

# **BACHELOR OF COMPUTER APPLICATIONS (BCA)**

## **(Revised Syllabus)**

BCA(Revised Syllabus)/ASSIGN/SEMESTER-III

**ASSIGNMENTS**

**(July - 2019 & January - 2020)**

**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.

<b>Course Code</b>	<b>:</b>	<b>MCS-021</b>
<b>Course Title</b>	<b>:</b>	<b>Data and File Structures</b>
<b>Assignment Number</b>	<b>:</b>	<b>MCA(3)/021/Assignment/2019-20</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>15<sup>th</sup> October, 2019 (For July 2019 Session)</b>
	<b>:</b>	<b>15<sup>th</sup> April, 2020 (For January 2020 Session)</b>

**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 language.**

- Q1.** Write an algorithm that accepts a Binary Tree as input and prints the number of leaf nodes to standard output.
  
- Q2.** Write an algorithm for the implementation of a AVL Tree.
  
- Q3.** Write a note of not more than 5 pages summarizing the latest research in the area of “Trees”. Refer to various journals and other online resources. Indicate them in your assignment.
  
- Q4.** Write an algorithm for the implementation of a Stack.

<b>Course Code</b>	<b>:</b>	<b>MCS-023</b>
<b>Course Title</b>	<b>:</b>	<b>Introduction to Database Management Systems</b>
<b>Assignment Number</b>	<b>:</b>	<b>BCA(3)/023/Assignment/2019-20</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>15<sup>th</sup> October, 2019 (For July 2019 Session)</b> <b>15<sup>th</sup> April, 2020 (For January 2020 Session)</b>

**This assignment has six questions carrying a total of 80 marks. Answer all questions. Rest 20 marks are for viva-voce. You may use illustrations and diagrams to enhance your 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. (20)**

Design an ER diagram for an ABC IT Training Institute that will meet the training needs for individuals and employees of corporate offices. Clearly indicate the entities, relationships, cardinality and the key constraints. The description of the environment is as follows:

The Institute offers 5 advanced courses of 3 months duration each. The Institute has 20 faculty and can handle upto 40 trainees per batch. The training will be conducted batch wise. They can accommodate maximum 5 batches per day (2 batches in the pre-lunch session and 3 batches in the post-lunch session). The student can register upto 2 courses simultaneously. Training consists of theory and practicals. Theory and practicals are scheduled on alternate days. Each batch is assigned a faculty member who takes theory sessions as well as practical sessions. Sunday is holiday for everyone. A test will be conducted per course every week to continuously evaluate the performance of the student. The question paper will be set by the faculty concerned whoever is teaching the batch. The result/grade will be declared at the end of the third month after conducting course-end exam.

**Q2. (10)**

Design the Relational Schema for the E-R diagram that you have drawn for part *Question 1*. The relations must be at least in 2 NF. Perform the following on the relations:

- Enter about 5 sets of meaningful data in each of the relations .
- Identify the domain of various attributes.
- Identify the Primary keys of all the relations.
- Identify the Foreign keys and referential integrity constraints in the relations.

**Q3. (10)**

- “For creating a Employee Management Information System of an Organisation a database management system(DBMS) is better or a file management system.” Justify the statement given above.

- (b) Assume that you are assigned the role of Database Administrator for the Organisation database, mention the key responsibilities you have to handle?

**Q4. (10)**

Given the *relational schema*:

***ENROL (ENo, C\_Id, Class) - ENo represents student number***  
***TEACH (Prof, C\_Id, Class) – C\_Id represents course number***  
***ADVISE (Prof, ENo) - Prof is project guide of ENo (Student's enrol\_no)***  
***PRE\_REQ (C\_Id, Pre\_C\_Id) - Pre\_C\_Id is prerequisite course***  
***GRADES (ENo, C\_Id, Grade, Year)***  
***STUDENT (ENo, SName) - SName is student name***

Write SQL statements for the following :

- (i) List all students whose project guide is Prof.Murthy.
- (ii) List the grade for the student with ENo=1234
- (iii) List those professors who teach more than one class.
- (iv) List all the student names and ENo's who got Grade A in the year 2018 in C\_Id= 100.
- (v) List all the students who has taken the pre-requisite course Pre\_C\_Id= 001.

*Note: Make suitable assumptions, if any.*

**Q5. (12)**

What are the advantages of indexed-sequential file organisation? With the help of an example explain the structure of indexed-sequential file.

**Q6. (6 X 3 = 18)**

- a) What are the problems associated with data Redundancy in a relation? How can you solve those problems? Can referential integrity constraints help in addressing those problems? Give reasons in support of your answer.
- b) Consider the following employee record in an organization:

***Employee ( ID, Name, date of birth, date of joining, age, address, department, manger, IDs of projects working on, role in the project, project name, project team leader, duration of project, dependent names)***

An employee works in one department. Each department is managed by one manager. An employee can work on many projects. A project has a team leader. An employee can have many dependents, however, one dependent can be related to only one employee.

Identify the functional dependencies in the relation given above. Normalise the relation up to BCNF. Make suitable assumptions, if any.

- c) Consider a relation Student(ID: 9 characters, name: 25 characters, department: 10 characters, programme\_code: 4 characters) having about 1,000,000 student records. The database is stored on a disk having a disk block size of 1 MB. Assume that the primary index of the relation is ID and this relation is required mostly for the application that generates programme wise list of student names in alphabetical order. Create a secondary index that will improve the performance of the system for the given application. Show how many block transfers will be saved on average due to creation of index. Make suitable assumptions if any.

**Course Code** : **MCS-014**  
**Course Title** : **Systems Analysis and Design**  
**Assignment Number** : **MCA(3)/014/Assignment/2019-20**  
**Maximum Marks** : **100**  
**Weightage** : **25%**  
**Last Dates for Submission** : **15<sup>th</sup> October, 2019 (For July 2019 Session)**  
**15<sup>th</sup> April, 2020 (For January 2020 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 development of a **Mobile Wallet** (PayTM, Mobikwik etc. are examples).SRS should be as per IEEE standard SRS template. Make necessary assumptions. **(30)**
- Q2.** Draw the DFDs upto 3<sup>rd</sup> level for **Mobile Wallet**. **(30)**
- Q3.** Draw ERD for **Mobile Wallet**.Make necessary assumptions. **(20)**

<b>Course Code</b>	<b>:</b>	<b>BCS-031</b>
<b>Course Title</b>	<b>:</b>	<b>Programming in C++</b>
<b>Assignment Number</b>	<b>:</b>	<b>BCA(3)/031/Assignment/2019-20</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>15<sup>th</sup> October, 2019 (For July 2019 Session)</b> <b>15<sup>th</sup> April, 2020 (For January 2020 Session)</b>

**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) Differentiate between Object Oriented Programming approach and Structured Programming Approach. Also explain advantages of Object Oriented Programming over Structured Programming. **(5)**
- (b) Explain different data types available in C++ programming language. **(5)**
- (c) Explain the use of followings in C++ programming with an example program for each. **(6)**
  - (a) if
  - (b) while
  - (c) switch

### **Q2.**

- (a) What is constructor? Define the class Account with all the basic attributes of a saving bank account. Define the default constructor, parameterised constructor in Account class. Define member functions display\_balance(), for displaying the balance of account and cash\_withdrawal() to withdraw some amount from account. Use appropriate access control specifiers in this program. **(7)**
- (b) Explain the following in detail, in context of C++ programming. **(9)**
  - i. Access Specifiers
  - ii. Virtual Function
  - iii. Abstract Class

### **Q3.**

- (a) What is inheritance? Explain different types of inheritance supported by C++ with the help of example programs. **(6)**



- (b) Write a C++ program to overload '+' operator to find the sum of length of two given strings. (Note: if S1 and S2 are two strings then S1+S2 should give the sum of lengths of S1 and S2). (10)

**Q4.**

- (a) What is stream manipulator? Explain use of setw( ) and setprecision( ) as stream manipulator. (4)
- (b) Write a C++ program to read the contents of a file and display it on console. (5)
- (c) What is an exception? Explain advantages of exceptions handling .Write a program in C++ to perform simple arithmetic operations with proper exceptions handling. (7)

**Q5.**

- (a) What is template? Write appropriate statements to create a template class for Stack data structure in C++. (5)
- (b) What is polymorphism? Explain different types of polymorphism with examples. (6)
- (c) Write C++ program to demonstrate implementation of friend function. Also explain advantages of friend function. (5)

**Course Code** : **BCSL-032**  
**Title** : **C++ Programming Lab**  
**Assignment Number** : **BCA (3)/BCSL-032/Assignment/2019-20**  
**Maximum Marks** : **50**  
**Last date of Submission** : **15<sup>th</sup> October, 2019 (for July 2019 Session)**  
**15<sup>th</sup> April, 2020(for January 2020 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 which take C++ Programming course marks of 10 students and find the average marks. **(10)**

**Q1(b):**

Write a C++ program to create class named Account to perform basic operations like display balance, cash withdrawal and cash deposit of a bank account. Derive Saving\_ Account class from Account class and override the methods of Account class as per need Make necessary assumptions wherever required. **(10)**

**Q2(a):**

Write C++ program for addison of two matrices by overloading '+' operator. Make necessary assumptions wherever required. **(10)**

**Q2(b):**

Write a C++ program to demonstrate exception handling by using matrix multiplication operation. Matrix multiplication function should notify if the order of the matrix is invalid, using exception. **(10)**

**Course Code** : **BCSL-033**  
**Course Title** : **Data and File Structures Lab**  
**Assignment Number** : **BCA(3)/033/Assignment/2019-20**  
**Maximum Marks** : **50**  
**Weightage** : **25%**  
**Last Dates for Submission** : **15<sup>th</sup> October, 2019 (for July 2019 Session)**  
**15<sup>th</sup> April, 2020(for January 2020 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 creates a Binary Search Tree with a set of given inputs. Then, it should prompt for a key value and print a message about the presence of key value in the Binary Search Tree. **(20)**
- Q2.** Write an algorithm and program for multiplication of two Polynomials. **(20)**

<b>Course Code</b>	:	<b>BCSL-034</b>
<b>Title</b>	:	<b>DBMS Lab</b>
<b>Assignment Number</b>	:	<b>BCA(3)/034/Assignment/2019-20</b>
<b>Maximum Marks</b>	:	<b>50</b>
<b>Weightage</b>	:	<b>25%</b>
<b>Last Date of Submission</b>	:	<b>15<sup>th</sup> October, 2019 (For July, 2019 Session)</b> <b>15<sup>th</sup> April, 2020 (For January 2020 Session)</b>

**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.** An *ABC Event Management Company* requires a computerized system to automize its operations that support the following activities:

- Event Marketing (like Marketing channels include social media, email marketing, media and blog sites)
- Event Registration(Online and Offline at the venue)
- Badges printing for all the participants
- Scheduling of Events
- Complete Budget Management for the Event
- Event Reporting
- Query support
- Report generation

**Perform the following tasks:**

- (i) Using any of the drawing tools like smartdraw, dia, visio, conceptdraw etc. or else by your own hand, draw the complete ER diagram for the above event management system by identifying the entities, relationships, cardinality and key constraints. Follow proper conventions.
- (ii) Create database to support/accommodate all the functionalities referred above. Perform Normalization till required NF and prepare Normalized tables.
- (iii) Using MS-Access, implement by designing various forms to support two modules **(i) event marketing** and **(ii) event registration activities** mentioned above.
- (iv) Report generation should include the expenditure statement for event-marketing (event-wise), reports of list of participants (event-wise), list of resource persons (event-wise) 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.***