

816113



## COMP 4 – 2 (RC)

### S.E. (Comp.) (Semester – IV) Examination, May/June 2013 (Revised Course) DATA STRUCTURES

Duration : 3 Hours

Total Marks : 100

- Instructions:** 1) Answer **any five** questions selecting at least **one** from **each** Module.  
2) Make **necessary** assumptions if **required**. **Clearly** state any such assumptions made.

#### MODULE – I

1. a) Provide an example using C code to demonstrate the difference between iteration and recursion. List all the differences. 8
- b) Explain the following with the help of a diagram : 9
  - i) Insert a node at the beginning, at the end and at the specified position of the singly linked list.
  - ii) Deleting the first node, last node and a node from a specified position in case of a doubly linked list.
  - iii) Deleting the first node, last node and a node from a specified position in case of circular linked list.
- c) Write briefly about the following with respect to files : 3
  - i) fscanf
  - ii) ftell
  - iii) fseek.
2. a) What do you understand by a circular linked list ? Demonstrate the significance of circular linked list by constructing the basic working and provide appropriate reasons. 9
- b) Write a function to accept a string and change characters in the string to uppercase. 7
- c) Explain the following pointer declaration : 4
  - i) &i
  - ii) \*(&i)
  - iii) \*j
  - iv) \*\*k

P.T.O.

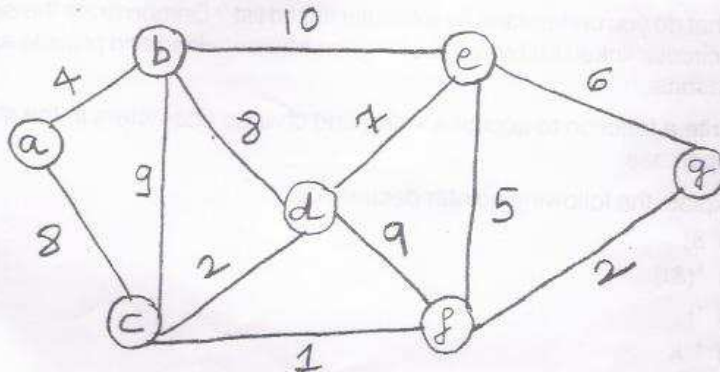


## MODULE - II

3. a) Write a C program to implement push and pop operation of a stack. 8
- b) Suppose the following alphabets are inserted in order on the empty BST. 4  
P M S W F I N G J Q  
Draw the BST.
- c) Transform the following to infix : 6  
i)  $+-+ABCD$   
ii)  $ABCD+-+$   
iii)  $*/-A+CBDE$
- d) What are threaded trees ? 2
4. a) Write an algorithm for inserting an item in a deque. 6
- b) Construct a binary tree for  $(A + (B - C) * (D - E) / (G/H)) - (F \& I)$  and hence find preorder, postorder, inorder and level order traversals. 8
- c) Evaluate the following postfix expression : 6  
i)  $987*+$   
ii)  $4025+205*3+$   
iii)  $21188^{\wedge}/9+$

## MODULE - III

5. a) Compute minimum spanning tree for the graph below using Prim's algorithm. 6



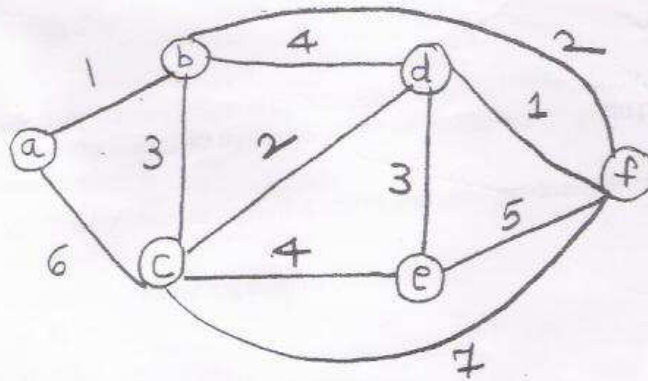
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COMP 4-2 (RC)

- b) Consider the algebraic expression  $E = (2x + y)(5a - b)$ . 6
- Draw the tree  $T$  which corresponds to the expression  $E$ .
  - Find the prefix Polish expression  $P$  which is equivalent to  $E$ , and find the preorder of  $T$ .
- c) Explain the first fit allocation algorithm. 8
6. a) Suppose the following list of letters is inserted in order into an empty binary search tree : 6
- S, T, P, Q, M, N, O, R, K, V, A, B
- Construct the tree  $T$
  - Find the inorder traversal of  $T$ .
- b) In Dijkstra's shortest path algorithm, what technique is used to choose the next vertex to process ? 6
- c) What is spanning tree ? Compute the minimum spanning tree for the graph below using Kruskal's algorithm. 6



- d) What is collector and compaction ? 2





## MODULE - IV

7. a) Describe the concept of binary search technique. Is it efficient than the sequential search ? 5
- b) State and explain Josephus problem. 7
- c) Write an algorithm to convert valid infix expression to prefix expression and hence convert : 8
- $(A + (((B - C) * (D - E) + F)/G) \$ (H - J)$
8. a) What is hashing ? What is the need for hashing ? 4
- b) Sort the following numbers using heap sort : 7
- 46, 25, 35, 49, 10, 92, 83, 32
- c) Explain the following with respect to files : 6
- i) Hash function
- ii) Buckets
- iii) Rehashing
- d) What is the working principle of bubble sort ? 3

