Zagazig University

Faculty of Science

Department of Mathematics

Year/Specialization: 3rd / (Math. Phy. Chem.)&Comp.	Examination Date: 29/8/ 2019
Examination Time: 2 hours	Number of Questions: 2
Course Title: Algorithms Design & Analysis	Number of Pages: 4
Course Code: M. 361	Number of Points: 60 Points

Answer the following questions

Question 1: Choose the Correct answer: [30points(One Point)]

1. The Time Complexity of the Binary Search Algorithm is ..... .
   a. $O(n^3)$ b. $O(n^2)$ c. **O(log n)** d. O(log(n-1)
2. ..... has an advantage of being easily converted into any programming language.
   a. Pseudo code b. Flowchart c. Program d. None of these
3. The complexity of Towers of Hanoi Problem through recursion is ..... .
   a. $O(n^2)$ b. $O(2^n)$ c. O(log n) d. $O(K^n)$
4. Algorithm must be..... .
   a. Programming language dependent b. Programming language independent
   c. Either of the above d. None of the above
5. If F(n)= 3×n+7, then f(n) is .....
   a. $\Omega(n)$ b. $\Omega(\log n)$ c. $\Omega(1)$ d. All of the above
6. The number of terms (n)of the sequence: **245, 735, ..., 59535** is..... .
   a. 7 b. 5 c. 6 d. 4
7. Which of the following methods can be used to solve a linear recursive equation?
   a. Substitution b. Genetic Algorithms c. greedy algorithm d. Both a,c
8. Which of the complexity of the algorithm having recursive equation T(n) = T(n-1)+1?
   a. O(n) b. $O(n^3)$ c. $O(n^2)$ d. None of the above
9. ..... is one in which the difference between any two terms is constant.
   a. Logarithmic b. Arithmetic progression
   c. Geometric Progression d. None of the above
10. If **f (n) =O(g(n))** and **f (n) = Ω (g(n))**, then f(n) =..... .
    a. $\Omega(g(n))$ b. $\Theta(g(n))$ c. $\omega(g(n))$ d. $O(g(n))$
11. If F(n)= 3×n+7, then f(n) is .....
    a. $\Omega(n)$ b. $\Omega(n^2)$ c. $\Omega(n^3)$ d. All of the above

12. Which of the following is used in the dynamic implementation of a queue?
    a. Stack b. Array c. Linked List d. None of the above
13. Which of the following find the minimum value in the given array and swaps it with the current position?
    a. Selection b. Bubble c. Insertion d. None of the above
14. If **f(n) = 3×log n + 7n + 3**, then **f(n)** is.....
    a. O(n) b. O(log n) c. O(1) d. All of the above
15. Which of the following is necessary to prevent stack overflow in recursion?
    a. An initial condition b. Range of variables
    c. A recursion relation d. None of the above
16. The *n* th term (T_n) of the AP sequence is .....
    a. $T_n = a + (2n) \times d$ b. $T_n = a + (2n-1) \times d$ c. $T_n = a \times r^{n-1}$ d. $T_n = a + (n-1) \times d$
17. In....., we assume the negation of the given argument to be true and then prove that our supposition was incorrect.
    a. Contradiction b. Conduction c. Induction d. Radiation
18. Which of the following is a general error while implementing recursion?
    a. Stack overflow b. Underflow-overflow
    c. Queue underflow d. None of the above
19. The complexity of factorial of a number through recursion is ..... .
    a. $O(n^2)$ b. O(n) c. O(log n) d. None of the above
20. Which of the following sort methods use the divide and conquer strategy?
    a. Selection b. Merge c. Insertion d. None of the above
21. Which of the following requires assuming the kth instance of the equation to be correct and proving the **(k + 1)**th instance to be correct?
    a. Convection b. Conduction c. Induction d. Radiation
22. In which of the following search only work if the array is already sorted?
    a. Linear search b. Binary search c. Interpolation search d. Both b,c
23. In Linked list, in order to delete a node from the end, first of all we traverse till the last but one node by the code..... .
    a. while (PTR-> LINK != NULL); b. int backup = FIRST-> DATA;
    c. int backup = (PTR-> LINK)-> DATA; d. while ((PTR-> LINK)-> LINK != NULL),
24. Which of the following can be used to solve the Tower of Hanoi problem?
    a. Divide and Conquer b. Procedural c. Recursion d. None of the above
25. Linear search algorithm will find the location "index" of key . Set index = ..., if the search is unsuccessful.
    a. 0 b. 1 c. -1 d. None of the above

26. _____ sort is a divide-and-conquer algorithm based on the idea of breaking down a list into several sub-lists.
a. Selection b. Merge c. Insertion d. None of the above

27. Which of the following can be a criteria (or criterion) for judging the efficiency of a sorting algorithm?
a. Number of swaps b. Stability c. Number of comparisons d. All of the above

28. Which of the following is a linear data structure?
a. Stack b. Tree c. Graph d. All of the above

29. Which of the following follows the principle of First In First Out (FIFO)?
a. Stack b. Queue c. Tree d. Graph

30. In _____ search the middle calculated in a weighted manner w.r.t. to the value of key relative to max and min values in the list.
a. Linear b. Binary c. Interpolation d. Both b,c

Question 2: True or False: [30 points(One Point)]

1. A linked list does not allow direct access to the individual elements.
2. Queue is internally used by compiler when we implement (or execute) any recursive function
3. In select sort algorithm, the smallest value in the collection is selected and move it to the front.
4. Linear search is even more efficient than binary search.
5. More memory is required to store elements in a linked list as compared to an array
6. In priority queue, if two elements have the same priority, they are served according to their order in the queue.
7. In linear search , the index = 0 if the search is unsuccessful.
8. In quick sort algorithm, is a sorting technique in which each pair of adjacent elements are compared
9. In linked list, the list is traversed till the LINK of the present node becomes NULL
10. The complexity of the algorithm to find the integer powers of a number x is O(n).
11. The Theta notation is used when the lower bound of a polynomial is to be found.
12. Access time for an individual element in an array is O(n).
13. An algorithm can have zero inputs but it must have at least one output.
14. A $\Theta(k^n)$ algorithm is better than $\Theta(n^k)$.
15. Substitution, Generating functions, [redacted] Tree method are some of the methods to find the [redacted] equation.
16. The complexity of conventional matrix multiplication is $O(n^3)$.
17. A Geometric Progression (GP) is one in which the ratio of any two terms is constant.
18. The tree method can also be used to solve the recursive algorithm having recursive equation.
19. In priority queue, an element with low priority is dequeued, before an element with high priority.
20. Internet Web browsers store the addresses of recently visited sites on a stack.
21. The average time complexity of the binary search algorithm is $O(\log_2 n)$.
22. Recursion uses the principle of last in first out and hence requires a queue.
23. The average time Complexity of the Quick Sort Algorithm is O(n log n)
24. The stack overflow condition occurs if **(TOP != -1)**
25. The complexity of insertion at the end in a linked list is O(n).
26. Mathematical Induction has three steps: verification, assumption, and induction.
27. Queue is also used to evaluate a mathematical expressi
28. The idea of the quick sort is to identify the smallest value in the collection and move it to the front.
29. Binary search means looking at each element of the array, in turn, until you find the target value.
30. The best time complexity of the linear search algorithm is O(n)

With my best wishes
DR / Hagar Ramadan