

B.Tech. VI Semester (Main&Back) Examination, April/May - 2017
Computer Sc. & Engg.
6CS2A Design and Analysis of Algorithms
CS, IT

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Time : 3 Hours**Maximum Marks : 80****Min. Passing Marks : 26****Instructions to Candidates:**

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.

Unit - I

1. a) Explain and write an algorithm for greedy method of algorithm design. Given 10 activities along with their start and finish time as **(8)**

$$S = \{A_1, A_2, A_3, A_4, A_5, A_6, A_7, A_8, A_9, A_{10}\}$$

$$S_i = \{1, 2, 3, 4, 7, 8, 9, 9, 11, 12\}$$

$$F_i = \{3, 5, 4, 7, 10, 9, 11, 13, 12, 14\}$$

Compute a schedule where the largest number of activities take place.

- b) i) Solve the recurrence **(4×2)**
 $T(n) = T(n-1) + T(n-2) + 1$, when $T=0$
 $T(1) = 1$
 ii) if $f(n) = 100 \cdot 2^n + n^3 + n$ show that $f(n) = O(2^n)$

OR

1. a) Determine the best case complexity of Merge sort algorithm. **(4)**
 b) Consider the following function **(4)**

```
int Sequential Search (int A[], int & x, int n)
```

```
{
```

```
    Int i;
```

```
    For (int i = 0, i < n & & a[i] != x; i++)
```

```
    If (i == n) return i;
```

```
}
```

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Determine the average and worst case complexity of the function Sequential Search.

- c) Show all the steps of Strassen's matrix multiplication algorithm to multiply the following matrices. rtuonline.com (8)

$$X = \begin{bmatrix} 3 & 2 \\ 4 & 8 \end{bmatrix} \text{ and } Y = \begin{bmatrix} 1 & 5 \\ 9 & 6 \end{bmatrix}$$

Unit - II

2. a) Discuss Knapsack problem with respect to dynamic programming approach. Find optimal solution for given problem, $w(\text{weight set}) = \{5, 10, 15, 20\}$ and size of knapsack is 8. (8)
- b) Discuss Dynamic programming solution to Longest common subsequence problem. Write an algorithm to compute an LCS of two given strings. (8)

OR

2. a) Write an algorithm for solving n-queen problem. Trace it for $N=6$ using backtracking approach. (8)
- b) Describe Travelling salesman problem. Show that a TSp can be solved using backtracking method in the exponential time. (8)

Unit - III

3. a) Explain and write Knuth Morris Pratt algorithm for pattern matching and also comment on its running time. rtuonline.com (8)
- b) Let $P = \text{rrllrrll}$ be a pattern and $T = \text{lrrrlrrlllrrrlrrllrlrrllrrlr}$ be a text in a string matching problem : (8)
- i) How many shifts (both valid and invalid) will be made by the Naïve string matching algorithm?
 - ii) Provide the algorithm to compute the transition function for a string matching automation.
 - iii) Find out the state transition diagram for the automation to accept the pattern P given above.

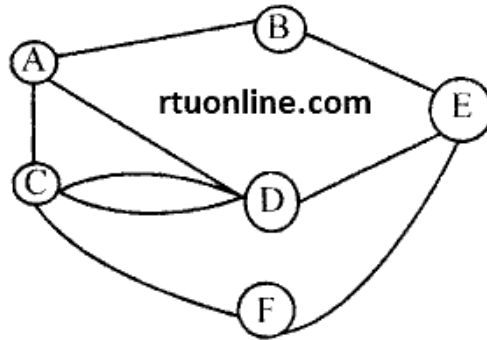
OR

3. a) Discuss Boyer moore pattern matching algorithm with appropriate example of good prefix and bad character. (8)
- b) State the assignment problem and solve the following assignment problem using branch and bound for which cost matrix is given below. (8)

$$\begin{array}{ccc} & 4 & 7 & 5 \\ \text{Cost} = & 2 & 6 & 1 \\ & 3 & 9 & 8 \end{array}$$

Unit - IV

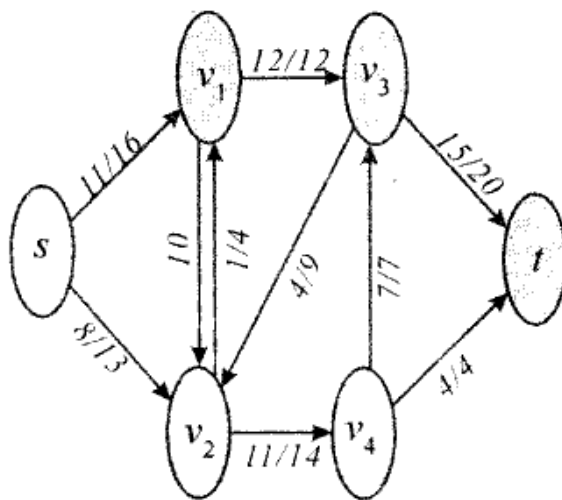
4. a) Give randomized algorithm for min cut of the following graph. (8)



- b) Write and explain ford Fulkerson algorithm (8)

OR

4.



- Find Maximum flow in above network. (5)
- Find the corresponding minimum cut and check that its capacity is same as that value of maximum flow found in a) part. (5)
- Compare Las vegas and Monte carlo algorithm approaches. (6)

Unit - V

5. a) Prove that circuit satisfiability problem belongs to the class NP. (8)
- b) Assuming 3 CNF satisfiability problem to be NP-complete, prove clique problem is also NP-complete. (8)

OR

5. a) Explain approximation algorithm for vertex cover. (8)
- b) Write short note on : (8)

NP-completeness

• Cook's theorem and its application

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