

# C.U.SHAH UNIVERSITY

## Summer Examination-2018

**Subject Name :** Design and Analysis of Algorithms

**Subject Code :** 4TE05DAA1

**Branch:** B.Tech (CE,IT)

**Semester :** 5

**Date :** 27/03/2018

**Time :** 10:30 To 01:30

**Marks :** 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  - (2) Instructions written on main answer book are strictly to be obeyed.
  - (3) Draw neat diagrams and figures (if necessary) at right places.
  - (4) Assume suitable data if needed.
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**Q-1**

**Attempt the following questions:**

- a) What is the difference between recursion and iteration? (01)
- b) What is principle of optimality? (01)
- c) What is empirical analysis of algorithm? (01)
- d) What is valid hit? (01)
- e) What is optimization problem? (01)
- f) What is optimal substructure? (01)
- g) Prepare the list of suffix for given string S="abcd". (01)
- h) What do you mean by spanning tree? (01)
- i) What is longest common subsequence? (01)
- j) What do you mean by time complexity of algorithm? (01)
- k) Which condition needs to be fulfilled for binary search? (01)
- l) What do you mean by average case complexity of algorithm? (01)
- m) Define the term potential function. (01)
- n) Write the complexity of insertion sort and binary search. (01)

**Attempt any four questions from Q-2 to Q-8**

**Q-2**

**Attempt all questions**

- (a) Answer the following questions (07)
  - (1) What is algorithm? Explain its properties.
  - (2) What is Asymptotic notation? Explain upper bound notation, lower bound notation and tight bound notation.
- (b) Solve following recurrences. (07)
  - (1)  $T(n) = 2 T(n/2) + n$
  - (2)  $T(n) = 3 T(n/3) + n^2$

**Q-3**

**Attempt all questions**

- (a) Which algorithm designing strategy is more suitable for solving fractional knapsack problem? Justify it with suitable example. (07)
- (b) Write the algorithm of linear search. Apply linear search algorithm on given data set  $A=\{6,25,24,92,63,56,99\}$  to search a key = 63. (07)



- Q-4** **Attempt all questions**
- (a) Answer the following questions (06)  
 (1) Compare Dynamic programming strategy and Divide and Conquer strategy.  
 (2) Derive Binomial coefficient for given situation  $C(5,4)$  using Dynamic programming strategy
- (b) Analyze Activity Selection Problem. Find the optimal set of activity for given set of data (08)
- | Activity [I] | 1 | 2  | 3 | 4  | 5 | 6  | 7 | 8  | 9 | 10 | 11 |
|--------------|---|----|---|----|---|----|---|----|---|----|----|
| Start time   | 5 | 6  | 3 | 8  | 5 | 8  | 0 | 2  | 3 | 12 | 1  |
| End time     | 9 | 10 | 8 | 11 | 7 | 12 | 6 | 13 | 5 | 14 | 4  |
- Q-5** **Attempt all questions**
- (a) Find Longest Common Subsequence of given two strings using Dynamic programming strategy.  $S_1 = zxcvcvbev$   $S_2 = zxcxvbn$  (07)
- (b) Explain P type and NP type of problems. (07)
- Q-6** **Attempt all questions**
- (a) Explain Prim's Algorithm with suitable example. (07)
- (b) What is relation? Explain types of relation with example. (07)
- Q-7** **Attempt all questions**
- (a) Solve Matrix Chain multiplication problem for given set of data and obtained optimal sequence of multiplication of matrices. Here  $A_1 (5 \times 4)$ ,  $A_2 (4 \times 6)$ ,  $A_3 (6 \times 2)$ , and  $A_4 (2 \times 7)$ . (08)
- (b) Explain Naive String matching algorithm. Find pattern string from text string using Naive String matching Algorithm. Here Text string (T) = abcaabccabca, and Pattern string (P) = abc (06)
- Q-8** **Attempt all questions**
- (a) Explain Backtracking. Solve 5-queen problem using backtracking. (07)
- (b) Analyze Merge sort. Write its algorithm and derive its complexity. (07)

