BACHELOR OF COMPUTER APPLICATIONS (BCA)

(Revised Syllabus)

ASSIGNMENTS

(July - 2023 & January - 2024)

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(III)/021/Assignment/2023-24
Maximum Marks	:	100
Weightage	:	30%
Last Dates for Submission	:	31st October, 2023 (For July Session)
	:	30th April, 2024 (For January Session)

This assignment has 10 questions of 8 Marks each, answer all questions. 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.

Q1. Elaborate various asymptotic notations used to evaluate the efficiency of the algorithm. **(8)**

Q2. Write a program that accepts two polynomials as input and displays the resultant polynomial after multiplication of input polynomials. **(8)**

Q3. Write a C programme to implement a doubly linked list. Also write functions to perform insertion and deletion operations in it. **(8)**

Q4. What is a Circular Queue? Write an algorithm to perform insertion and deletion operation in a Circular Queue **(8)**

Q5. Write a program in C for insertion sort. Write the step-by-step working of the insertion sort for the following set of data: 10, 25, 86, 1, 16, 95, 37, 56, 5, 15, 20, 4. Also count the number of swaps and comparison operations performed for it. **(8)**

Q6. Write a detailed note on file organization techniques. **(8)**

Q7. Create the binary tree for which the in-order and post order traversal are given as below: **(8)**

In-order: QUVTMPSYZXR

Post-order: VUTQZYXSRPM

Q8. Create a B tree of order-5 for the following keys, inserted in the sequence. **(8)**

25, 5, 10, 2, 3 35, 45, 30, 50, 55, 60, 12, 18, 20, 1

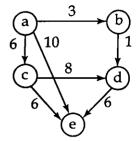Further, delete the keys 1, 2, 10, and 12. Show all the intermediate steps.

Q9. Create AVL tree for the following keys inserted in the order: **(8)**

5, 15, 3, 25, 10, 2, 35, 7, 45, 30, 12, 20, 14

Further, delete the keys 2, 5, 7, and 8. Show all the intermediate steps.

Q10. Solve the following instance of single source shortest paths problem with vertex 'a' as the source using suitable method. **(8)**

Course Code	:	MCS-023
Course Title	:	**Introduction to Database Management Systems**
Assignment Number	:	**BCA(III)/023/Assignment/2023-24**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Date of Submission	:	**31ˢᵗ October, 2023 (For July Session)**
		30ᵗʰ April, 2024 (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. **(40)**

    A. Draw and explain the detailed system architecture of DBMS. **(4)**

    B. Discuss the 3-level architecture of DBMS. Explain how it leads to data independence. **(4)**

    C. What are integrity constraints? Discuss the various types of integrity constraints that can be imposed on database. **(4)**

    D. What is the two phase locking protocol? How does it guarantee Serializability? Explain. **(4)**

    E. Discuss the anomalies due to insertion, updation and deletion in a relation that is not in QNF. Illustrate with the help of an example. **(4)**

    F. List and explain the 4 basic properties of a Transaction with the help of appropriate examples. **(4)**

    G. Explain the Log-based recovery scheme with the help of an example. **(4)**

    H. Explain the need of Distributed DBMS over Centralized DBMS. Also give the structure of Distributed DBMS. **(4)**

    I. Write SQL commands for each of the following. Also illustrate the usage of each command through suitable example. **(2 Marks each)**

        (i) Creation of views
        (ii) Creation of sequences
        (iii) Outer join
        (iv) To give access permission to any user

Q2. **(20)**

A bookshop has a huge collection of books to sell them online and therefore requires a database to track its sales. For each book they store the Title, Author(s), name, Publisher, Volume, ISBN No., Price, Stock (no. of copies), Year of publication, etc. To help the customers to search the book, they require that each book is assigned to one or more categories such as Engineering, Sciences, Fiction, Literature, Applications, etc. If at all, any discounts that are there for certain books, need to be notified on the site (best-buy offer). To buy a book, a customer needs to register on the site. Also it maintains the profile of the user and also their earlier purchases. The bookshop also sends "Newsletter" to all the registered users to update them about the publications.

Identify the entities, relationships, constraints and cardinality and construct an ER diagram for the above mentioned specifications. List your assumptions and clearly indicate the cardinality mappings as well as any role indicators in your ER diagram.

Q3. (10)

Consider the following tables:
WORKS(Pname, Cname, Salary)
LIVES(Pname, Street, City)
LOCATED(Cname, City)
MANAGER(Pname, Mname)

Write a query in SQL for the following:

(i)   List the names of the people who work for the company Wipro' along with the cities they live in.
(ii)   Find the people who work for the company `Infosys' having salary greater than 50,000.
(iii)   List the names of the people, along with the street and city addresses.
(iv)   Find the persons whose salaries are more than that of all of the 'Oracle' employees.
(v)   Find the names of the persons who do not work in `Infosys'.

Make suitable assumptions, if any.

Q4. (10)

(a) Compute the closure of the following set F of functional dependencies for relation schema
    R = (A, B, C, D, E).
    $A \rightarrow BC$
    $CD \rightarrow E$
    $B \rightarrow D$
    $E \rightarrow A$

List the candidate keys for R.

(b) Consider the relation R (A, B, C, D, E) and the set of functional dependencies :-
    $F(A \rightarrow D, \{A,B\} \rightarrow C, D \rightarrow E)$

    Assume that the decomposition of R into {R1 (A, B, C) and R2 (A, D, E)}.
    Is this decomposition lossless? Justify?

Course Code	:	**MCS-014**
Course Title	:	**Systems Analysis and Design**
Assignment Number	:	**BCA(III)/014/Assignment/2023-24**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Dates for Submission	:	**31st October, 2023 (For July Session)**
		30th April, 2024 (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 SRS for **Student Admission System.** SRS should be as per IEEE standard SRS template. Make necessary assumptions. **(30)**

Q2. Draw the DFDs upto 3rd level for **Student Admission System.** **(30)**

Q3. Draw ERD for an **Student Admission System**. Make necessary assumptions. **(20)**

Course Code	:	**BCS-031**
Course Title	:	**Programming in C++**
Assignment Number	:	**BCA(III)031/Assignment/2023-24**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Date of Submission	:	**31st October, 2023 (for July session)**
		30th April, 2024 (for January session)

This assignment has three 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. What is a Virtual Base Class? How does it differ from a Base Class. Explain with examples. **(30)**

Q2. What is a Template? What are its applications? Give an example. **(30)**

Q3. What is iostream ? Write a short note on it. **(20)**

Course Code	:	**BCSL-032**
Course Title	:	**C++ Programming Lab**
Assignment Number	:	**BCA (III)/ L-032/Assignment/2023-24**
Maximum Marks	:	**50**
Weightage	:	**25%**
Last date of Submission	:	**31ˢᵗ October, 2023 (for July session)**
		30ᵗʰ April, 2024 (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. Write a program in C++ for multiplication of two sparse matrices using Pointers. **(20)**

Q2. Write a program in C++ to find the sum of elements in an array using Function Template. Make necessary assumptions. **(10)**

Q3. Write a program in C++ to compute the salaries of Employees of an organization who are having different designations. Use Virtual Base Class or Classes. Make necessary assumptions. **(10)**

Course Code	:	BCSL-033
Course Title	:	**Data and File Structures Lab**
Assignment Number	:	**BCA(III)/L-033/Assignment/2023-24**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Dates for Submission	:	**31st October, 2023 (for July Session)**
		30th April, 2024 (for January Session)

There are 10 questions of 08 marks each in this assignment carrying a total of 80 marks. Rest 20 marks are for viva voce. Please go through the guidelines regarding assignments given in the Programme Guide for the format of the presentation. Write all the programs in 'C' language.

Q1. Write a program to multiply two matrices using array. **(8)**

Q2. Write a program to implement singly linked list for user inputs. Also, perform insertion and delete operation on it. **(8)**

Q3. Write a program using linked list that accepts two polynomials as input and displays the resultant polynomial after performing the addition of the input polynomials. **(8)**

Q4. Write a program to implement doubly linked list for user inputs. Also, perform insertion and deletion operations on it. **(8)**

Q5. Write a program in C to sort user input data using quick sort method. Also, print the number of swaps and comparison operations performed for sorting the given data set. **(8)**

Q6. Write a program in C to search an input data from a set of data, stored in an array using binary search algorithm. Also, print the number of comparison operations performed for searching the given data. **(8)**

Q7. Write a program to implement two stacks with the help of single array. **(8)**

Q8. Write a program to implement a DEQUE (Double Ended Queue) using a doubly linked list. **(8)**

Q9. Write a program to convert an infix expression to a postfix expression. Use appropriate data structure. **(8)**

Q10. Write a program to implement binary search tree (BST). Also, write functions to traverse the BST in In-order, Pre-order and Post-order forms. **(8)**

Course Code	:	**BCSL-034**
Title	:	**DBMS Lab**
Assignment Number	:	**BCA(III)/L-034/Assignment/2023-24**
Maximum Marks	:	**50**
Weightage	:	**25%**
Last Date of Submission	:	**31ˢᵗ October, 2023 (for July Session)**
		30ᵗʰApril, 2024 (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. A XYZ-star hotel requires a computerized system to automize its front office operations **(40)** that support the following functionalities:

- Easy input facility for new data
- Keep details about rooms, tariff, details of occupied rooms, details of unoccupied rooms, check-in / check-out timings, staff etc..
- Update necessary details about the room-billing, extra facilities used like gym, laundry, STD/ISD calls made etc.
- Query support
- Report generation

Perform the following tasks:

(i)   Draw the ER diagram by identifying the entities, relationships and cardinality by using any of the drawing tools like smartdraw, dia, visio, conceptdraw etc.. Follow proper conventions.

(ii)   Create suitable database to support/accommodate all the functionalities referred above.

(iii)   Using MS-Access, design various forms to support the hotels' front office operations such as enquiry form, tariff, categories of rooms along with their category, list of vacant rooms, list of occupied rooms, list of unoccupied rooms, room-billing (which includes extra facilities also), restaurant billing, staff details, list of phone numbers, reservations etc..

(iv)   Report generation like daily reports of list of vacant rooms, list of occupied rooms, on-duty staff list, list of room reservations made etc.

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.