

Register Number:.....

B.E DEGREE EXAMINATIONS DEC 2012

Second Semester

COMPUTER SCIENCE AND ENGINEERING

CSE102: Data Structures

Time: Three Hours

Maximum Marks:100

Answer ALL Questions:-

PART A (10x1=10 Marks)

1. Two main measures for the efficiency of an algorithm are
 - a. Processor and memory.
 - b. Complexity and capacity.
 - c. Time and space.
 - d. Data and space.
2. The time complexity to compute the sums for the first N terms ($n \geq 0$) for the following series:
 - a. $O(N^2)$
 - b. $O(N \log N)$
 - c. $O(N)$
 - d. $N O(\log N)$
3. Linked lists are best suited
 - a. for relatively permanent collections of data
 - b. for the size of the structure and the data in the structure are constantly changing
 - c. for both of the above situation
 - d. for none of the above situation
4. In a circular linked list
 - a. components are all linked together in some sequential manner.
 - b. there is no beginning and no end.
 - c. components are arranged hierarchically.
 - d. forward and backward traversal within the list is permitted.
5. What is the postfix form of the following prefix expression $-A/B * C \$ D E$
 - a. $ABCDE \$ */ - .$
 - b. $A-BCDE \$ */ - .$
 - c. $ABC \$ ED */ - .$
 - d. $A-BCDE \$ */ - .$
6. A queue is a,
 - a. FIFO (First In First Out) list.
 - b. LIFO (Last In First Out) list.
 - c. Ordered array.
 - d. Linear tree.
7. A BST is traversed in the following order recursively: Right, root, left The output sequence will be in
 - a. Ascending order
 - b. Descending order
 - c. Bitomic sequence
 - d. No specific order

8. When Inorder traversing a tree resulted E A C K F H D B G; the preorder traversal would return
- a. FAEKCDBHG
 - b. FAEKCDHGB
 - c. EAFKHDCBG
 - d. FEAKDCHBG
9. Which of the following sorting methods would be most suitable for sorting a list which is almost sorted
- a. Bubble Sort
 - b. Insertion Sort
 - c. Selection Sort
 - d. Quick Sort
10. The quick sort algorithm exploit _____ design technique
- a. Greedy
 - b. Dynamic programming
 - c. Divide and Conquer
 - d. Backtracking

PART B (10 x 2 = 20 Marks)

- 11. Define algorithm.
- 12. What is the purpose of big-oh-notation?
- 13. What is abstract data type?
- 14. What are the features present in pointer implementation of linked list?
- 15. Write the routine to test whether a stack is empty using linked list implementation.
- 16. Write the routine to make an empty queue using array implementation.
- 17. Draw the expression tree for $(a + b * c) + ((d * e - f) / g)$.
- 18. What is sentinel?
- 19. What is the running time of insertion sort if all keys are equal?
- 20. How would you implement merge sort without using recursion?

PART C (5 x 14 = 70 Marks)

21. a) Explain the top down design strategy for designing algorithm.

(OR)

- b) (i) Write an algorithm to compute the factorial of numbers.

(7)

(ii) Write an algorithm to generate the Fibonacci sequence. (7)

22. a) (i) Write a program to create a singly linked list and display the entered elements. (7)

(ii) Write a program to swap two adjacent elements using doubly linked list. (7)

(OR)

b) The Josephus problem is the following game: N people, numbered 1 to N , are sitting in a circle. Starting at person 1, a hot potato is passed. After M passes, the person holding the hot potato is eliminated, the circle closes ranks and the game continues with the person who was sitting after the eliminated person picking up the hot potato. The last remaining person wins. Thus, if $M=0$ and $N=5$, players are eliminated in order, and player 5 wins. If $M=1$ and $N=5$, the order of elimination is 2,4,1,5.

(i) Write a program to solve the Josephus problem for general values of M and N . (10)

(ii) What is the running time of your program? (4)

23. a) (i) Write short notes on implementation of Stacks. (7)

(ii) Write a program to convert a infix expression to postfix expression. (7)

(OR)

b) Explain the array implementation of Queues and write the applications of Queues.

24. a) (i) Show the result of inserting 3,1,4,6,9,2,5,7 into an initially empty binary search tree. (5)

(ii) Show the result of deleting the root. (3)

(iii) Show the result of inserting 2, 1,4,5,9,3,6,7 into an initially empty AVL tree. (6)

(OR)

b) Show the result of inserting 10,12,1,14,6,5,8,15,3,9,7,4,11,13,and 2, one at a time, into an initially empty binary heap.

25. a) (i) Sort the sequence 3, 1, 4,1,5,9,2,6,5 using insertion sort. (7)

(ii) Show how heap sort processes the input 42,54,23,65,45,79,57,34,11,24,81,10. (7)

(OR)

b) (i) Sort 3, 1,4,1,5,9,2,6 using merge sort. (6)

(ii) Sort 3,1,4,1,5,9,6,2,5,3,5 using quick sort. (8)
