

## QUESTION 2017

### Group – A

#### (Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following:

i) Prefix notation is also known as

- a) reverse polish notation
- c) polish reverse notation

- b) reverse notation
- d) polish notation

ii) The searching an element in a hash table of size  $m$  with  $n$  keys requires

- a)  $O(n)$  comparisons
- c)  $O(m)$  comparisons

- b)  $O(m/n)$  comparisons
- d)  $O(n/m)$  comparisons

iii) The complexity of linear search algorithm is

- a)  $O(n)$
- c)  $O(n^2)$

- b)  $O(\log n)$
- d)  $O(n \log n)$

iv) The best data structure to see whether an arithmetic expression has balanced parenthesis is a

- a) stack
- c) tree

- b) queue
- d) list

v) The sparse matrix is a matrix whose

- a) most of the elements are non-zero
- b) most of the elements are zero and half of the elements are non-zero
- c) half of the elements are zero
- d) none of these

BCA DATA-141

- vi) The postfix notation is also known as
- a) polish notation
  - ✓ b) reverse polish notation
  - c) reverse notation
  - d) none of these
- vii) For any non-empty binary tree  $T$ , if  $n$  is the number of nodes and  $e$  is the number of edges, then the relation between  $e$  and  $n$  is
- ✓ a)  $e = n - 1$
  - b)  $e = n + 1$
  - c)  $e + 1 = n$
  - d)  $e = n$
- viii) When determining the efficiency of algorithm the time factor is measured by
- a) counting microseconds
  - ✓ b) counting the number of key operations
  - c) counting the number of statements
  - d) counting the kilobytes of algorithm
- ix) A data structure where elements can be added or removed at either end but not in the middle is
- a) linked list
  - b) stack
  - c) queue
  - ✓ d) dequeue
- x) Complexity expressed in  $O$ -notation is
- a) lower bound
  - ✓ b) upper bound
  - c) middle between (a) and (b)
  - d) none of these
- xi) When the malloc() function returns NULL value it means
- ✓ a) memory is not allocated
  - b) memory is allocated but no data entered
  - c) both (a) and (b)
  - d) none of these

#### Group – B

#### (Short Answer Type Questions)

2. Write a C function to implement 'PUSH' and 'POP' operations in a stack.

See Topic: ARRAYS, STACKS & QUEUES, Short Answer Type Question No. 2.

3. Convert the following infix expression into postfix form by using stack:

$$a + b * c - (d - e * f) / g$$

See Topic: ARRAYS, STACKS & QUEUES, Short Answer Type Question No. 9.

4. What are the advantages of linked list over array? What are the disadvantages over array?

See Topic: LINKED LIST, Short Answer Type Question No. 2.

5. What is B-tree? What is the difference between a B-tree and a B+tree?  
See Topic: TREES & GRAPHS, Short Answer Type Question No. 9.

6. What is dequeue? What is the advantage of dequeue over ordinary queue?  
1st part: See Topic: ARRAYS, STACKS & QUEUES, Long Answer Type Question No. 9(b).  
2nd part: See Topic: ARRAYS, STACKS & QUEUES, Long Answer Type Question No. 8.

### Group – C

#### (Long Answer Type Questions)

7. a) What are the differences between general tree and a binary tree?

b) Prove that the height  $h$  of a binary tree  $T$  is  $h = \log_2(n+1)$ .

c) Construct a B-tree of order 5 from the following key values: 5

a, g, f, b, k, d, h, m, j, e, s, i, r, x, c, l, n, t, u, p

d) What is hashing? How is collision problem solved in hashing?

a) See Topic: TREES & GRAPHS, Long Answer Type Question No. 20(a).

b) See Topic: TREES & GRAPHS, Long Answer Type Question No. 24.

c) See Topic: SEARCHING & SORTING, Long Answer Type Question No. 8 (2<sup>nd</sup> part).

d) See Topic: HASHING & COLLISIONS, Short Answer Type Question No. 2.

8. a) Explain with an example the heap sort algorithm.

b) Write an algorithm for this heap sort.

c) Find the time complexity of the above algorithm.

a), b) and c) See Topic: SEARCHING & SORTING, Short Answer Type Question No. 5.

9. Write the functions for the following:

a) Insert a node after a particular node in singly linked list.

b) Reverse display of the list in doubly linked list.

c) Physically reverse the singly linked list.

a), b) and c) See Topic: LINKED LIST, Long Answer Type Question No. 6(a),(b) and (c).

10. a) What is an adjacency matrix representation of a graph?

b) Prove that maximum number of nodes on level  $i$  of a binary tree is  $2^{i-1}$ ;  $i \geq 1$ .

c) What is the difference between recursion and iteration?

d) What will be the complexity for the following operations – quick sort, binary search, selection sort?

a) & b) See Topic: TREES & GRAPHS, Long Answer Type Question No. 17(a) & (b).

c) See Topic: RECURSION, Short Answer Type Question No. 3.

d) See Topic: SEARCHING & SORTING, Short Answer Type Question No. 3.

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11. Write short notes on any *three* of the following:

- a) AVL tree
- b) Threaded binary tree
- c) Search algorithm of BST
- d) Priority queue
- e) ADT

- a) See Topic: TREES & GRAPHS, Long Answer Type Question No. 25(c).
- b) See Topic: TREES & GRAPHS, Long Answer Type Question No. 25(g).
- c) See Topic: TREES & GRAPHS, Long Answer Type Question No. 14.
- d) See Topic: ARRAYS, STACKS & QUEUES, Long Answer Type Question No. 9(d).
- e) See Topic: INTRODUCTION, Short Answer Type Question No. 1.