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6E6022

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

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 $f(n) = 100*2^n + n^3 + n$ 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 ;
}
```

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. **(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(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. **(8)**

b) Let P = rrllrrll be a pattern and T = lrrrlrrlllrrrlrrlrrllrlrrlrrlr 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

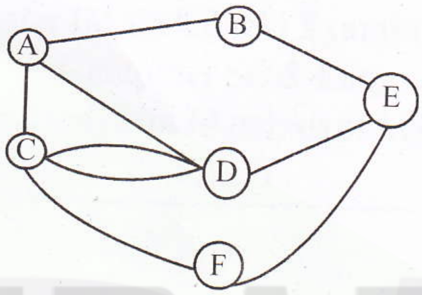
3. a) Discuss Boyer moore pattern matching algorithm with appropriate example of good prefix and bad character. **(8)**

b) State the assignment problem and solve the following assignment problem using branch and bound for which cost matrix is given below. **(8)**

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

Unit - IV

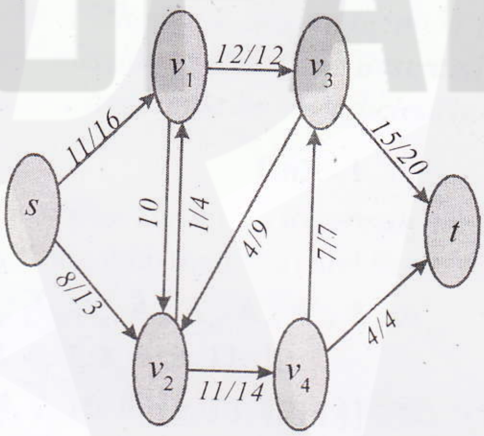
4. a) Give randomized algorithm for min cut of the following graph. **(8)**



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

OR

4.



a) Find Maximum flow in above network. **(5)**

b) Find the corresponding minimum cut and check that its capacity is same as that value of maximum flow found in a) part. **(5)**

c) 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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