

Roll No

MCSE/MSE - 102
M.E./M.Tech., I Semester

Examination, June 2013

Advanced Data Structure and Algorithm*Time : Three Hours***RGPVONLINE.COM***Maximum Marks : 70***Note:** Attempt any five questions. All questions carry equal marks.

1. a) Write a program in c/c++ to implement DEQUE and its operations.
 b) Write a function to merge two sorted circular Linked list to create a single circular Linked list.
2. Solve following recurrence relations and represent them using Big O notation
 - i) $T(n) = n + 2T(n/2)$
 - ii) $T(n) = n + T(n-1)$
 - iii) $T(n) = 1 + T(n/2)$
 - iv) $T(n) = 6n^2 + 4n + 3n + 5$
3. a) Write a program for Heap Sort, that should also print the number of passes, the number of comparisons in each pass and the Total number of comparisons to sort n-elements.
 b) Write a function/algorithm to convert a Doubly Linked list into a Circular Doubly Linked List.
4. a) How can you say that Huffman Encoding Algorithm is based on Greedy Technique? Generate Huffman codes for following messages.

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PTO

| Message | M1 | M2 | M3 | M4 | M5 | M6 | M7 |
|-----------|----|----|----|----|----|----|----|
| Frequency | 5 | 8 | 13 | 2 | 18 | 3 | 15 |

- b) Write a program to print all the Hamiltonian cycles in a graph represented by Adjacency Matrix A [1:n, 1:n]
5. a) Prove that the time complexity of Quick Sort in Average case is $O(n \log_2 n)$
 b) Prove that the time complexity of Insertion sort in Best case is $O(n)$.
6. What do you mean by Reliability design problem? Design a 3-stage system with devices types D1, D2 & D3. The cost of the devices are \$ 35, \$ 20 & \$ 25 respectively and their reliabilities are 0.9, 0.8 & 0.5 respectively. The cost of the system is to be no more than \$ 135. Determine the best design, its reliability & the total cost of the system using dynamic programming technique.
7. a) Write a program to implement Set ADT and also the basic set of operations in it.
 b) Write a non recursive function/algorithm for post order traversal of a Binary tree.
8. Following are the four types of rotations that are performed in an AVL tree.
 - 1) LL Rotation 2) RR Rotation
 - 3) LR Rotation 4) RL Rotation
 - a) With the help of examples explain in which case each of these rotations are performed.
 - b) Write algorithms/functions for each of the above mentioned rotations.

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