Registration No.:_____ _____ 22231CSE11712

Paper Code: A

Course Code:CSE205
Course Title: DATA STRUCTURES AND ALGORITHMS

Time Allowed: 03:00hrs. **Max Marks: 70**

Read the following instructions carefully before attempting the question paper.
1. Match the Paper Code shaded on the OMR Sheet with the Paper code mentioned on the question paper and ensure that both are the same.
2. This question paper is divided into two parts A and B.
3. Part A contains 30 questions of 1 mark each. 0.25 marks will be deducted for each wrong answer.
4. Part B contains 5 questions of 10 marks each. Attempt any 4 questions out of these 5 questions. In case all the 5 questions are attempted then only the first four attempted questions will be evaluated.
5. Attempt all the questions in serial order.
6. Do not write or mark anything on the question paper except your registration no. on the designated space.
7. After completion of first 90 minutes, the OMR sheet will be taken by the invigilator.
8. Submit the question paper and the rough sheet(s) along with the answer sheet to the invigilator before leaving the examination hall.

Part-A

Q1)

1) Perform the memory address of fifth element of an array can be calculated by the formula :
(a) LOC(Array[5]=Base(Array)+w(5-lower bound), where w is the number of words per memory cell for the array
(b) LOC(Array[5]=Base(Array)+(5-lower bound), where w is the number of words per memory cell for the array
(c) LOC(Array[5]=Base(Array)+w(5+lower bound), where w is the number of words per memory cell for the array
(d) None of the above

CO1,L2

2) Predict the output of the given code?

```
int main() {
    int a[] = {1, 2, 3, 4, 5};
    int sum=0;
    for(int i = 0; i < 5; i++) {
        if(a[i]%2 == 0) {
            sum += a[i];
        } }
    cout << sum << endl; }
```

(a) 5 (b) 9 (c) 6 (d) 15

CO1,L2

3) The complexity of

```
for(int i = 0; i < n; i++)
 {
for(int j = 1; j < n; j *= 2)
 { //do constant time stuff
} }
```

(a) O(log n) (b) O(n^2) (c) O(n log n) (d) O(n)

CO1,L2

4) Identify the best case time complexity of selection sort?
(a) O(n log n) (b) O(n^2) (c) O(1) (d) O(n)

CO1,L2

5) Identify the slowest sorting technique among the following?
(a) Merge Sort (b) Quick Sort (c) Bubble Sort (d) Selection Sort

CO1,L2

6) What are the time complexities of finding 5th element from beginning and 5th element from end in a singly linked list? Let n be the number of nodes in linked list, you may assume that n > 5.
A) O(1) and O(n) (B) O(1) and O(1) (C) O(n) and O(1) (D) O(n) and O(n)
(a) A (b) B (c) C (d) D

CO1,L2

7) Linked list data structure offers considerable saving in _____
(a) Computational Time (b) Space Utilization
(c) Space Utilization and Computational Time (d) Speed Utilization

CO2,L4

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8) The situation when in a linked list START=NULL is
(a) underflow (b) overflow (c) housefull (d) saturated
CO2,L4

9) A linear collection of data elements where the linear node is given by means of pointer is called?
(a) Linked list (b) Node list (c) Primitive list (d) None
CO2,L4

10) Which of the following operations is performed more efficiently by doubly linked list than by singly linked list?
(a) Deleting a node whose location in given
(b) Searching of an unsorted list for a given item
(c) Inverting a node after the node with given location
(d) Traversing a list to process each node

11) Evaluate the following Infix to Postfix Expression:- CO2,L4
(A+B)*(C*D-E)*F/G
(a) AB+CD*E-*F*G/ (b) AB+CD*EF-**G/
(c) AB+CD*E-*F*/G (d) AB+CD*E-F**G/

12) Identify the incorrect statement(s) in the following: CO2,L4
A. Stack is LIFO data structure
B. Stack is FILO data structure
C. Stack is LILO data structure
D. Stack can be implemented by using queues
(a) A (b) B (c) C (d) D

13) Which of the following statement is true? CO1,L2
(A) stack if FIFO list
(B) prefix and postfix form of a infix expression will be the mirror image of each other
(C) prefix form is also known as polish notation
(D) Queue is LIFO list
(a) A (b) B (c) C (d) D

14) The postfix form of the expression (A+ B)*(C*D- E)*F / G is? ,L1
(a) AB+ CD*E – FG /** (b) AB + CD* E – F **G /
(c) AB + CD* E – *F *G / (d) AB + CDE * – * F *G /

15) Identify the data structure which allows deletions at both ends of the list but insertion at only one end. CO2,L4
(a) Input-restricted deque (b) Output-restricted deque
(c) Priority queues (d) None of above

16) Examine which of the following is false about a binary search tree? CO2,L4
(a) The left child is always lesser than its parent
(b) The right child is always greater than its parent
(c) The left and right sub-trees should also be binary search trees
(d) None of the mentioned

17) What will be the second move to transfer 5 disk from peg P to peg R with the help of peg Q in Tower of Hanoi problem. CO4,L3
(A) P->Q
(B) P->R
(C) R->Q
(D) Q->R

(a) A (b) B (c) C (d) D

18) The inorder and preorder traversal of a binary tree are d b e a f c g and a b d e c f g, respectively. The postorder traversal of the binary tree is: CO4,L3
(a) d e b f g c a
(b) e d b g f c a
(c) e d b f g c a
(d) d e f g b c a

(a) A (b) B (c) C (d) D
CO1,L2

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19) Identify the strategy used in the merge sort algorithm
(a) Brute Force (b) Greedy (c) Divide and Conquer (d) Optimal
CO1,L2

20) The no of external nodes in a full binary tree with n internal nodes is?
(a) n (b) n+1 (c) 2n (d) 2n +1
CO4,L3

21) Analyze which of the following set of codes(for any 3 characters) is NOT possible in Huffman coding?
(a) 010, 1,011
(b) 10,0,11
(c) 101,01,10
(d) None of the above

CO2,L4

22) Analyze the AVL and choose the true statements about AVL tree are :
(a) It is a binary search tree
(b) Left node and right node differs in height by at most 1 unit
(c) Worst case time complexity is O(logn)
(d) All of the Above

CO2,L4

23) Analyze AVL trees have LL, LR, RR, RL rotations to balance the tree to maintain the balance factor (LR: Insert node in Right sub tree of Left sub tree of node A, etc). Among rotations the following are single and double rotations:

(A) LL, RL and LR, RR

(B) LL, RR and LR, RL

(C) LR, RR and LL, RL

(D) LR, RL and LR, RL

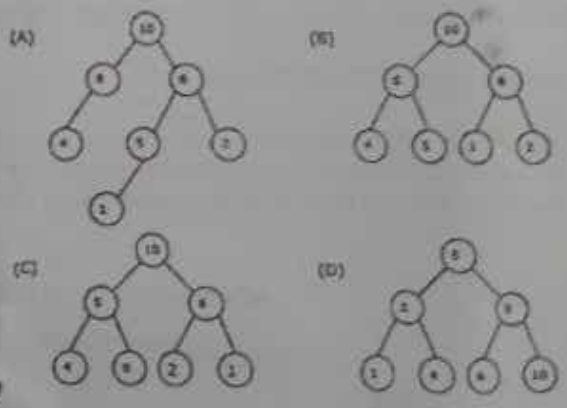
CO2,L4

24) Given a Heap, H = {25, 30, 25, 40, 30, 50, 30, 45}

What will be the array after applying the first Pass of Heap Sort?
(a) 25, 30, 30, 40, 30, 50, 45, 25
(b) 25, 30, 40, 30, 30, 50, 45, 25
(c) 25, 30, 30, 40, 50, 30, 45, 25
(d) 25, 30, 50, 40, 30, 30, 45, 25

CO2,L4

25)



Which of the following is a max-heap?
(a) A
(b) B
(c) C
(d) D

CO2,L4

26) Complete graph of N element will required atleast..... edges.
A) N - 1
B) N*N
C) N*(N-1)/2
D) None of these

CO4,L3

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27) The characters of the string K R P C S N Y T J M are inserted into a hash table of size 10 using hash function

h(x) = ((ord(x) - ord(A) + 1)) mod 10

If linear probing is used to resolve collisions, then the following insertion causes collision
(a) Y (b) C (c) M (d) P CO4,L3

28) Which of the following algorithm uses the Queue data structure?
(a) Depth First Search
(b) Breadth First Search
(c) Warshall's Algorithm
(d) Best First Search

29) A hash table contains 10 buckets and uses linear probing to resolve collisions. The key values are integers and the hash function used is key % 10. If the values 43, 165, 62, 123, 142 are inserted in the table, in what location would the key value 142 be inserted? CO4,L3

(a) 2
(b) 3
(c) 4
(d) 6

30) What is the number of edges present in a complete graph having n vertices? CO4,L3
(a) (n*(n+1))/2
(b) (n*(n-1))/2
(c) n
(d) Information given is insufficient

CO4,L3

Part-B

Q2). Define Single Linked List and Double Linked List? Explain Insertion and Deletion concepts in Single and Double Linked List with examples

CO2,L4, [10 marks]

Q3). Write an algorithm for deletion in a heap tree. create a heap form the following elements : 10 54 98 21 5 11 6 7. perform deletion on it and draw the final heap tree.

CO3,L4, [10 marks]

Q4). Perform binary search to find 47 in the array below
12, 23, 34, 45, 47, 56, 67, 78, 89, 90,100

CO2,L4, [10 marks]

Q5). Illustrate insertion and deletion of nodes in stack and queue with proper diagram and algorithms

CO2,L4, [10 marks]

Q6). i) Write the algorithm of Depth First Search.

ii) If the keys 22, 17, 32, 16, 5, 96 and 72 are inserted in an initially empty hash table of size 10 using the hash function K mod 10 and Double Hashing is used for collision resolution, then Show all the steps to map the keys in hash table and find the average number of probs for successful search.

CO6,L3, [10 marks]

--End of Question paper--