

Roll No.621115.....

Total No. of Questions : 9]
(2042)

[Total No. of Printed Pages : 4

**BCA (CBCS) RUSA IInd Semester
Examination**

3746

DATA STRUCTURES

Paper : BCA-0204

Time : 3 Hours]

[Maximum Marks : 70

Note :- Attempt *five* questions in all, selecting *one* question from each Unit-I, II, III and IV. Q. No. 1 (Part-A) is compulsory.

Part-A

(Compulsory Question)

1. (A) Attempt all Parts.

Fill in the blank spaces with most appropriate words :

- (i) In general, the index of the first element in an array is *1*..... .
- (ii) In a stack, if a user tries to remove an element from an empty stack it is called
- (iii) A linear collection of data elements where the linear node is given by means of pointer is called

CH-713

(1)

Turn Over

State whether the statement is True or False :

(iv) Merge sort is preferred for arrays over linked lists. (True/False)

(v) Quicksort algorithm is the fastest among all the sorting algorithms ? (True/False)

Answer the following MCQ's by selecting the most appropriate option :

(vi) What are the advantages of arrays ?

(a) Objects of mixed data types can be stored.

(b) Elements in an array cannot be sorted.

(c) Index of first element of an array is 1.

(d) Easier to store elements of same data type.

(vii) What is the value of the postfix expression $6\ 3\ 2\ 4\ +\ -\ * \ ?$

(a) 1 (b) 40

(c) 74 (d) -18

(viii) A data structure in which elements can be inserted or deleted at/from both ends but not in the middle is ?

(a) Queue (b) Circular queue

(c) Dequeue (d) Priority queue

CH-713

(2)

(ix) Which data structure is used to convert an infix notation to prefix notation ?

(a) Stack (b) Queue

(c) B-Trees (d) Linked-list

(x) The pre-order traversal of a binary tree is A, B, E, C, D. The inorder traversal of the same binary tree is B, E, A, D, C. The level order sequence for the binary tree is

(a) A, C, D, B, E

(b) A, B, C, D, E

(c) A, B, C, E, D

(d) D, B, E, A, C

$1 \times 10 = 10$

(B) Answer the following in 25 to 50 words :

(i) Why do we need data structures ? Discuss in brief.

(ii) Differentiate between linear and non-linear data structures.

(iii) What is the principle of Queue ? Also discuss the different types of Queues.

(iv) What is meant by Binary Search Tree ?

(v) What is Doubly Linked List ? Give example. $5 \times 4 = 20$

Unit-I

2. (a) Explain Time and Space complexity in the analysis of Algorithms.

(b) Describe rate of growth of complexity with n. 5,5

CH-713

(3)

Turn Over

3. (a) What is Linear Array ? Write an algorithm to insert an element at K^{th} position in a linear array with N elements, where $K \leq N$.

(b) Give the formula for address calculation in arrays.

7,3

Unit-II

4. (a) What is a Linked List ? Give the algorithm to traverse a Linked List.

(b) What are the advantages of Array over Linked List ?

7,3

5. (a) Explain different types of Linked Lists.

(b) Write an algorithm to delete a node from Linked List.

4,6

Unit-III

6. Write the algorithms of PUSH and POP operations on Stacks.

10

7. (a) Discuss the working of QUICKSORT technique to sort an array with a proper example.

(b) Give the algorithm to insert a new element in the Queue.

5,5

Unit-IV

8. Discuss the various methods for tree traversal. Also give the algorithm for preorder tree traversal.

10

9. (a) Discuss the bubble sort technique of sorting and also give its complexity.

(b) What is Linear Search ? Give its algorithm and complexity.

5,5

Or

6. Explain the advantages and disadvantages of a doubly linked list over a singular linked list.

Part-D

10 each

7. Give a brief description of operations that can be performed on a stack.

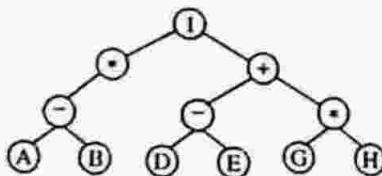
Or

8. What is a circular queue? Write an algorithm/function for deleting an element from circular queue.

Part-E

10 each

9. Traverse the tree as given below in preorder, inorder and postorder and list the vertices in the order they would be visited in each traversal scheme:



Or

10. Apply quick sort algorithm for the following list of elements by showing all the steps:

15, 10, 5, 4, 25, 30, 13.

CH-714

(4)

Roll No. _____

Total No. of Questions : 10] (1049)

[Total No. of Printed Pages : 4

B.C.A. (CBCS) RUSA IIInd Semester Examination

4388

DATA STRUCTURES

Paper : BCA-0204

Time : 3 Hours]

[Maximum Marks : 70

Note :- Part-A is compulsory. Candidates need to attempt one question each from Parts B, C, D and E.

Part-A

(Compulsory Question)

1. Answer the following objective type questions :

- (a) The of an algorithm is the amount of time the computer requires to execute the algorithm.
- (b) Best case complexity of the bubble sort algorithm is
- (c) is called a FIFO data structure.

CH-714

(1)

Turn Over

- (d) is a data structure where data can be represented as a chain of nodes.
- (e) A tree can be drawn if it is in preorder and traversal is given.
- (f) The running time for traversing all the nodes of binary search tree with n nodes and printing them in order is

Choose the correct option from the following multiple choice questions :

- (g) Height of binary search tree of the given sequence 40, 30, 42, 5, 7, 23, 9, 19, is (empty tree is of height 0) :
- (a) 4 (b) 5
- (c) 6 (d) None of these
- (h) Which of the following data structure is used in recursion ?
- (a) Array (b) Stack
- (c) Linked list (d) None of these
- (i) The value of the postfix expression 5 2 2 +* 30 6 / - is :
- (a) 36 (b) 16
- (c) 15 (d) None of these
- (j) A full binary tree with n leaves contains :
- (a) n nodes (b) $\log_2 n$ nodes
- (c) $2n - 1$ nodes (d) 2^n nodes

CH-714

(2)

2. Answer the following questions in brief :

- (a) Describe the stack data structure using an example.
- (b) Briefly explain the difference between a tree and a binary tree.
- (c) What do you mean by the time complexity and the space complexity of an algorithm ?
- (d) Convert the following infix expression to postfix expression ;
- $$A * (B + C) / E - F * (G + H/K)$$
- (e) Construct a binary tree from the given preorder traversal :

Pre-order : * - + F A B + C D 5x4=20

Part-B

10 each

3. What do you mean by time and space complexity ? Explain.

Or

4. Write an algorithm for the subtraction two matrices of dimension $r \times c$, where r and c represent the number of rows and columns, respectively.

Part-C

10 each

5. Write an algorithm/function to count the number of nodes in a singular linked list.

CH-714

(3)

Turn Over

Total No. of Questions : 9]
(1065)

[Total No. of Printed Pages : 4

BCA (CBCS) IInd Semester Examination

989

DATA STRUCTURES

BCA-204

Time : 3 Hours]

[Maximum Marks : 50

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note :- Attempt Five questions in all. Select one question each from Unit I, II, III and IV. Q. No. 9 in Unit-V is compulsory. All questions carry equal marks.

Unit-I

1. (a) What is Data Structure ? Explain different types of data structure with example.
(b) What is Algorithm Complexity ? How you represent time complexity in term of big 'O' notation ?
2. (a) What is Linear Array ? Write an algorithm to insert an element in ordered list.
(b) What is Sequential Search ? Write algorithm of sequential search. Find its all case complexities.

Turn Over

(1)

L-7

Unit-II

3. (a) Write an algorithm to insert an element at end of linked list. Also find its complexity.
- (b) Write an algorithm to insert an ITEM before a given location in a Doubly Linked List.
4. (a) Write the algorithm to copy a linked list into another linked list.
- (b) What is Circular Linked List ? What are its advantages over singly linked list ?
- Unit-III
5. (a) Write an algorithm to evaluate Postfix Expression and implement the algorithm on the following Postfix Expression :

(b) What is Circular Queue ? How you will implement it ?

6. (a) Write an Algorithm to convert infix expression into postfix expression and implement the Algorithm on the following Infix Expression :
 $5 + 2^3 - 10 / 2 * 4 + 10$

(b) What are the various applications of Stack in Computers ?

Unit-IV

7. (a) Write an algorithm to sort the singly linked list by using bubble sort. Count the number of interchanges and also find its complexity.

L-7

(2)

- (b) Write an algorithm for POST ORDER traversal in a Binary Tree.
8. (a) How Binary Tree is different from BST (Binary Search Tree) ? Write an algorithm for deletion in BST.
- (b) Write an algorithm for sorting the data by using quick sort sorting technique.

Unit-V

9. Write short notes on the following :
 - (i) If the address of A [1, 1] and A [2, 1] are 1000 and 1010 respectively and each element occupies 2 bytes, then the array has been stored in major order.
 - (ii) Complexity of inserting an element in Array is you mean by Linked Lists ?
 - (iv) The following sequence of operation is performed on a stack. Push (1), Push (2), Pop, Push (1), Push (2), Pop, Pop, Push (2), Pop. The sequences of popped out values are.
 - (v) A postfix expression is merely the reverse of the prefix expression.
(True/False)
 - (vi) The correct push function is :
 - (a) $S \rightarrow \text{arr}[S \rightarrow \text{top} + 1] = \text{data}$
 - (b) $S \rightarrow \text{arr}[\text{++}S \rightarrow \text{top}] = \text{data}$
 - (c) $S \rightarrow \text{arr}[\text{++}(S \rightarrow \text{top})] = \text{data}$
 - (d) None of these

L-7

(3)

Turn Over

(vii) Strictly Binary Tree.

(viii) Full Binary Tree.

(ix) Complete Binary Tree.

(x) What is the maximum size of the operator stack during the conversion of the Infix expression $A + B * C - D/E$ to postfix ?