid for addition, using exception.

(10 Marks)

Question 2(b):

Write C++ program to read the contents from a given file and display in on console.

(10 Marks)

Course Code : **BCSL-033**
Course Title : **Data and File Structures Lab**
Assignment Number : **BCA(3)/L-033/Assignment/2021-22**
Maximum Marks : **50**
Weightage : **25%**
Last Dates for Submission : **31st October, 2021 (for July Session)**
15th April, 2022 (for January Session)

This assignment has two questions, each of 20 marks. Rest 10 marks are for viva-voce. Attach input and output of the program to the assignment. Write programs in ‘C’ language.

- Q1:** Write an algorithm and program that accepts the following list of integers and uses Bubble Sort to sort and print them: **(20 Marks)**
6, 2, 10, 12, 89, 34, 99, 3, 105
- Q2:** Write an algorithm and program for multiplication of two Polynomials **(20 Marks)**

Course Code	:	BCSL-034
Title	:	DBMS Lab
Assignment Number	:	BCA(3)/L-034/Assignment/2021-22
Maximum Marks	:	50
Weightage	:	25%
Last Date of Submission	:	31st October, 2021 (for July Session) 15th April, 2022 (for January Session)

This assignment has only one question. Answer the question. This question carries 40 marks. Rest 10 marks are for viva voce. You may use illustrations and diagrams to enhance the explanation. Please go through the guidelines regarding the assignments given in the programme guide for the format of presentation.

Question 1: ABC theatre requires a computerized system to streamline their manual operations. The objective of this project is to create a “Theatre Management System” that should automate and provide answers of different queries and generate reports related to theatre that were previously tedious and error prone. You are asked to create the database of ABC theatre in any RDBMS, which must provide the following functionalities: **(40 Marks)**

- Query support
- Report generation
- Easy input facility for new data
- Keep details about production costs, ticket sales etc
- Maintain necessary details about customer, staff, accommodation (seats), ticket, movies etc.

After creating the database you must perform the following tasks:

- i) Find out how many customers booked the tickets but did not come for watching movie in an year.
- ii) Design a report to display different age-group of customer and type of movie (Action, Comedy etc) for which they are mostly coming.
- iii) Find the name of attendant who was at duty in Hall_Number-3 (SPICE), 9-12 PM on 20-01-2021.
- iv) Write a procedure/trigger on Hall_Number so such that the validity of the number is checked and the name of Hall is automatically displayed on selection of Hall_Number. Assume and create the necessary tables and constraints.
- v) Display records where Ticket-Counter person has achieved sales more than average sales of all window persons of all the counters in ABC theatre.

- vi) Display all records of staff members where name starts with 'S'.
- vii) Find out the names of top ten movies that gained maximum number of customers in a year.
- viii) Design a report to display the history sheet of movies at the end of month contains:
 - Number of people watched the movies (day by day record)
 - Total cost of movie including purchase cost, display cost, staff cost, Miscellaneous.
 - Total profit/loss

Note: You must perform the above said activities and also take prints of screenshots of the layouts, sample input and output along with the necessary documentation for this practical question. Assumptions can be made wherever necessary.