Total No. of Questions—**7**] [Total No. of Printed Pages—**8**

Seat No.	

[5219]-3001

S.Y.B.C.A. (Science) (III Semester) EXAMINATION, 2017

BCA-301 : DATA STRUCTURE

(2016 PATTERN)

Time : Three Hours **Maximum Marks : 70**

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Attempt any *two* questions from Group I and any *two* questions from Group II.

(*iii*) *All* questions carry equal marks.

(*iv*) Figures to the right indicate full marks.

(*v*) Assume suitable data if necessary.

1. (A) Choose *correct* option : [7×1=7]

(1) Time complexity of a program refer to :

(*a*) Complexity involved with the input time of a program

(*b*) Complexity involved in space mission and control

(*c*) Amount of time a program needs to run for completion

(*d*) None of the above

P.T.O.

(2) The memory address of the first element of an array is called :

(*a*) floor address

(*b*) foundation address

(*c*) first address

(*d*) base address

(3) Elements are added at which position of the stack ?

(*a*) Bottom

(*b*) Middle

(*c*) Top

(*d*) None of the above

(4) In the last node of the circular linked list the link field contains ?

(*a*) Null

(*b*) Pointer data item

(*c*) Pointer to next node

(*d*) Pointer to first node

(5) Which is the property of dequeue ?

(*a*) LIFO

(*b*) LILO

(*c*) FIFO

(*d*) None of the above

(6) Binary tree can be represented as :

(*a*) Linked list only

(*b*) Array only

(*c*) Both (*a*) and (*b*)

(*d*) None of the above

(7) In a graph Breadth First Search can be implemented with :

(*a*) Stack

(*b*) Queue

(*c*) Tree

(*d*) Forest

(B) Answer the following : 7×1=7

(*a*) "A data structure may be implemented by other data structure." State true/false.

(*b*) What is the Best Case and Worst Case time complexity of merge sort ?

(*c*) Give *one* advantage of using header node in linked list.

(*d*) What is the result of evaluating the postfix expression AB – CD * / given A = 2 B = 10 C = 4 D = 1.

(*e*) Define Dequeue.

(*f*) What is Right Skewed binary tree ?

(*g*) Define complete graph.

Group I

2. Attempt the following :

(*a*) Write a C function to delete node from a circular link list at any position. [5]

(*b*) Sort the following data using merge sort : [5]

24, 11, 9, 2, 6, 5, 4, 3

(*c*) Calculate the time complexity for the following code in table method : [4]

```
float sum (float a[ ], int n)
{
    float s = 0.0;
    for (int i = 1; i< = n; i++)
        s + = a[i];
    return s;
}
```

3. Answer the following :

(*a*) Write a C function for sequential search in a sorted array. [4]

(*b*) What are different types of linked list ? Give node structure of each type. [4]

(*c*) Give the best case and worst case efficiency of the following algorithm : [3]

(*i*) Bubble sort

(*ii*) Quick sort

(*iii*) Insertion sort.

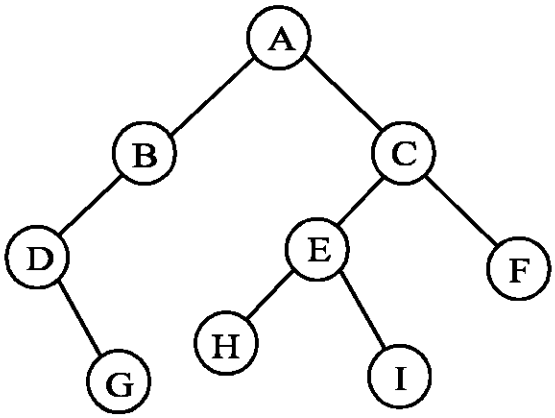
(*d*) What are different applications of Double linked list ? [3]

4. Attempt the following :

(*a*) What are the applications of stack ? [4]

(*b*) Differentiate between stack and queue ? [4]

(*c*) To find Preorder, Inorder, Postorder of the following tree : [3]



(*d*) Define the following terms : [3]

(*i*) Acyclic graph

(*ii*) Multigraph

(*iii*) Sink.

Group II

5. Answer the following :

(*a*) Write a C function to count depth of tree. [5]

(*b*) Give the output of the following code with contents of the stack. : [5]

```
initstack (5);
push (5, 10);
push (5, 6);
i = pop (5);
while (i > 0)
{
    push (5, i * 10);
    i - - ;
}
push (5, i * 10);
while (! stackempty (5))
{
    printf ("%d", pop (5));
}
```

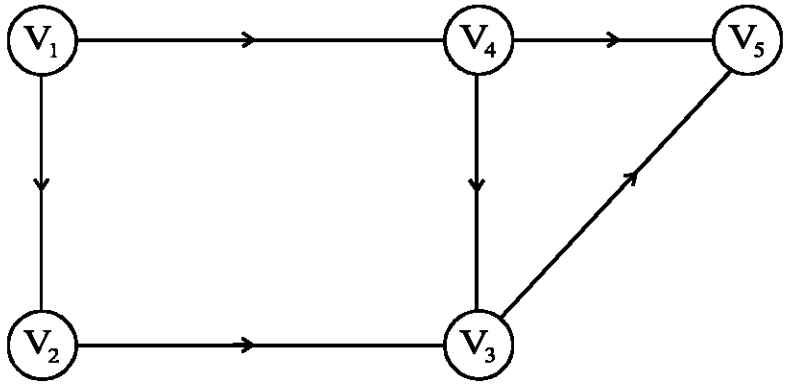
(*c*) What are different operations performed on queue ? Explain each. [4]

6. Answer the following :

(*a*) Define expression tree. Construct expression tree for the following given expression : [4]

(a + b * c) * e + f

(*b*) Construct the adjacency matrix and adjacency list for the following graph. [4]



(*c*) Write a C function to print queue data. [3]

(*d*) Construct the binary search tree for the following : [3]

11, 7, 15, 25, 18, 5, 12, 20

7. Answer the following :

(*a*) Write 'C' function to delete last node of a linked list. [4]

(*b*) Write a 'C' function to push an element to a stack (dynamic representation). [4]

(*c*) Represent generalized linked list for the following expression diagrammatically : [3]

A = (a, (b, c, d) e, f)

G = ((d, e) (e, f), c, d)

(*d*) Define linear and non-linear data structure. List any *three* linear and non-linear data structure. [3]