

# C.U.SHAH UNIVERSITY

## Winter Examination-2015

Subject Name: Data and File Structure

Subject Code: 4TE03DFS1

Branch: B.Tech(CE,IT)

Semester: 3 Date: 10/12/2015 Time: 2:30 to 05:30

Marks: 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  - (2) Instructions written on main answer book are strictly to be obeyed.
  - (3) Draw neat diagrams and figures (if necessary) at right places.
  - (4) Assume suitable data if needed.
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**Q-1 Attempt the following questions: (14)**

- a) Define: Data structure
- b) Define: time complexity and space complexity
- c) Define: successor and predecessor
- d) Define: directed graph and weighted graph
- e) Define: hash table and hash function.
- f) Difference between iteration and recursion.
- g) Difference between linear and non-linear data structure.
- h) Difference between primitive and non-primitive data structure.
- i) Difference between static memory allocation and dynamic memory allocation.
- j) Difference between sequential access file and random access file.
- k) To implement Sparse matrix dynamically, the following data structure is used  
(A) Trees (B) Graphs  
(C) Priority Queues (D) Linked List
- l) The balance factor for an AVL tree is either  
(A) 0,1 or -1 (B) -2,-1 or 0  
(C) 0,1 or 2 (D) All the above
- m) Graphs are represented using  
(A) Adjacency tree (B) Adjacency linked list  
(C) Adjacency graph (D) Adjacency queue
- n) The data structure needed to convert a recursion to an iterative procedure is  
(A) Queue. (B) Graph.  
(C) Stack. (D) Tree.

**Attempt any four questions from Q-2 to Q-8**

- Q-2 Attempt all questions**
- a) What is recursion? Write a C program to solve Tower of Hanoi problem using recursion. (5)
  - b) Write an algorithm for merge sort. (5)
  - c) Explain binary search algorithm with suitable example. (4)



- Q-3 Attempt all questions**
- a) Write an algorithm to insert an element into and delete from Circular Queue (5)
- b) Do Evaluation of following expression using stack. (5)  
 $((A / (B \wedge C)) + (D * E)) - (A * C)$   
 Where A=27, B=3, C=2, D=3, E=17.
- c) What do you mean by priority queue ? Explain it with suitable example. (4)

- Q-4 Attempt all questions**
- a) Write the following algorithms for a Singly linked list. (5)  
 i) Insert an element at last position  
 ii) Delete a specified element
- b) Translate the following string into polish notation and trace the content of stack: (5)  
 $A * (B + C * D) + E$
- c) Explain Deque and its variations with example. (4)

- Q-5 Attempt all questions**
- a) What is Stack? Write algorithms for performing PUSH, POP, PEEP and CHANGE operations on a stack. (5)
- b) Define B-Tree. Construct B-tree of order 5 for following data. (5)  
 1, 7, 6, 2, 11, 4, 8, 13, 10, 5, 19, 9, 18, 24, 3, 12, 14, 20, 21, 16
- c) Convert following Infix expression into Postfix and Prefix expression. (4)  
 i.  $((A * B) + (C / D))$       ii.  $((A * (B + C)) / D)$

- Q-6 Attempt all questions**
- a) Explain Threaded Binary Tree with suitable example. (5)
- b) Define AVL Tree. Construct AVL tree for following data (5)  
 Jan, Feb, Mar, Apr, May, June, July, Aug, Sep, Oct, Nov, Dec.
- c) Write a note on: Collision Resolution Techniques. (4)

- Q-7 Attempt all questions**
- a) What do you mean by Shortest Path? Find out shortest path for given Figure 1 using Dijkstra's Algorithm. Consider source vertex is: b (5)
- b) Define sparse matrix. Briefly explain representation of sparse matrix with the help of link list and 3-Column form. (5)
- c) Define Binary Search Tree. Create the BST for the following data. (4)  
 40, 65, 25, 55, 10,70,30,50,15,80,75

- Q-8 Attempt all questions**
- a) What do you mean by MST? Find out MST for Figure 2 using Prim's algorithm. (5)
- b) Explain Graph Traversal Techniques. (5)
- c) What is Augmented Data Structure? Explain its applications. (4)

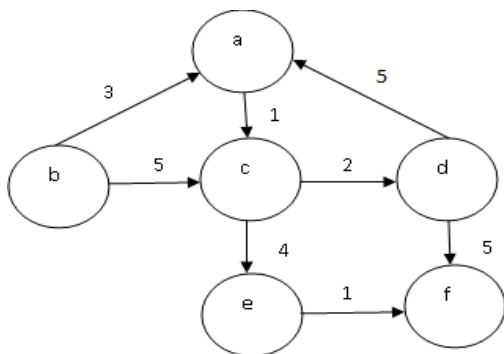


Figure: 1

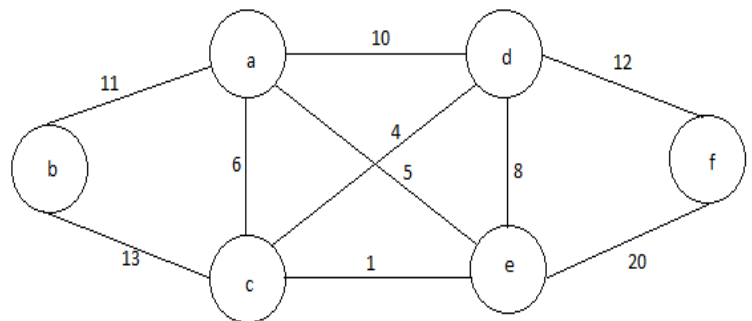


Figure: 2

