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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING MID TERM EXAMINATION - MAY 2023

Semester : Semester III - 2021

Course Code : CSE2007

Course Name : Sem III - CSE2007 - Design and Analysis of Algorithms

Program : B.Tech. Computer Science and Engineering

Date : 18-MAY-2023

Time : 2.00 PM - 3.30 PM

Max Marks : 50

Weightage : 25%

Instructions:

- (i) Read all questions carefully and answer accordingly.
 - (ii) Question paper consists of 3 parts.
 - (iii) Scientific and non-programmable calculator are permitted.
 - (iv) Do not write any information on the question paper other than Roll Number.
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PART A

ANSWER ALL THE TEN QUESTIONS

10 X 1=10M

1. The running time of an algorithm means
 - a) No. of Primitive Operations(Steps) executed in a machine- independent manner (CO1) [Knowledge]
 - b) Time taken on a Standard Computer to execute the program
 - c) Time taken by the algorithm on a particular input size.
 - d) None of these
2. What is the worst case time complexity of merge sort?
 - a) $O(n \log n)$ (CO1) [Knowledge]
 - b) $O(n^2)$
 - c) $O(n^2 \log n)$
 - d) $O(n \log n^2)$
3. **Binary Search can be categorized into which of the following?**
 - a) Brute Force technique (CO2) [Knowledge]
 - b) Divide and conquer
 - c) Greedy algorithm
 - d) Dynamic programming

4. Best case Time Complexity is also known as ---?
a) Big O (CO1) [Knowledge]
b) Omega
c) theta
d) None of the these
5. The best-case time complexity of Quicksort is ?
a) $O(n \log n)$ (CO2) [Knowledge]
b) $O(\log n)$
c) $O(n^2)$
d) $O(n)$
6. A _____ is a special Tree-based data structure in which the tree is a complete binary tree.?
a) Graph (CO2) [Knowledge]
b) Heap
c) List
d) stack
7. What is the difference between a flowchart and a pseudocode?
a) A flowchart is a diagram while the pseudocode is written in a programming language (e.g. Pascal or Java) (CO1) [Knowledge]
b) A flowchart is textual but the pseudocode is a diagram
c) A flowchart is a schematic description of an algorithm, while pseudocode is a textual description of an algorithm.
d) A flowchart and a pseudocode are the same
8. What is the Worst Case time complexity of the binary search algorithm?
a) $O(n)$ (CO2) [Knowledge]
b) $O(1)$
c) $O(\log n)$
d) $O(n^2)$
9. Heap is a -----?
a) Tree structure (CO2) [Knowledge]
b) Complete Binary Tree
c) Binary Tree
d) None of the Above
10. what is the worst case time complexity of Linear Search?
a) $O(n)$ (CO2) [Knowledge]
b) $O(1)$
c) $O(\log n)$
d) none of the above

PART B**ANSWER ALL THE FOUR QUESTIONS****4 X 5 = 20M**

11. Design an algorithm for performing quick sort, Apply the same to sort the following set of numbers?
50,30,10,90,80,20,40,70
(Hint : Take First element has Pivot Element.)
- (CO2) [Comprehension]
12. write the pseudo code of Binary Search? Explain the same thing with Example
- (CO2) [Comprehension]
13. What is Asymptotic Notation and Explain Types of Asymptotic Notations?
- (CO1) [Comprehension]
14. write the pseudo code of Merge Sort? Explain the same thing with Example
- (CO1) [Comprehension]

PART C

ANSWER ALL THE TWO QUESTIONS

2 X 10 = 20M

15. Apply Strassen's multiplication to multiply the following matrix. show the details of the computation
 $A = \begin{bmatrix} 4 & 5 \\ 1 & 3 \end{bmatrix}$ $B = \begin{bmatrix} 0 & 2 \\ 1 & 3 \end{bmatrix}$
- (CO2) [Application]
16. Design an algorithm for performing heap sort, Apply the same to sort the following set of numbers?
98 , 87 , 78 , 46 , 54, 9, 25, 63 , 102
- (CO2) [Application]