



Dezyne École College

Bachelor of Computer Applications (BCA)

First Year – 2nd Semester C++ And DSA

Probable Question for C++ And DSA

Unit - 1

1. Define encapsulation in C++ and explain how it is achieved using access specifiers.
2. What is the difference between function overloading and operator overloading?
3. Explain the concept of inline functions. When should they be used?
4. What is the scope resolution operator (::) in C++? Give two examples of its usage.
5. Define static data members and static member functions with their characteristics.
6. What is a friend function? How does it differ from member functions?
7. Explain the difference between call by value and call by reference with examples.
8. What is a copy constructor? When is it automatically called?
9. Explain polymorphism in C++ with types and examples.
10. What is inheritance? Explain different types of inheritance with syntax.
11. Differentiate between public, private, and protected access specifiers.
12. What are virtual functions? Why are they needed?
13. Explain the concept of function prototyping in C++.
14. Explain the difference between call by value and call by reference with examples.
15. What are inline functions? When should they be used and what are their limitations?
16. Predict the output:

```
int n = 5;
for(int i = 1; i <= n; i++){
    if(i == 3)
        continue;
    if(i == 4)
        break;
    cout << i << " ";
}
cout << "End";
```

17. What does this nested loop print?

```
int i = 1;
while(i <= 3){
    int j = 1;
    do {
        if(i % 2 == 0 && j % 2 == 0)
```

```
        cout << "*";    else
        cout << i + j;    j++;
    } while(j <= i);
    cout << endl;    i++;
}
```

18. Write a C++ program to demonstrate operator overloading for a 'Complex' class. Overload '+' operator to add two complex numbers, '<<' operator for output, and '==' operator for comparison.
19. Create a C++ program demonstrating inheritance. Create base class 'Employee' with protected members (id, name, salary), derive class 'Manager' with additional bonus attribute, implement virtual functions for polymorphic behavior, and create objects to demonstrate the concept.
20. Create a program to print Fibonacci series using recursion and also using loops. Compare both approaches.

Unit -2

21. Define Data Structure and Algorithm. Explain the relationship between them.
22. What is time complexity and space complexity? Give examples.
23. Explain Big O, Big Omega, and Big Theta notations with examples.
24. What is the difference between linear search and binary search? When is each preferred?
25. Compare bubble sort and selection sort in terms of time complexity and working mechanism.
26. Explain the divide and conquer approach used in merge sort.
27. What is recursion? What are the essential components of a recursive function?
28. Define linked list. What are the advantages and disadvantages of linked lists over arrays?
29. What is the difference between singly linked list and doubly linked list?
30. Explain memory representation of linked lists with diagrams.
31. What are the basic operations performed on linked lists?
32. Compare the time complexity of insertion and deletion operations in arrays vs linked lists.
33. In Tower of Hanoi with n disks, why is the minimum number of moves $2^n - 1$? Can it be solved in fewer moves?
34. What is the main disadvantage of linked lists compared to arrays in terms of memory access?
35. In a doubly linked list, why do we need both next and previous pointers? Can we traverse backwards with only next pointers?
36. What happens if we try to delete a node from an empty linked list? How should this be handled?
37. Why is insertion at the beginning of a linked list $O(1)$ but insertion at the end is $O(n)$ in singly linked list?
38. Write a program to implement doubly linked list with bidirectional traversal and demonstrate insertion and deletion at any position.
39. Create a program to reverse a singly linked list both iteratively and recursively.
40. Implement merge sort algorithm and demonstrate its divide-and-conquer approach with step-by-step output.
41. Create a program to detect if a linked list has a cycle (loop) and find the starting point of the cycle.
42. Write a C++ program to implement binary search algorithm. Also write a recursive function to calculate factorial of a number and demonstrate the Tower of Hanoi problem for $n=3$ disks.
43. Implement a doubly linked list in C++ with functions for insertion at beginning, insertion at end, deletion of a specific node, and traversal in both forward & backward directions. Also write functions for linear search and bubble sort on an array.

Unit - 3

44. Define stack and explain its LIFO principle. What are the primitive operations of a stack?
45. What is a queue? Explain FIFO principle and basic properties of queues.
46. Compare implementation of stack using array vs linked list. Which is better and why?
47. Define tree and explain basic tree terminology (root, leaf, parent, child, height, depth).
48. What is a binary tree? How does it differ from a general tree?
49. Explain the three types of binary tree traversals: Pre-order, In-order, and Post-order.
50. Define Binary Search Tree (BST). What property must a BST satisfy?
51. Compare searching in BST vs linear search in terms of time complexity.
52. What is a graph? Explain the difference between directed and undirected graphs.
53. Define adjacency matrix representation of graphs. What are its advantages and disadvantages?
54. Explain Breadth First Search (BFS) algorithm for graph traversal.
55. What is Depth First Search (DFS)? How does it differ from BFS?
56. Compare BFS and DFS in terms of space complexity, time complexity, and applications.
57. In BST deletion, why is the inorder successor (or predecessor) chosen to replace the deleted node?
58. Why is adjacency matrix not suitable for sparse graphs? What are the memory implications?
59. What is the space complexity difference between BFS and DFS? Which one is better for finding shortest path?
60. In DFS, why do we need to mark nodes as visited? What happens if we don't mark them?
61. Can BFS be implemented using a stack instead of a queue? What would be the consequences?
62. Why does BFS guarantee the shortest path in unweighted graphs but DFS doesn't?
63. What is the difference between tree traversal and graph traversal? Why is cycle detection important in graphs?
64. Write C++ programs to implement:
 1. Stack using array with push, pop, and display operations
 2. Queue using linked list with enqueue, dequeue, and display operations
 3. Binary tree traversals (preorder, inorder, postorder) using recursion
65. Implement the following in C++:
 1. Binary Search Tree with insert, search, and delete operations
 2. Graph representation using adjacency matrix
 3. BFS and DFS traversal algorithms for the graph

Total No. of Pages: 02

[Total No. of Questions: 18]



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BCA (Part-II) Examination, 2023
Paper - BCA - 205
C++ Programming for
Object Oriented Systems

Duration of Examination: 3 Hours

परीक्षा की अवधि: 3 घण्टा

Max. Marks: 50

पूर्णांक: 50

Instructions to the Candidates:परीक्षार्थी के लिए निर्देश:-**Part-A (Compulsory)**

Answer all ten questions (upto 20 words each). Each question carries equal marks.

(Marks-15)

Part-B (Compulsory)

Answer all five questions (upto 50 words each). Each question carries equal marks.

(Marks-15)

Part-C

Answer all three questions (upto 400 words each). Three question of 7, 7 & 6 marks.

(Marks-20)

Part-A (Compulsory)

- 1- What is meant by copy constructors.
- 2- What is the need for virtual functions in C++?
- 3- What are the standard stream operators of C++?
- 4- Find the value of a and b
 $a = (b = 10, b * 2, b = b + 45, b - 10)$
- 5- How reference variable is declared?
- 6- What is the value of p in the following C++ code

```
#include <iostream.h>
void main()
{
    int p;
    bool a = true;
    bool b = false;
    int x = 10;
    int y = 5;
    p = ((x|y)+(a+b));
    cout << p;
}
```
- 7- What will be the output

```
int main()
{
    register int i=1;
```

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```
int *ptr = &i;
cout << * ptr;
}
```

- 8- What are the standard stream operator of C++?
 9- What will be the output of following C++ code

```
int main ()
{
  int a = 5;
  float b;
  cout << size of (++ a + b);
  cout << a;
  return 0;
}
```

- 10- What will be the output of following code

```
int main ()
{
  char c = 74;
  cout << c;
  return 0;
}
```

Part-B (Compulsory)

- 11- Write a program to accept a string from user and print length of every word present in the string.
 12- When should one use references and when should I use pointer?
 13- What is the order that local object are destructed.
 14- Can I overload the destructor for my class? Support your answer?
 15- Write a program to input a number and find the count of digit in a number?

Part-C

Unit-I

- 16- (a) When do we make a virtual function "Public" ? What are the implications of making a function pure virtual function?
 (b) Write a program to accept a string and remove all duplicate characters.
 OR
 (a) What is pointer arithmetic? How it is performed? Support your answer with an example?
 (b) Write a program to create a function which accept two string and return biggest string?

Unit-II

- 17- (a) What are empty classes? Can instances of empty class be created? Give reason?
 (b) Write a function that return the list of prime number between 2 specified numbers?
 OR
 (a) What is the difference between static binding and run time binding? Explain with a suitable C++ Code.
 (b) Write a program to accept 10 number in or array and display number those are unique?

Unit-III

- 18- Develop a C++ program to perform addition and multiplication of two complex number by overloading + and * operators.
 OR
 (a) Write a program to accept a date from user. Overload ++ operator to generate next valid data?
 (b) Explain with example about constructor overloading C++?

Total No. of Pages: 02

[Total No. of Questions: 18]



2384

B.C.A. (Part-I) Examination, 2022

B.C.A. - 103

DATA STRUCTURE

Duration of Examination: 1½ Hours

परीक्षा की अवधि: 1½ घण्टा

Max. Marks: 25

पूर्णांक: 25

Instructions to the Candidates:**परीक्षार्थी के लिए निर्देश:-****Part-A (Compulsory)**

Answer any five questions (upto 20 words each). Each question carries one marks. (5x1=5 Marks)

कोई पाँच प्रश्न कीजिये। प्रत्येक प्रश्न का उत्तर 20 शब्दों से अधिक नहीं होना चाहिए। प्रत्येक प्रश्न एक अंक का है।

Part-B (Compulsory)

Answer any two questions (upto 100 words each). Each question carries three marks. (2x3=6 Marks)

कोई दो प्रश्न कीजिये। प्रत्येक प्रश्न का उत्तर 100 शब्दों से अधिक नहीं होना चाहिये। प्रत्येक प्रश्न तीन अंक का है।

Part-C (Compulsory)

Candidate is required to attempt any two question. (upto 400 words). (2x7=14 Marks)

कोई दो प्रश्न का उत्तर दीजिये। प्रश्न का उत्तर 400 शब्दों से अधिक नहीं होना चाहिये।

Part-A

- Q-1. Are linked lists of linear or non-linear type?
- Q-2. Write any four applications of stack.
- Q-3. How is a stack different from a queue?
- Q-4. Which sorting algorithm is considered the fastest? Why?
- Q-5. Write any two applications of Graph Data Structures?
- Q-6. What do you understand by Column major?
- Q-7. Do dynamic memory allocations help in managing data? How?
- Q-8. How do you find the height of a node in a tree?
- Q-9. Can doubly linked be implemented using a single pointer variable in every mode? Explain your answer.
- Q-10. How to check if a given Binary Tree is BST or not?

Part-B

- Q-11. How are linked lists more efficient than arrays?
- Q-12. How do you implement stack using array? Explain.
- Q-13. Write the inorder traversal algorithm of Binary Trees.
- Q-14. How do you represent a graph? Explain in detail.
- Q-15. Differentiate tree and graph data structures.

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2384

Part-C

Q-16. You have given an array {38, 27, 43, 3, 9, 82, 10}. Sort this array using merge sort and find the complexities.

OR

Explain the quick sort algorithm and its complexities with suitable example.

Q-17. Explain the following with suitable example:-

(a) BFS in graph

(b) DFS in graph

OR

How Insertion and deletion can be performed in Binary search tree? Explain with suitable example.

Q-18. Write short note on the following:- (in brief)

(i) Properties of queues.

(ii) Representation of linked list in memory.

OR

Write short note on following:- (in brief)

(i) Adjacency matrix in graph.

(ii) Time and space complexity.

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B

2237

B.C.A. (Part II) EXAMINATION, 2018

C++ PROGRAMMING

Paper-XIV

Time allowed : Three hours

Maximum marks : 50

Part-A (Compulsory) {Marks : 15}

Answer all ten questions (50 words each). Each question carries equal marks.

Part-B (Compulsory) {Marks : 15}

Answer all five questions (50 words each). Each question carries equal marks.

Part-C {Marks : 20}

Answer any three questions (400 words each), selecting one question from each unit. Three questions of 7, 7 & 6 marks.

PTO

Part-A (Compulsory)

1. What is function overloading ?
2. What is Recursion ?
3. What do you mean by friend function ?
4. What is user defined data types ?
5. What is member function ?
6. What is nested classes ?
7. What is the purpose of default case in switch statement ?
8. How a base-class pointer can be converted to derived class member ?
9. What are Pointers ? How to use Pointers ?
10. What is concept of inline member functions ?

Part-B (Compulsory)

11. Explain operator overloading with suitable example.

12. Explain the use of pointers in call by reference parameter passing for function.
13. Write a program using array to read the ten integer numbers and find the counts for number of positive and negative numbers.
14. Describe stream state member functions with example.
15. Explain the meaning of following statements with reference to pointers :

```
int * ptr, m = 8;
```

```
*ptr = m;
```

```
ptr = &m;
```

Part-C

Unit-I

16. Write a program in C++, to read a line of text and output the number of words and characters in it.

Or

Distinguish between Procedure Oriented Programming and Object Oriented Programming.

Unit-II

17. Write a friend function for adding the two different subject marks and display its sum, using two class.

Or

What is inheritance ? Explain multiple inheritance and multilevel Inheritance with example.

Unit-III

18. Explain pure virtual function with suitable example.

Or

Write short notes on :

- (i) Operator overloading
- (ii) Polymorphism
- (iii) Opening and closing of files

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ROLL NO.

B.C.A. (Part-I) EXAMINATION, 2017
DATA STRUCTURE AND ALGORITHM
(B.C.A. -05)

Time allowed: Three Hours

Maximum Marks: 50

Part – A (Compulsory) {15 Marks}

Instructions:

Answer all ten questions (upto 50 words each). Each question carries equal marks.

Part – B (Compulsory) {15 Marks}

Instructions:

Answer all five questions (upto 50 words each). Each question carries equal marks.

Part – C {20 Marks}

Instructions:

Answer any three questions (upto 400 words each), selecting one question from each unit. Three question of 7, 7 & 6 marks.

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Part – A (Compulsory)

- Q.1 What is Data Structure? [1½]
- Q.2 What are the advantages of linked list over arrays? [1½]
- Q.3 What is the difference between LIFO and FIFO? [1½]
- Q.4 What is hashing? [1½]
- Q.5 What is binary tree? [1½]
- Q.6 What is the difference between static memory allocation and dynamic memory allocation? [1½]
- Q.7 What is internal and external sorting? [1½]
- Q.8 What is ISAM? [1½]
- Q.9 What is the difference between structure and union? [1½]
- Q.10 What is null graph? [1½]

Part – B (Compulsory)

- Q.11 What is the difference between primitive and composite data type? [3]
- Q.12 What is recursion? Give an example. [3]
- Q.13 What is the difference between malloc and calloc functions? [3]
- Q.14 Convert following infix notation to postfix form: [3]
$$X + (Y - Z) / P * Q ^ (R * S) / T$$
- Q.15 Define all types of graphs with suitable diagrams. [3]

Part – C**UNIT – I**

Q.16 Explain time and space complexity of algorithms with suitable examples. [7]

OR

Q.16 Define Prim algorithm with suitable example. [7]

UNIT – II

Q.17 Explain Kruskal algorithm with suitable example. [7]

OR

Q.17 Explain Binary search algorithm with suitable example. [7]

UNIT – III

Q.18 Write short notes on (any two) - [3+3=6]

- (a) D - queue
- (b) BSF
- (c) Linked List

OR

Q.18 (a) What is file structure? Explain fields, records and files. [3]

- (b) Explain bubble sorting with an example. Explain the steps by dry run. [3]
-

B.C.A. (Part-II) EXAMINATION, 2017**C++ PROGRAMMING****Fourteenth Paper****(BCA – XIV)**

Time allowed: Three Hours

Maximum Marks: 50

Part – A (Compulsory) {15 Marks}**Instructions:**

Answer all ten questions (upto 50 words each). Each question carries equal marks.

Part – B (Compulsory) {15 Marks}**Instructions:**

Answer all five questions (upto 50 words each). Each question carries equal marks.

Part – C {20 Marks}**Instructions:**

Answer any three questions (upto 400 words each), selecting one question from each unit. Three questions of 7, 7 & 6 marks.

- Q.1 The && and | | operator operate on the value type [1½]
- Q.2 What is the purpose of default case in switch statement? [1½]
- Q.3 Which type of function call can be used in an expression? [1½]
- Q.4 What is the difference between C & C++ array? [1½]
- Q.5 When a member function can be declared static? [1½]
- Q.6 How a base - class pointer can be converted to derived class member? [1½]
- Q.7 What is the purpose of scope - resolution operator? [1½]
- Q.8 Consider the following code - [1½]

```
if (number >= 0)
    if (number > 0)
        cout << "number is positive\n";
    else
        cout << "number is negative\n";
what will the output if number = 0?
```

- Q.9 In the following code find error containing lines. [1½]

```
int j = 0;
while (j < 10) {
    j++;
    if (j == 5) continue loop;
    cout << " j is " << j ; }
```



```
int main {  
{  
    int x, y = 10, z = 10 ;  
    x = (y == z);  
    cout << x;  
    return 0 ;  
}
```

Part – B (Compulsory)

Q.11 Given the array declaration [3]

int x [10];

what does * (x + 3) mean?

Q.12 In which order the operator will evaluate in the following:

y = a* ++b + m/z ; [3]

Q.13 Differentiate the following statements: [3]

const int M = 100;

define M 100

Q.14 A character array name is defined as follows: [3]

Char name [30] = "Programming";

what will the value of m and n?

int m = size of (name);

int n = strlen (name);


```
int n = 0;  
for (int i = 1; i <= n; i++)  
    cout << i;
```

Part – C**UNIT – I**

Q.16 Write a function that creates a vector of user – given size M using new operator. [7]

OR

Q.16 Can we have more than one construction in a class? If yes, explain the need for such situation with example. [7]

UNIT – II

Q.17 Explain Ambiguity Resolution in Inheritance with suitable example. [7]

OR

Q.17 When do we make a virtual function “Pure”? What are the implications of making a function a pure virtual function? [7]

UNIT – III

Q.18 What is the difference between opening a file with a constructor function and opening a file with open () function? When is one method preferred over the other? [6]

OR

Q.18 Write short note on: [2×3=6]

- (a) Containership
- (b) Inheritance
- (c) Conceptual framework

3730

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B.C.A. (Part - I) EXAMINATION, 2016
DATA STRUCTURE AND ALGORITHM
(B.C.A.-05)

Time allowed: Three Hours**Maximum Marks: 50****Part – A (Compulsory) {10 Marks}****Instructions:**

Answer all ten questions (upto 20 words each.) Each question carries equal marks.

Part – B (Compulsory) {10 Marks}**Instructions:**

Answer all five questions (upto 50 words each). Each question carries equal marks.

Part – C {30 Marks}**Instructions:**

Answer any three questions (upto 400 words each), selecting one question form each Unit. Each question carries equal marks.

- Q.1 How many queues are needed to implement the priority queue? [1]
- Q.2 How do you reference all the elements in a one-dimension array? [1]
- Q.3 What is the data structure used to perform recursion? [1]
- Q.4 What are the notations used in Evaluation of Arithmetic Expressions using prefix and postfix forms? [1]
- Q.5 What is a spanning Tree? [1]
- Q.6 What are multidimensional arrays? [1]
- Q.7 Differentiate NULL and VOID. [1]
- Q.8 What is a linear search? [1]
- Q.9 What is the advantage of the heap over a stack? [1]
- Q.10 What is a postfix expression? [1]

Part – B (Compulsory)

- Q.11 What is binary search tree? [2]
- Q.12 What is difference between Stack and Queue data structure? [2]

Doubly Linked List data structure? [2]

Q.14 Differentiate file structure from storage structure. [2]

Q.15 How does dynamic memory allocation help in managing data? [2]

Part – C

UNIT – I

Q.16 Explain the inverted lists and multi lists. [10]

OR

Q.16 Discuss the problems and benefits of using hashing. [10]

UNIT – II

Q.17 Explain the quick sort algorithm with suitable example. [10]

OR

Q.17 Explain the merge sort algorithm with suitable example. [10]

UNIT – III

Q.18 What is an algorithm? What are the characteristics of a good algorithm? [10]

OR

Q.18 Explain: [10]

- (a) Depth first search
- (b) Breadth first search
