6E3202

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6E3202

B. Tech.VI Sem. (Main & Back) Exam. May/June 2013

Computer Engg.

6CS2 Design and Analysis of Algorithms

Common to CS & IT

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

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 suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1._____ 2._____

UNIT – I

Q.1. (a) Express the following function using asymptotic notations:

(i) $6 * 2^n + n^2$

(ii) $\frac{1}{2} n (n-1)$ [4x2=8]

(b) Apply Stassen's algorithm to compute, using 2x2 matrices, existing the recursion when n = 2

$$\begin{bmatrix} 1 & 0 & 2 & 1 \\ 4 & 1 & 1 & 0 \\ 0 & 1 & 3 & 0 \\ 5 & 0 & 2 & 1 \end{bmatrix} * \begin{bmatrix} 0 & 1 & 0 & 1 \\ 2 & 1 & 0 & 4 \\ 2 & 0 & 1 & 1 \\ 1 & 3 & 5 & 0 \end{bmatrix}$$ [8]

OR

Q.1. (a) Determine the frequency counts for all statements in the following two algorithm segments: [4x2=8]

(i)
```
for i = 1 to n do
  for j = 1 to i do
   for k = 1 to j do
      x = x+1
```

(ii)
```
i = 1
while (i ≤ n) do
{
   x = x+1 ;
   i = i+1 ;
}
```

(b) Find optimal solution to the knapsack (0.1) instance n = 7, m = 15.
$(p_1\ p_2 \ldots\ p_7) = (10, 5, 15, 7, 6, 18, 3)$ and $(w_1\ w_2 \ldots .w_7) = (2, 3, 5, 7, 1, 4, 1)$ [8]

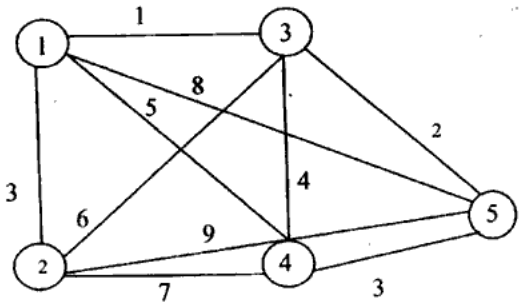
UNIT – II

Q.2. When and how dynamic programming approach is applicable? Discuss matrix chain multiplication with reference to dynamic programming technique and also write a subroutine for matrix chain multiplication and apply it on the following array [16]

30	1	40	10	25

OR

Q.2. (a) Solve the travelling Salesman problem (TSP) for the following graph by using the branch and bound algorithm, the tour must be start from vertex 1 and generate only tour in which 2 is visited before 3. [8]



(b) Let S = { 4, 6, 7, 8} and m = 18 . Find all possible subsets of s that sum to m. Draw the state space tree that is generated [8]

UNIT – III

Q.3. Write the KMP string matching algorithm and also find the prefix function for the following pattern: a b a b b a b a a and implement the algorithm for one step. [16]

OR

Q.3. (a) Using Robin Karp algorithm to solve the feet T = 2359023141526739921 and P = 31415 and modulo q = 13, m = 5 [8]

(b) Solve the assignment problem using Hungarian algorithm for which the following cost matrix [8]

$$\begin{bmatrix} 15 & 5 & 9 & 7 \\ 2 & 13 & 6 & 5 \\ 7 & 8 & 3 & 11 \\ 2 & 4 & 6 & 10 \end{bmatrix}$$

UNIT – IV

Q.4. (a) Explain multi commodity flow problem with some suitable example. [8]

(b) What is flow shop scheduling problem? Schedule two Jobs on 4 machines using flow shop scheduling technique. The time required by each operation of these Jobs is given by following matrix

$$J = \begin{bmatrix} 3 & 0 \\ 0 & 3 \\ 4 & 2 \\ 5 & 2 \end{bmatrix}$$ [8]

OR

Q.4. (a) Explain the concept of randomized algorithm? And give advantages and disadvantages of it? [8]

(b) Explain randomized algorithm for min-cut. [8]

UNIT – V

Q.5. (a) Obtain a nondeterministic algorithm of complexity O(n) to determine whether there is a subset of n number a_i, $1 \le i \le n$, that sum to m [8]

(b) Give approximation algorithm for vertex cover problem. [8]

OR

Q.5. (a) Define the term P, NP, NP–complete. Give suitable examples of each. [8]

(b) What is Cook's theorem? Explain. [8]
