# QUESTION 2015

## Group – A
## (Multiple Choice Type Questions)

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

i) The most appropriate matching for the following pairs

| | |
|---|---|
| X. Bubble Sort | 1. O(log2n) |
| Y. Linear Search | 2. O(n2) |
| Z. Binary Search | 3. O(n) |

a) X-1, Y-2, Z-3 b) X-3, Y-1, Z-2 c) X-3, Y-2, Z-1 ✓d) X-2, Y-3, Z-1

ii) The best data structure to evaluate an arithmetic expression (in postfix form) is

a) queue ✓b) stack c) tree d) linked list

iii) The tree traversal technique in which the root is traversed after its children is known as

✓a) post-order traversal
b) pre-order traversal
c) in-order traversal
d) none of these



iv) Let "q" be the queue of integers defined as follows

```
#define MAX 10
struct queue
{ int data[MAX];
int rear, front;
}q;
```

To insert an element into the queue, we may write operation

a) ++q.data[q.rear]=x;
b) q.data[q.rear]++=x;
✓c) q.data[++q.rear]=x;
d) none of these

v) A linear collection of data elements where the linear node is given by means of pointer is called

✓a) linked list b) node list c) tree d) none of these

vi) Adjacency matrix for an undirected graph is

a) unit matrix
✓b) symmetric matrix
c) asymmetric matrix
d) none of these

vii) An adjacency matrix representation of a graph cannot contain information of

a) Nodes
b) Edges
c) Direction of edges
✓d) Parallel edges

viii) Which of the following data structure may give overflow error, even through the current number of elements in it is less than its size

✓a) simple queue b) circular queue c) stack d) none of these

ix) Number of possible binary tree with 4 node is

✓a) 14 b) 34 c) 24 d) none of these

x) Number of nodes in a complete binary tree of depth k is

a) 2k b) 2k ✓c) 2k – 1 d) none of these

xi) Time complexity of insertion sort algorithm in the best case is

✓a) O(n) b) O(nlog2n) c) O(n2) d) none of these



xii) The following sequence of operations is performed on a stack push(1), push(2), pop, push(1), push(2), pop, pop, pop, push(2), pop. The sequence of popped values are

a) 2,2,1,2,1 ✓b) 2,2,1,1,2 c) 2,1,2,2,1 d) 2,1,2,2,2

xiii) Which of the following traversal techniques lists the nodes of binary search tree in ascending order?

a) post-order ✓b) in-order c) pre-order d) none of these

xiv) The most appropriate matching for the following pairs

| | |
|---|---|
| X. First In First Out | 1. Tree |
| Y. Depth First Search | 2. Queue |
| Z. In-order Traversal | 3. Graph |

a) X-1, Y-2, Z-3 b) X-3, Y-1, Z-2 c) X-3, Y-2, Z-1 ✓d) X-2, Y-3, Z-1

xv) "p" is a pointer to a structure. A member "x" of that structure is referenced by

✓a) (*p).x b) p -> x c) *(p.x) d) none of these

## Group – B

### (Short Answer Type Questions)

2. What do you mean by 'Abstract Data Type'? Explain with an example.

**See Topic: INTRODUCTION, Short Answer Type Question No. 4.**

3. What are the advantages of linked list over array?

**See Topic: LINKED LIST, Short Answer Type Question No. 1.**

4. What is a circular queue? What are its advantages?

**See Topic: ARRAYS, STACKS & QUEUES, Short Answer Type Question No. 14.**

5. How a binary tree is different from binary search tree?

**See Topic: TREES AND GRAPHS, Long Answer Type Question No. 2(a).**

6. Write an algorithm/C-function for preorder traversal of a binary tree.

**See Topic: TREES AND GRAPHS, Short Answer Type Question No. 16.**

7. How is binary search more beneficial than linear search?

**See Topic: SORTING AND SEARCHING, Long Answer Type Question No. 6(b).**



## Group – C

### (Long Answer Type Questions)

8. a) Write an algorithm for conversion of an infix arithmetic expression in its corresponding postfix form.

b) What is stack? Explain various operations performed using stack with examples.

c) What is recursion? How does it differ from iteration?

**a) See Topic: ARRAYS, STACKS & QUEUES, Long Answer Type Question No. 6.**

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

**c) See Topic: RECURSION, Short Answer Type Question No. 2.**

9. a) Convert the following infix expression to corresponding postfix expression:

(A+B)/C*E+F$G–H/(I*J)

b) Write a program to implement queue using linked list.

**See Topic: ARRAYS, STACKS & QUEUES, Long Answer Type Question No. 7.**

10. a) Write a function to return the maximum number in a linked list.

b) Write and explain an algorithm to add a node to a doubly linked list.

c) Consider the following sequence of binary tree traversals:

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inorder | : | Q, | B, | K, | C, | F, | A, | G, | P, | E, | D, | H, | R |
| Preorder | : | G, | B, | Q, | A, | C, | K, | F, | P, | D, | E, | R, | H |

Hence construct the binary tree.

a) & b) See Topic: LINKED LIST, Long Answer Type Question No. 7.
c) See Topic: TREES AND GRAPHS, Short Answer Type Question No. 17.

11. a) Define the following terminologies
(1) Node (2) Root (3) Siblings (4) level (5) leaf node.
b) Write a recursive algorithm for Preorder and Postorder traversals of a binary tree.
c) What is graph? Explain different types of graph.
a) See Topic: TREES AND GRAPHS, Short Answer Type Question No. 18.
b) See Topic: TREES AND GRAPHS, Long Answer Type Question No. 23.
c) See Topic: TREES AND GRAPHS, Long Answer Type Question No. 1(b).

12. a) Write and explain an algorithm to search a list of numbers using binary search method.
b) Show the bubble sort steps for the following numbers.
25 10 72 18 40 11 32 9
c) What is a circular queue? How it differs from linear queue?
a) See Topic: SORTING AND SEARCHING, Long Answer Type Question No. 1(a).
b) See Topic: SORTING AND SEARCHING, Long Answer Type Question No. 10.
c) See Topic: ARRAYS, STACKS & QUEUES, Short Answer Type Question No. 14.



13. Write short notes (any three):
a) Sparse matrix
b) Hashing
c) Circular list
d) B-tree
e) Quick sort

a) See Topic: ARRAYS, STACKS & QUEUES, Long Answer Type Question No. 9(e).
b) See Topic: HASHING AND COLLISION, Long Answer Type Question No. 3(b).
c) See Topic: LINKED LIST, Long Answer Type Question No. 8(b).
d) See Topic: TREES & GRAPHS, Long Answer Type Question No. 25(a).
e) See Topic: SORTING AND SEARCHING, Long Answer Type Question No. 11(c).