

6E6022

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Total Printed Pages : **4****6E6022****B. Tech. (Sem. VI) (Main & Back) Examination, April-May 2018****Computer Sc. & Engg.****6CS2A Design & Analysis of Algorithms****CS, IT**

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

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. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1/ (a) Solve the recurrence relation for time complexity.

$$T(n) = 2$$

$$\text{If } n = 2$$

$$= 2 T(n/2) + 3 * n$$

$$\text{If } n > 2$$

(b) Derive the recurrence relation for merge sort algorithm's time complexity. Also solve it.

(c) Describe various asymptotic notations.

5+8+3**OR**

1 (a) Explain Strassen's matrix multiplication and derive its complexity also justify how it is better than ordinary multiplication.

8

- (b) Solve the following recurrence relations and their complexities using Master's Theorem.

$$T(n) = 2T(\sqrt{n}) + \lg_2 n$$

$$T(n) = 4T(n/2) + n^2$$

4+4

UNIT - II

- 2/ (a) Find optimal parenthesization of matrix chain product whose sequence of dimensions is (4, 10, 4, 40, 5).

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- (b) What is dynamic programming ? How it gives optimal solutions ?

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OR

- 2 (a) Solve the following instance of LCS through Dynamic Programming.

X = ABCDCDBCAD

Y = BACCD CABBD

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- (b) Solve the TSP problem having the following cost matrix using branch and bound technique.

| | A | B | C | D |
|---|---|---|---|---|
| A | x | 5 | 2 | 3 |
| B | 4 | x | 2 | 3 |
| C | 4 | 2 | x | 3 |
| D | 7 | 6 | 8 | x |

8

UNIT - III
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- 3 (a) Given the text $T = \langle 2, 3, 5, 9, 0, 2, 3, 1, 4, 1, 5, 2, 6, 7, 3, 9, 9, 2, 1 \rangle$
 $P = \langle 3, 1, 4, 1, 5 \rangle$ and modulo $q = 13$ $m = 5$. Choose the pattern matching with average case complexity and explain the search process. Justify the answer for choosing such algorithm.

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- (b) Discuss the formulation of simple assignment problem of size n .

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OR

- 3 (a) Describe Naive string matching algorithm in detail.

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- (b) Write short note on :

- (i) Quadratic Assignment problem
 (ii) Prefix function for string matching.

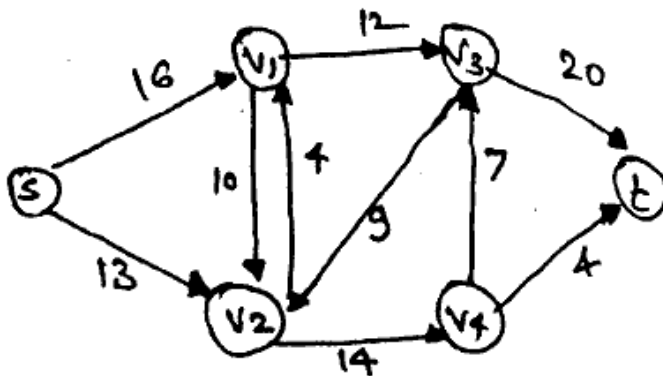
4+4

UNIT - IV

- 4 (a) Explain randomized min cut theorem with example.

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- (b) What do you mean by multi commodity flow in the network ? Find max flow path by Ford-Fulkerson method for given network.



2+6

OR
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4 (a) Explain Las Vegas algorithm with example.

8

(b) Solve $f = (x_1 \vee \overline{x_2})(x_3 \vee \overline{x_4})(\overline{x_1} \vee x_3)(x_4 \vee x_6)$ using randomized algorithm.

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UNIT - V

5 (a) Prove the Hamilton cycle problem is NP-complete.

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(b) Explain Cook's theorem with suitable example.

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OR

5 (a) Write an algorithm for approximation for set cover problem with suitable example.

8

(b) Prove that TSP is NP-complete.

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