

Seat No. : _____

AR-120

April-2022

M.Sc. (CA & IT), Sem.-VIII

Design and Analysis of Algorithm

Time : 2 Hours]

[Max. Marks : 50

- Instructions :**
- (1) All Questions in Section-I carry equal marks.
 - (2) Attempt any **three** questions in Section-I.
 - (3) Question **6** in Section-II is Compulsory.

Section – I

1. Answer the following : (14)
 - (A) What is the Branch and Bound approach ? Explain with suitable example. (7)
 - (B) Explain the priori and posteriori approach. And also define space complexity and time complexity. (7)

2. Answer the following : (14)
 - (A) Following recurrence equation is solve by using the master theorem and substitution method. $T(n) = 2T(n/8) + n^2$ (7)
 - (B) Consider the following data to create a binary search tree. (7)
12,5,15,3,10,13,17,4,7,11,14,6,8

3. Answer the following : (14)
 - (A) Consider the chain of matrices A1, A2, A3, A4 with the dimensions given below. (7)

Matrix	Dimensions
A1	7*1
A2	1*5
A3	5*4
A4	4*2
 - (B) Consider the following data for longest common subsequence and find out the appropriate longest sequence. (7)
A[i] : ABCAB
B[i] : ABC

4. Answer the following : (14)
- (A) Perform the fixed size and variable size Huffman coding for the following message. (7)
 Message : “aabbabcccaabbdddaacceeecdd”
- (B) What is the Greedy approach ? Explain with suitable example. (7)
5. Answer the following : (14)
- (A) Prove that TSP is NP Complete problem. (7)
- (B) Consider the pattern and text to apply the Rabin Karp string matching algorithm.
 Text: 123452457979927490412 (7)
 Pattern: 99

Section – II

6. Attempt any **eight** questions. (8)
- (A) On which string-matching algorithm an applied a Brute force approach ? (1)
- (A) Both
 (B) Rabin-Karp Algorithm
 (C) Naive Bayes Algorithm
 (D) None
- (B) Which option is True for NP-Class ? (1)
- (A) The class NP consists of those problems that are verifiable in polynomial time.
 (B) The class NP consists of those problems that are not verifiable in polynomial time, but they can be solvable in a polynomial time.
 (C) The class NP consists of those problems that are not verifiable and not solvable in polynomial time.
 (D) The class NP consists of those problems that are both verifiable and solvable in polynomial time
- (C) What is the time complexit in average case for quick sort algorithm ? (1)
- (A) $n \log_2 n$
 (B) n^2
 (C) N
 (D) $\log_2 n$
- (D) _____ is a tree pruning techniques for used to solve optimization problem. (1)
- (A) Backtracking
 (B) Branch and Bound
 (C) Greedy Method
 (D) Dynamic Programming

- (E) Hamilton cycle problem of _____ . (1)
- (A) Np-Complete
 - (B) NP-Hard
 - (C) P Class
 - (D) NP Class
- (F) What is the time complexity of activity selection problem where activity is already sorted ? (1)
- (A) $O(n)$
 - (B) $O(n \log n)$
 - (C) $O(n) + O(n \log n)$
 - (D) $O(n^2)$
- (G) Which of the following is false about a binary search tree ? (1)
- (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) In order sequence gives decreasing order of elements
- (H) How many steps are required to prove that a decision problem is NP complete ? (1)
- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4
- (I) Select the correct recurrence relation for Tower of Hanoi ? (1)
- (A) $T(n) = 2T(n-1) + 1$
 - (B) $T(n) = 2T(n/1) + 1$
 - (C) $T(n) = 2T(n+1) + 1$
 - (D) $T(n) = 2T(n-1) + n$
- (J) Following option which one is not a NP Class problem ? (1)
- (A) Hamilton Cycle
 - (B) Vertex cover problem
 - (C) Travelling salesman problem
 - (D) Matrix chain multiplication
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