B.E. (Information Technology) Fourth Semester (C.B.S.)
Algorithm & Data Structure

P. Pages : 3

Time : Three Hours

11964

AHK/KW/19/2148

Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Define data, data types and data structure. Elaborate on the classification of data structures.   5

   b) Write recursive functions in C for.   8
   i) Computation of factorial of a number.
   ii) Finding sum of digits of n – digit number.

OR

2. a) What are asymptotic notations? Elaborate with definitions the Big-oh (0), theta and the Big – omega notations; giving behavioral representation of the function f(n) and g(n) with respect to the input n.   7

   b) Define algorithm. And explain about the essential characteristics of an algorithm.   6

3. a) Write an algorithm to convert infix expression to prefix form. And convert the following infix expression into prefix using stack.   7
   $A+(B*C-(D/E)*G)*H$

   b) Explain the concept of circular queue.   6
   Also write 'C' function for the following in circular queue.
   i) Insertion
   ii) Deletion
   iii) Display

OR

4. a) Explain the concept of stack. Also write 'C' functions for the following in stack: 7
   i) Push
   ii) Pop
   iii) Display.

   b) Write short note on.   6
   i) Double ended queue.
   ii) Priority queue.
   iii) Application of stack.

5.	a)	Write a C function to find the length singly linked list	4

b) Write an algorithm or 'C' functions for the following operations on singly linked list. **9**
i) insert – node – at – begin ()
ii) insert – node – at – end ()
iii) delete – node – from – begin ()
iv) delete – node – from – end ()

OR

6. a) Explain sparse matrix with example. Also write its application. **5**

b) State & explain the concept of following. **8**

i) Circular linked list.
ii) Doubly linked list
iii) Circular doubly linked list.

7. a) Explain the representation of Binary Tree with suitable example. **4**

b) Draw all possible binary trees if number of nodes are given as 1, 2, 3. **4**

c) Draw the Binary Tree if the traversal sequence are given as. **6**

In order	4	7	2	8	5	1	6	9	3
Pre order	1	2	4	7	5	8	3	6	9

Also find the post order traversal sequence for the obtained binary tree.

8. a) Write an algorithm or 'C' functions for the following. **6**

i) Pre -order traversal of binary tree.
ii) Post- order traversal of binary tree.
iii) In -order traversal of binary tree.

b) Write short note on AVL tree. **3**

c) Draw the Binary search Tree (BST) for the following nodes. **5**
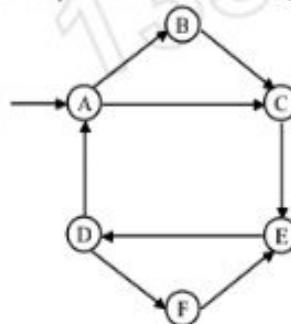{36, 28, 14, 4, 9, 11,98, 75, 36, 82, 18, 54, 26}

9. a) Explain Dijkstra's algorithm for finding shortest path between vertices. **7**

b) Find the DFS and BFS traversal sequence of the following graph starting at node A. **7**

10. a) For the following graph obtain.   7
   i) Indegree and outdegree of each node.
   ii) Adjacency matrix representation.
   iii) Adjacency list representation.
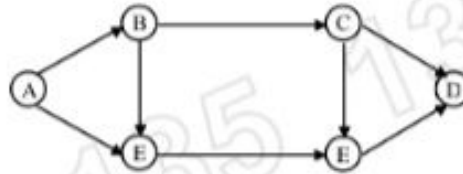   iv) Adjacency multi list representation.

Fig. : Directed Graph

   b) For the given graph draw minimum cost spanning tree using Kruskal's algorithm. Also   7
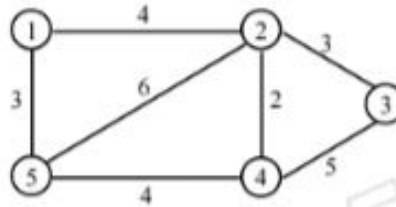   find the total minimum cost of the tree (MCST)

fig: undirected, weighted graph

11. a) Write a program to implement binary search algorithm. Also state the complexity of   5
   algorithm.

   b) Give the algorithm for bubble sort and trace the steps by using the following list.   8
   List = {5, 6, 15, 0, 4, 8,}. Sort the list in ascending order. Also give total number of
   swappings in each iteration.

OR

12. a) Explain quick sort algorithm with example.   6

   b) Using division remainder method of hashing for table size 13. Store the following numbers   7
   in hash table
   Number = {25, 42, 96, 101, 102, 162, 197, 201, 208}
   Use linear probing, quadratic probing and bucket - chaing method for collision handling.

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