

**B.C.A. (Part-III) Examination, 2017**

**[Time: Three Hours]**

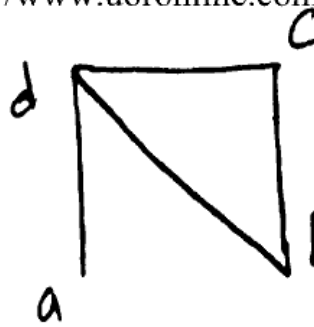
**[Maximum Marks: 100]**

**Part – I**

1. a) What is a LIFO?
- b) What is a dequeue?
- c) What are the notations used in evaluation of arithmetic expressions using prefix and postfix form?
- d) In tree construction which is the suitable efficient data structure?(Array, Linked List, Stack, Queue)
- e) Whether linked is linear or non-linear data Structure.
- f) What is doubly linked list?
- g) What is extended binary tree?
- h) What is connected graph?
- i) What is Linear Search?
- j) What is the time complexity of quick sort algorithm?

**Part – II**

2. Explain the different operations to be performed on the data structures.
3. Discuss the advantages, if any of a two-way list over a one way list for each of the following operations:
  - a) Deleting a node whose location POS is given.
  - b) Traversing the list of process each node.
4. Draw all possible binary tree T, with 3 nodes.
5. Find the number of spanning trees in the following graph:



6. Explain the time complexity of bubble sort algorithm.

**Part - III**

7. What do you mean by Stack? Write an algorithm in C to perform PUSH and POP operations.

**OR**

What is circular queue? Write an algorithm in C for insertion and deletion in Queue.

8. Convert  $X : A + (B * C - (D / E - F * G) * H)$  into postfix form showing stack status after every step in tabular form.

**OR**

Write an algorithm to insert a number in the linked list at the following positions:

- a) In the beginning of the list.
- b) Inserting a new node at the specified positions.
- c) At the end of the list.

9. A binary tree T has 9 nodes. The inorder and preorder traversals yield the following sequence of nodes:

Inorder : E A C K F H D B G

Preorder : F A E K C D H G B

Draw the tree T.

**OR**

Write an algorithm for each of the following :

- a) Inorder binary tree traversal.
- b) Preorder binary tree traversal.
- c) Postorder binary tree traversal.

10. Explain the shortest path algorithm with suitable example.

**OR**

Explain the breadth first traversal algorithm with example.

11. Explain the selection sort algorithm with example.

**OR**

What is the pre-requisite for the binary search? Explain the binary search algorithm.

**B.C.A. (Pt.-III)**

Data Stru. (Using C/C++)

**301/331**

**B.C.A. (Part-III) Examination, 2023**

(Faculty of Science)

(Three Year Scheme of 10+2+3 Pattern)

**Data Structure (Using C/C++)**

**Paper : 301/331**

**Time Allowed : 3 Hours**

**Maximum Marks : 100**

Answer of all the questions (Short answer as well as are to be given in the main answer-book only. Answers of short answer type questions must be given in sequential order. Similarly all the parts of one question of descriptive part should be answered at one place in the answer-book. One complete question should not be answered at different places in the answer-book.

Write your roll number on question paper before you start writing answers of questions.

Question paper consists of **Three** parts.

**All Three** parts are **Compulsory**

**PART-I :** (Very short answer) consists of 10 questions of 2 marks each. Maximum limit for each question is up to 40 words.

**PART-II :** (Short answer) consists of 5 questions of 4 marks each, Maximum limit for each question is up to 80 words.

**PART-III :** (Long answer) consists of 5 questions of 12 marks each with one question from each unit with internal choices.

**PART-I**

1. Very short Answer :

10×2=20

- ✓(a) Give any two applications of Stack.
- ✓(b) Differentiate between Stack and Queues.
- ✓(c) What are circular linked tests?

- ☒ (d) What are the different types of Polish Notations?
- ☒ (e) What do you understand by Binary Search Tree?
- ☒ (f) What are the applications of Binary Trees?
- ☒ (g) Define Graph data Structure.
- ☒ (h) Mention full forms of BFS and DFS.
- ☒ (i) Give average and worst time complexities of bubble sort and merge sort.
- ☒ (j) What is Sequential Searching?

## PART-II

2. Short Answer :

5×4=20

- ☒ (a) What are data Structures? Explain different types of data Structures.
- ☒ (b) Write differences between Arrays and linked tests.
- ☒ (c) What are Tree Traversals? Explain.
- ☒ (d) Explain different ways of Graph Representation.
- ☒ (e) Discuss the concept of binary search.

## PART-III

3. ☒ What are Arrays? How do we create arrays in C/C++? Explain in detail.

4+8=12

Or

What are Stacks? Explain different operations available in stack data structure. Also discuss implementation of stack as an array. <https://www.uoronline.com>

4+4+4

4. ☒ What is a linked list data Structure? What are the applications of it? Describe different types of linked lists in brief.

4+4+4

Or

Write a code in C/C++ to create a singly linked list and perform the following operations.

- (a) Insert Node. 6
- (b) Delete Node. 6

15. Explain the following terms associate with trees.

12×1=12

- |                          |                       |
|--------------------------|-----------------------|
| (a) Node                 | (b) Child Node        |
| (c) Leaf Node            | (d) Parent Node       |
| (e) Root                 | (f) Edge              |
| (g) Height of the Node   | (h) Depth of the Node |
| (i) Degree of Node       | (j) Subtree           |
| (k) Neighbours of a Node | (l) Sibling           |

Or

What are Binary Trees? Explain any four operations that can be performed on Binary Trees. 4+8

6. Explain various types of Graphs. Also explain any two operations on Graphs. 8+4

Or

Discuss the following :

- |                                    |   |
|------------------------------------|---|
| (a) All-Pairs shortest paths.      | 6 |
| (b) Transitive closure of a Graph. | 6 |

7. What is Searching? Write an algorithm for sequential Search. Also write code for sequential search in C/C++.

Or

Discuss the concept of bubble sort. Write an algorithm and a code in C/C++ for bubble sort. 4+8

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**B.C.A. (Part-III)**

**Data Stru. (Using C/C++)**

**301**

**B.C.A. (Part-III) Examination, 2021**

(Faculty of Science)

(Three-Year Scheme of 10+2+3 Pattern)

**DATA STRUCTURE (Using C/C++)**

**Time Allowed : 3 Hours**

**Maximum Marks : 100**

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**PART-III :** (Long Answer) consists 5 questions of 12 marks each with internal choice.

**PART-I**

1. Very Short Answer :

(a) What is big.O notation in data structure?

- (b) What is the difference between stack and queue?
- (c) Write algorithm to find middle of linked list.
- (d) Write a difference between circular linked list and doubly linked list.
- (e) What is the time complexity of insertion, deletion and searching an element in binary tree and binary search tree?
- (f) Define Huffman algorithm.
- (g) Write a difference between Adaptive and Non-adaptive algorithm of sorting.
- (h) What is binary search?
- (i) Write basic operations of array in data structure.
- (j) Define classification of data structure.

### PART-II

2. Convert the following infix expression into prefix expression :

(i)  $2 + 3 * 4 - 5$

(ii)  $2 + 3/5 \wedge 6 - (4 * 5)$

(iii)  $A \text{ AND } B + C \wedge D \text{ OR } E \text{ AND } F$

(iv)  $-2 + 3 * 4 \wedge (5/3) + \text{NOT } 7$

3. Define Deque and its variations.

4. Write some of the properties of binary tree.

5. Write short notes on

(i) Bubble sort

(ii) Merge sort

(iii) Quick sort

(iv) Selection sort.

6. Explain depth first search of traversing a graph.

### PART-III

7. Explain the concept of dynamic memory allocation.

**OR**

How is linked list different from arrays as data structure?



8. What is stack? Explain the pop and push operation of it

**OR**

Write an algorithm to add a item to a circular queue.

9. Explain the process of deleting a node from binary tree using example.

**OR**

What is adjacency matrix? How is it made?

10. Write an algorithm for :

- (i) Binary search
- (ii) Sequential search.

**OR**

What is the difference between :

- (i) Directed and Undirected graph?
- (ii) BFS and DFS?

11. What are the various operations possible on a doubly linked list? Explain with the algorithm.

**OR**

Write an algorithm to create Binary search tree.

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# **301/331 B.C.A. (Part-III) Data Stru. (Using C/C++)**

## **B.C.A. (Part-III) EXAMINATION - 2022**

(Faculty of Science)

(Three-Year Scheme of 10+2+3 Pattern)

## **DATA STRUCTURE (Using C/C++)**

Time Allowed : 3 Hours

Maximum Marks : 100

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**Part - III :** (Long Answer) consists 5 questions of 12 marks each with internal choice.

### **PART - I**

1. Very Short Answer :

10x2=20

- ~~(a)~~ What is an Algorithm ?
- ~~(b)~~ Explain an Array in Data structure.
- (c) Define polish notation.
- ~~(d)~~ Write advantages of Double Linked List over Single Linked List.
- (e) Write difference between Tree and Graph.
- ~~(f)~~ Explain Binary Tree with diagram.
- (g) What is adjacency matrix in Graph ?
- ~~(h)~~ Differentiate between directed and undirected graphs .
- (i) What is hashing ?
- (j) Write time complexity of merge sort in all cases.

## PART - II

2. Short Answer :

5x4=20

- (a) Explain Efficiency of an algorithm with example.
- (b) What is Linked List ? Explain doubly linked list with diagram.
- (c) Write Huffman's algorithm.
- (d) Explain shortest path in Graph with example.
- (e) Write an algorithm of Linear search for one dimension array.

## PART - III

3. ~~What is Stack ?~~ Write the procedure of PUSH and POP operation in Stack.

4+8

OR

What is Queue ? Explain types of queue and its operation.

4+8

4. Explain Circular linked list. Write an algorithm for inserting and deleting a node in circular linked list. <https://www.uoronline.com>

4+8

OR

~~Explain Infix, Prefix and Postfix expression.~~ Convert the following infix expression into postfix expression using stack.

6+6

$((A+B) - C*(D/E)) + F$ .

5. ~~What is Binary Search Tree (BST) ?~~ Write an algorithm for searching into Binary Search Tree.

4+8

OR

~~Explain Tree Traversal in detail with example.~~

12

6. Explain graph traversal-BFS and DFS with example.

12

OR

Write Warshall's algorithm with diagram.

12

7. What is binary search ? Write advantages of binary search over linear search. Write complexity of binary search.

4+4+4

OR

What is heap ? Write an algorithm for Heap sort.

12

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**B.C.A. (PART-III) EXAMINATION, 2019**

(Faculty of Science)

(Three-Year Scheme of 10+2+3 Pattern)

**DATA STRUCTURE (Using C/C++) - 331**

Time Allowed : Three Hours

Maximum Marks : 100

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**PART - III :** (Long answer) consists of 5 questions of 12 marks each with internal choice.

**PART - I**

- |   |   |
|---|---|
| 1. (a) What is data structure ?                           | 2 |
| (b) What is LIFO ?  | 2 |
| (c) What is dequeue ?                                     | 2 |
| (d) How depth first search traversal works ?              | 2 |
| (e) How insertion sort and selection sort are different ? | 2 |
| (f) What is doubly linked list ?                          | 2 |
| (g) What is binary tree ?                                 | 2 |
| (h) Why do we need to do algorithm analysis ?             | 2 |
| (i) What is hashing ?                                     | 2 |
| (j) What is the time complexity of quick sort ?           | 2 |

**PART - II**

- |   |     |
|---|-----|
| 2. Explain the different operations to be performed on the data structures. | 4   |
| 3. What is algorithm ? Write the characteristics of algorithm.              | 2+2 |

4. Write the algorithm for insert the element in Binary Search Tree. 4

5. Explain orthogonal representation of graph. 4

6. Explain time complexity of insertion sort. 4

### PART - III

7. What do you mean by STACK? Write an algorithm in C to perform PUSH and POP operations. 4+8

OR

What is an array? What are different types of array? Given an array A[0 : 15]. If B = 1000 and S = 2 then calculate the address of A[10]. 2+4+6

8. What is Circular Linked List? Explain the procedures for inserting and deleting nodes from a doubly linked list. 4+8

OR

Convert EXP :  $A + (B * C - (D / E \uparrow F) * G) * H$  into postfix form showing stack status after every step. 12

9. For a binary tree T, the inorder and postorder travel sequences are as follows : 12

inorder : D, C, K, E, A, H, B, Q, J, I       $ABC * DE / F \uparrow - G * H +$

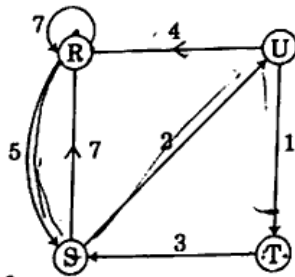
postorder : D, K, E, C, H, Q, J, I, B, A

Draw the binary tree T.

OR

Make a binary search tree of values 80, 40, 150, 100 and 30. 12

10. Consider the weighted graph G. 12



Assume  $V_1 = R$ ,  $V_2 = S$ ,  $V_3 = T$  and  $V_4 = U$ . Find a matrix C which will tell us the lengths of the shortest paths between the nodes.

OR

Write an algorithm for DFS and BFS. 6+6

11. What is Binary Search? Write an algorithm for binary search in an ascending order. Write the complexity of Binary Search. 4+8

OR

Explain the selection sort. Write an algorithm for selection sort. 4+8

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