Printed Pages : 4

NCS-301

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 110307

Roll No.

B. Tech. (IT)

(SEM. III) (ODD SEM.) THEORY EXAMINATION, 2014-15

DATA STRUCTURE USING C

Time : 3 Hours] [Total Marks : 100

1 Attempt any **four** parts of the following : 5×4=20

(a) Define Data structure. Describe about its need and types. Why do we need a data type?

(b) Write difference between array and linked list.

(c) What do you understand by complexity of an algorithm? Compute the worst case complexity for the following C code:

```
main ()
{
int  s=0,i,j,n;
        for  (j=0;j<(3*n);j++)
{
for(i=0;i<n;i++)
{
s=s+i;
}
printf("%d",j);
}}
```

(d) Write the difference between malloc and calloc functions. Why do we use dynamic memory allocation?

(e) Write algorithm or C code to insert a node in doubly link list in beginning.

(f) What is row major order? Explain with an example.

2 Attempt any four parts of the following : **5×4=20**

(a) What is Tower of Hanoi problem? Write the recursive code in C language for the problem.

(b) What is circular queue? Write a C code to insert an element in circular queue. Write all the condition for over flow.

(c) What is stack? Implement stack with singly link list.

(d) Write the procedures for insertion, deletion and traversal of a queue.

(e) Write a function in C language to reverse a string using stack.

(f) Convert following infix expression into post fix expression.
A + (B*C+D)/E

3 Attempt any Two parts of the following : **10×2=20**

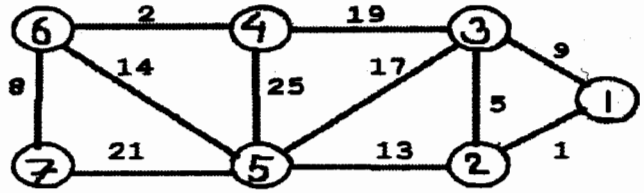
(a) Construct a height balanced Binary search tree by performing following operations:
Step 1 : Insert
19, 16, 21, 11, 17, 25, 6, 13
Step 2 : Insert
3
Step 3 : Delete
16

(b) What is Huffman tree? Create a Huffman tree with following numbers.
24, 55, 13, 67, 88, 36, 17, 61, 24, 76

(c) Define Binary Search Tree. Create BST for the following data, show all steps
20, 10, 25, 5, 15, 22, 30, 3, 14, 13

4 Attempt any **Two** parts of the following : **10×2=20**

(a) Define spanning tree. Find the minimal spanning tree for the following graph using Prim's algorithm.



(b) Find out the shortest path from node 1 to node 4 in a given graph (Fig. 1) using Dijikstra shortest path algorithm.

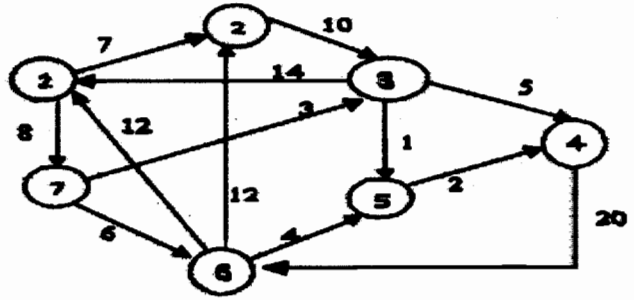


Figure: 1

(c) Write DFS algorithm to traverse a graph. Apply same algorithm for the graph given above (Figure 1) by considering node 1 as starting node.

5 Attempt any Two parts of the following : **10×2=20**

(a) What do you mean by hashing and collision? Discuss the advantages and disadvantages of hashing over other searching techniques.

(b) Write an algorithm for merge sorting using the algorithm sort in according order :
10, 25, 16, 5, 35, 48, 8

(c) Write short notes on any three :
(i) B-Tree
(ii) Insertion Sort
(iii) Heap Sort
(iv) Garbage Collection.