BACHELOR OF COMPUTER APPLICATIONS (BCA)

(Revised Syllabus)

BCA(Revised Syllabus)/ASSIGN/SEMESTER-III

ASSIGNMENTS

(July - 2022 & January - 2023)

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
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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/2022-23**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Dates for Submission	:	**31ˢᵗ October, 2022 (For July Session)**
	:	**15ᵗʰ April, 2023 (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 algorithms should be written in C language.

Q1. Write an algorithm that converts a Tree into a Binary Tree. **(20)**

Q2. Is it possible to implement multiple stacks in a Queue. Justify your answer. **(20)**

Q3. List the names of all SEARCH 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. **(20)**

Q4. Write an algorithm for creation of an AVL tree. **(20)**

Course Code	:	**MCS-023**
Course Title	:	**Introduction to Database Management Systems**
Assignment Number	:	**BCA(3)/023/Assignment/2022-23**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Date of Submission	:	**31st October, 2022 (For July Session)**
		15th April, 2023 (For January Session)

This assignment has four questions. Answer all the questions for 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.

Q1. **a)** Draw and explain the detailed system architecture of DBMS.

b) With the help of a diagram, describe the concept of client/server model.

c) Explain in detail about various key constraints used in database system. Give examples for each.

d) Explain the importance of NULL values in Relational Model.

e) Discuss the mechanism of attribute relationship inheritance. How is it useful?

f) By considering an example describe various data update operations in SQL. Give examples.

g) Explain insertion, deletion and modification anomalies with suitable examples.

h) State BCNF. How does it differ from 3NF?

i) How can a database recover from failure when many transactions are going on? Describe with the help of an example.

j) What is a distributed database management system? How is it different to that of client server database systems? **(40)**

Q2. Suppose you are given the following requirements for a simple database for the National Football League (NFL): **(20)**

- the NFL has many teams,
- each team has a name, a city, a coach, a captain, and a set of players,
- each player belongs to only one team,
- each player has a name, a player position (such as Centre Forward, left midfield, center midfield, right midfield, left fullback, centre back etc..), a skill level, and a set of injury records,
- a team captain is also a player,
- a game is played between two teams (referred to as host_team and guest_team) and has a date (such as May 11th, 2000) and a score (such as 4 to 2).

Construct an ER diagram for the NFL database using the Chen notation with all conventions. List your assumptions and clearly indicate the cardinality mappings as well as any role indicators in your ER diagram.

Q3. Consider a "Library Management System" which keeps the following tables: **(10)**
Book (isbn_no, book_title, author, publisher, edition, year_of_copyright)
BookAccession (accession_no, isbn_no, date_of_purchase)
Members (m_id, m_name, m_address, m_phone).
Issue_return (accession_no, m_id, expected_date_of_return, actual_date_of_return)

Please note that a member can be issued a book for a period of 15 days. The actual-date-of-return is kept blank for the books that have not been returned. Write and run the following SQL queries on the tables:

(i) Find the m_id and m_name of the members who have got maximum number of un-returned books.
(ii) List the book details along with the number of copies for that book in the library (issued or not-issued both)
(iii) Find the names of all those students who have got all the books issued to him of the author named "ABC" .
(iv) Find the books that are expected to be returned in this week.
(iv) Find those members who have not got any book issued to him/her during last six months.

Make suitable assumptions, if any.

Q4. Consider the Relation R={A, B, C, D, E, F, G } and the set of functional dependencies.
(10)

A→F   B→CD   C→G   F→E

What is the key for R? With the help of a suitable example discuss the Insertion, Deletion and Updation anomalies which can arise if the relation is not in 2NF and 3NF ? Decompose R into 2NF, 3NF and finally in BCNF relation.

Course Code	:	**MCS-014**
Course Title	:	**Systems Analysis and Design**
Assignment Number	:	**BCA(3)/014/Assignment/2022-23**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Dates for Submission	:	**31st October, 2022 (For July Session)**
		15th April, 2023 (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.

Q1. Develop for SRS **Real Time Traffic Management System.** SRS should be as per IEEE standard SRS template. Make necessary assumptions. **(30)**

Q2. Draw the DFDs upto 3rd level for **Real Time Traffic Management System.** **(30)**

Q3. Draw ERD for an **Real Time Traffic Management System**. Make necessary assumptions. **(20)**

Course Code	:	**BCS-031**
Course Title	:	**Programming in C++**
Assignment Number	:	**BCA(3)031/Assignment/2022-23**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Date of Submission	:	**31ˢᵗ October, 2022 (for July session)**
		15ᵗʰ April, 2023 (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.

Q1. **(a)** What is Object Oriented Programming (OOP) approach? Explain featurs of OOP. **(5)**

    (b) Briefly explain different operators of C++. **(5)**

    (c) Explain use of followings in C++ programming, with an example program for each. **(6)**

        (a) ::
        (b) for loop
        (c) ?:

Q2. **(a)** Write a C++ program to add two matrices. **(5)**

    (b) Explain the following in detail, in context of C++ programming. **(5)**
        i. Abstract class
        ii. Order of constructer calling in inheritance

    (c) Write a C++ program to explain how an object can be passed as a parameter to a function. **(6)**

Q3. **(a)** What are containers? Explain any two container classes of C++. **(5)**

    (b) What is inheritance? What are different types of inheritance supported by C++? Explain advantage of inheritance with the help of a program. **(5)**

    (c) What is operator overloading in C++? Explain use of operator overloading with the help of a program to add two real numbers. **(6)**

Q4. **(a)** Explain the following in detail with the help of examples, in context of C++ programming **(10)**

        i. Object and Class
        ii. Virtual Function
        iii. Friend function
        iv. Constructors

    (b) What is template? Write appropriate statements to create a template class for Queue data Structure in C++. **(6)**

Q5. **(a)** What is exception? What is need of exceptions handling in C++? Write program to handle arithmetic as exception in C++. Make necessary assumptions. **(6)**

(b) What is function overriding? Write a C++ program to explain concept of function overriding. **(6)**

(c) Explain Explain how I/O formatting is done in C++ with the help of a program. **(4)**

Course Code	:	**BCSL-032**
Title	:	**C++ Programming Lab**
Assignment Number	:	**BCA (3)/ L-032/Assignment/2022-23**
Maximum Marks	:	**50**
Weightage	:	**25%**
Last date of Submission	:	**31ˢᵗ October, 2022 (for July session)**
		15ᵗʰ April, 2023 (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.

Q1. **(a)** Write a C++ program to demonstrate us of different data types in C++. **(10)**

(b) Write a C++ program to create Shape class which is having abstract method area(). Derive classes Triangle and Rectangle from Shape class. Override area method in Triangle class and Rectangle class to find the area of the respective shape. Make necessary assumptions if any. **(10)**

Q2. **(a)** Demonstrate exception handling in C++ by writing a program for simple calculator. Make necessary assumptions. **(10)**

(b) Write C++ program to demonstrate operator overloading, by overloading + operator for adding two matrices. **(10)**

Course Code	:	**BCSL-033**
Course Title	:	**Data and File Structures Lab**
Assignment Number	:	**BCA(3)/L-033/Assignment/2022-23**
Maximum Marks	:	**50**
Weightage	:	**25%**
Last Dates for Submission	:	**31st October, 2022 (for July Session)**
		15th April, 2023 (for January Session)

This assignment has two questions, each of 20 marks. 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 Quick Sort to sort and print them: **(20)**

15, 18, 24, 12, 89, 34, 99, 3, 105

Q2. Write an algorithm and program for addition of two polynomials. **(20)**

Course Code	:	BCSL-034
Title	:	DBMS Lab
Assignment Number	:	BCA(3)/L-034/Assignment/2022-23
Maximum Marks	:	50
Weightage	:	25%
Last Date of Submission	:	31st October, 2022 (for July Session)
		15thApril, 2023 (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.

Q1. The objective of this project is to create a **"Bus Ticket Booking Management System"** for **ABC Travels** company that should automate and provide answers of different queries and generate reports related to bus ticket booking that were previously tedious and error prone.

They ply buses to various destinations from Delhi. They have various categories of buses like luxury, semi-luxury, deluxe, super deluxe, Volvo and sleeper. This system is built on the concept of booking bus tickets in advance. The passenger can book tickets only one month before their travel. The user can check the bus schedule, book tickets, cancel reservations, and check the bus status board using this system. When purchasing tickets, the user must first enter the bus number, after which the system will display the entire number of bus seats along with the passengers' names, and the user must then enter the number of tickets, seat number, and person's name.

To develop the system, you are required to create the database in any RDBMS, which must provide the following functionalities: **(40)**
- Query support
- Report generation
- Easy input facility for new data
- Keep details about costs, ticket sales etc
- Maintain necessary details about customer, staff, bus schedules, seats etc.

After creating the database you must perform the following tasks:

i) Find out how many customers booked the tickets but did not board the bus on a particular day.

ii) To display how many seats are filled and how many seats are vacant for a particular trip of a specific category of bus.

iii) Find the name of driver who was on duty on a particular day.

iv) To calculate the no. of passengers travelled on a particular day and particular month.

v) To calculate total income earned for that day.

vi) To calculate total income earned for a particular month.

vii) To calculate no. of male, female and kids travelled on a particular day.

viii) Design a report to display different age-group of passengers who prefer the luxury, semi-luxury, deluxe, super deluxe, Volvo and sleeper bus travel.

ix) To display the report consisting of the complete status of each bus on a particular day.

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.