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COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY
MCA DEGREE THIRD SEMESTER RE-EXAMINATION, APRIL 2021
19-381-0301 DESIGN AND ANALYSIS OF ALGORITHM
(MCA-2019 ADMISSION)

Time: 3 Hours**Maximum Marks :50**

Answer any five.
Each question carries 10 Marks

1. (a) Describe the characteristics of an algorithm with suitable example. (3 Marks)
- (b) Explain how do you analyze an algorithm. (3 Marks)
- (c) Analyse the time complexity of the following Pseudo code: (4 Marks)

```
foo(n)
{
    int i=1, s=1;
    while(s<=n)
    {
        i++;
        s=s+i;
        printf("hello");
    }
}
```

2. (a) Define maximum subarray problem? Illustrate maximum sub array problem using divide and conquer strategy. (4 Marks)
- (b) Using heapsort algorithm sort the following list of numbers: (6 Marks)
5,13,2,25,7,17,20,8,4
Illustrate the working with diagrams.
3. (a) Explain Strassen's algorithm for matrix multiplication with the help of an example. (4 Marks)
- (b) Construct a B-tree of minimum degree 3 by inserting the elements in given order. (6 Marks)
16, 27, 26, 21, 10, 22, 38, 43, 54, 4, 5, 46

4. (a) Discuss any one of the amortized analysis method with an example. (4 Marks)
- (b) A file contains the following characters with the frequencies as shown. If Huffman Coding is used for data compression, determine Huffman Code for each character. (6 Marks)
- A(20), B(4), C(3), D(15), E(25), F(6), G(16)
5. (a) List the stages and states of dynamic programming (4 Marks)
- (b) Find the optimal solution for the given fractional knapsack problem using greedy approach. Number of objects $n=5$, $w = 60$ kg (6 Marks)
- $(w_1, w_2, w_3, w_4, w_5) = (5, 10, 15, 22, 25)$
 $(b_1, b_2, b_3, b_4, b_5) = (30, 40, 45, 77, 90)$
6. (a) What do you mean by backtracking algorithm and how is it different from branch and bound technique? (3 Marks)
- (b) Solve the following sum of subsets problem using backtracking and draw a portion of state space tree (7 Marks)
- $M = 35$, $W = (5, 7, 10, 12, 15, 18, 20)$.
7. (a) Define NP, NP Complete and NP Hard problem. (3 Marks)
- (b) What are the steps to show that a given problem is in NP-Complete? (3 marks)
- (c) Distinguish between deterministic and non-deterministic algorithm with an example. (4 Marks)
