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Paper Code : BCAN-203(N)

DATA STRUCTURE WITH C

Time Allotted : 3 Hours | *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) The worst case complexity of bubble sort is

a) $O(n^2)$ b) $O(n)$

c) $O(log_2 n)$ d) $O(n log_2 n)$.

ii) The way for traversing a Binary tree is

a) preorder traversing

b) inorder traversing

c) postorder traversing

d) all of these.

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

a) queue b) stack

c) tree d) linked list.

iv) Stack works on

a) LIFO b) FIFO

c) FILO d) both (a) & (c).

v) Let n be the size of the array. top is a variable which indicates the last element of the stack.

```
if(top==n-1)
{
     ??
}
 else
{
     prinft("Enter a value to be pushed:");
     scanf("%d",&x);
     ??
     stack[top]=x;
}
```

The operation in place of ?? is

a) printf("\n\tSTACK is over flow");

b) stack[top]=x;

c) printf("\n\tSTACK is under flow");

d) printf("\n\tSTACK is over flow"); and top++;

vi) Convert the infix expression A^B/C*D/E^F*G to postfix expression :

a) AB^CD*/EF^G*/

b) ABC/^DE/F^*G*

c) AB^C/D*EF^/G*

d) None of these.

vii) Malloc

a) allocates requested size of bytes and returns a void pointer pointing to the first byte of the allocated space

b) allocates space for an array of elements, initialize them to zero and then returns a void pointer to the memory

c) releases previously allocated memory

d) modify the size of previously allocated space.

viii) The general format of the function used for opening a file is

```
FILE* fp;
fp=fopen("filename", "mode");
```

Here "mode" is

a) file pointer

b) actual file name with full path of the file.

c) the operation that will be performed on the file. Example: r, w, a, r+, w+ and a+.

d) none of these.

ix) Example of non-linear data structure is

a) tree b) linked list

c) graph d) both (a) & (c).

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

a) post-order traversal

b) in-order traversal

c) pre-order traversal

d) none of these.

xi) What is the output of the following code ?

```
#include<stdio.h>
int main ()
 {
     int d, a = 1, b = 2;
     d = a++ + ++b;
     printf("%d %d %d", d, a, b);
 }
```

a) The code has syntax error

b) 5 2 3

c) 4 1 3

d) 4 2 3.

xii) A conversion specification % 7.4f means

a) print a floating point value of maximum 7 digits where 4 digits are allotted for the digits after the decimal point

b) print a floating point value of maximum 4 digits where 7 digits are allotted for the digits after the decimal point

c) print a floating point value of maximum 7 digits

d) print a floating point value of minimum 7 digits where 4 digits are allotted for the digits after the decimal point.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What do you mean by ADT (Abstract Data types) and primitive data types ? Explain with example.

3. Write a function of Push and Pop of a Stack using Linked list representation.

4. Write a recursive algorithm for preorder and postorder traversal of a binary tree.

5. How is a binary tree different from binary search tree ? What is recursion ? How does it differ from iteration ?

2 + 1 + 2

6. What is Hashing ? Discuss different types of Hash function. 1 + 4

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Write a program in C to implement the Insert and Delete operations in a Queue using Linked list.

   b) Write C functions to perform the following operations in single linked list :

      i) Add item before a specified node

      ii) Reverse the linked list

      iii) Delete an item. (3 + 3) + (3 + 4 + 2)

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

   4 + 3 * 10/6 + 7 - 4 / 2 + 5 ^ 3

   b) Create an AVL tree with the following numbers :

   10, 20, 15, 25, 30, 16, 18, 19 7 + 8

9. a) How is binary search more beneficial than linear search ? Explain with example.

   b) Write a C function to reverse 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. 4 + 6 + 5

10. a) What is Priority Queue ?

   b) Write an algorithm to insert a node in a binary search tree.

   c) Write down the C function of Insertion sort.

   d) What do you mean by adjacency matrix of a graph ? 3 + 4 + 6 + 2

11. Write short notes on any *three* of the following : 3 × 5

   a) Abstract Data type

   b) Dequeue

   c) Threaded Binary Tree

   d) Modes of opening a file in C

   e) BFS Algorithm for graph traversal.