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EN-TERM Examination
Academic Year 2021-22

Subject:-Fundamentals of Data Structures Max Marks:-30

Instructions:

1. Total **30** questions
2. Each question carries **1** mark
3. Figures to right indicates CO, RBT Level and Marks
4. Use of scientific calculator(non programmable) is allowed

CO_4 Understand the computational efficiency of the principal algorithms for searching and sorting and choose the most efficient one for the application

1. There is sequence $\{1, 6, 18, 57....\}$, what would be the recurrence relation to represent this CO_4, L_4 [1]
   (a) $a_n = 3a_{n-1} + 3$ (b) $a_n = 3a_{n-1} + 2$ (c) $a_n = 3a_{n-1} + 1$ (d) $a_n = 3a_{n-1} + 8$
2. There is a recurrence relation $a_n = 2a_{n-1} - 1$, select the proper solution of the recurrence CO_4, L_4 [1]
   (a) $a_n = 2^n - 1$ (b) $a_n = 2^n + 1$ (c) $a_n = 2^{n+1}$ (d) $a_n = 2^n$
3. There is a sorted list on with binary search to be applied, what would be the running time in worst case CO_4, L_2 [1]
   (a) $O(n)$ (b) $O(\log n)$ (c) $n \log n$ (d) $\log n^2$
4. The index sequential search algorithm is applied on n elements, what would be the worst case running time CO_4, L_2 [1]
   (a) $O(n)$ (b) $O(n^2)$ (c) $n \log n$ (d) n^3
5. There is an unsorted list of n elements and Quick Sort algorithm to be applied on it, what would be the best case running time of it CO_4, L_2 [1]
   (a) $O(n)$ (b) $O(n^4)$ (c) $n \log n$ (d) n^2
6. Out of insertion and selection sort which performs better in best case CO_4, L_1 [1]
   (a) selection (b) Insertion (c) Quick sort (d) Shell sort
7. Performance of the counting sort depends on CO_4, L_2 [1]
   (a) Range of the elements (b) First quartile
   (c) First Quantile (d) Deviation of the data

CO_3 Demonstrate use of sequential data structures- Array and Linked lists to store and process data

8. Which of the following operations is not efficiently supported by a singly-linked list? CO_3, L_2 [1]
   (a) accessing the element in the current position
   (b) insertion after the current position
   (c) insertion before the current position
   (d) moving to the position immediately following the current position c

9. Insertion of a node into a doubly linked list requires how many changes to various **Next** and **Prev** pointers? CO_3, L_3 [1]

   (a) no changes (b) 1 Next, 1 Prev (c) 2 Next, 2 Prev (d) 3 Next, 3 Prev

10. What operation is supported in constant time by the doubly linked list, but not by the singly linked list? CO_3, L_3 [1]

    (a) Advance (b) Backup (c) First (d) Retrieve

11. For the linked list implementation of the stack, where are the pushes and pops performed? CO_3, L_2 [1]

    (a) Push in front of the first element, pop the first element

    (b) Push after the last element, pop the last element

    (c) Push after the last element, pop the first element

    (d) Push in front of the first element, pop the last element

12. For the linked list implementation of the queue, where are the enqueue and dequeues performed? CO_3, L_2 [1]

    (a) Enqueue in front of the first element, dequeue the first element

    (b) Enqueue after the last element, dequeue the last element

    (c) Enqueue after the last element, dequeue the first element

    (d) Enqueue in front of the first element, dequeue the last element

13. For the linked list implementation, if the stack is not empty, which of the following statements in a main procedure can be used to access the top element in the stack S? CO_3, L_4 [1]

    (a) S.Element (b) S.TopOfStack

    (c) S.TopOfStack.Element (d) none of the above

14. There is a singly circular linked list, last node points to the first node, unfortunately it points some intermediate node. Your task is to find out the place where it pointed wrongly, with faster and slower pointer. What would be running time of this show in worst case CO_3, L_4 [1]

    (a) $O(n)$ (b) $O(n^2)$ (c) $O(n^3)$ (d) $O(\sqrt(2))$

15. Using the text implementation, if Front and Rear have identical values, what is the size of the queue? CO_3, L_4 [1]

    (a) 0 (b) 1

    (c) 2 (d) The answer can not be determined

CO_2 Discriminate the usage of various structures, Design/Program/Implement the appropriate data structures; use them in implementations of abstract data types and Identity the appropriate data structure in approaching the problem solution

16. The data structure required to evaluate a postfix expression is? CO_6, L_1 [1]

    (a) Stack (b) Queue (c) B-Tree (d) R-Tree

17. The result of evaluating the postfix expression $5, 4, 6, +, *, 4, 9, 3, /, +, *$ (Elements of Expression are separated by ','))is CO_6, L_4 [1]

    (a) 550 (b) 600 (c) 700 (d) 350

18. The result of evaluating the prefix expression $+, *, 5, 3, -, /, 4, 2, /, 8, 4$ (Elements of Expression are separated by ','))is CO_6, L_4 [1]

    (a) 16 (b) 17 (c) 19 (d) 15

19. There is list of operators $L = \{=, *, +, -\}$ to be placed on stack with operator precedence(Higher precedence on top of the stack), there is a *cost*() function which returns the cost. The cost of single push operation, Rs.1/- and single pop operation cures cost Rs. -1/- what is the amount a cost function will return CO_6, L_4 [1]

    (a) 6 (b) 5 (c) 3 (d) 4

20. The minimum number of comparisons required to find the minimum and the maximum of 100 numbers is CO_6, L_4 [1]

(a) 145 (b) 164 (c) 146 (d) 147

21. The minimum number of arithmetic operations required to evaluate the polynomial $P(X) = X^5 + 4X^3 + 6X + 5$ for a given value of X using only one temporary variable CO_6, L_4 [1]

(a) 6 (b) 7 (c) 8 (d) 9

22. Queue is the data structure most suitable for CO_6, L_2 [1]

(a) BFS (b) DFS (c) RFS (d) R-TREE

23. In a circular queue both front and rear points to same element, what would be number of elements present into queue CO_6, L_2 [1]

(a) 1 (b) 2 (c) n (d) k

24. There are operators to be pushed on stack with their priorities, Single push cost 1 rupees and single pop causes -1 rupees. What would be the final cost returned by cost function for operations $\{/, ==, +, *, -\}$

(a) 2 (b) 4 (c) 6 (d) 1

25. What value does function lunar return when called with a value of 4? CO_6, L_2 [1]
int mystery (int number)

if (number ¡= 1)
return 1;
else
return number * mystery(number – 1);

(a) 0 (b) 1 (c) 4 (d) 24

26. Recursion is memory-intensive becauseCO_6, L_2 [1]

(a) Recursive functions tend to declare many local variables

(b) Previous function calls are still open when the function calls itself and the activation records of these previous calls still occupy space on the call stack

(c) Many copies of the function code are created

(d) It requires large data values

27. Linear search is highly inefficient compared to binary search when dealing withCO_6, L_2 [1]

(a) Small, unsorted arrays (b) Small, sorted arrays

(c) Large, unsorted arrays (d) Large, sorted arrays

28. An algorithm that requires——operations to complete its task on n data elements is said to have a linear runtime CO_6, L_2 [1]

(a) $n^3 + 9$ (b) $3n^2 + 2n + 2$ (c) $3n + 4$ (d) 100

29. On a stack few operators to be pushed by preserving operator precedence, the list of operators is $\{+, *, /, =\}$, cost of one push is 2 and one pop is -1 what would be the final cost returned by the function CO_6, L_2 [1]

(a) 8 (b) -4 (c) 4 (d) 12

30. On a stack few operators to be pushed by preserving operator precedence, the list of operators is $\{+, *, /, =\}$, cost of one push is 2 and one pop is -2 what would be the final cost returned by the function CO_6, L_2 [1]

(a) 4 (b) 8 (c) 16 (d) 24