

(Please write your Exam Roll No.)

Exam Roll No. 002186

END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2017

Paper Code: ETCS 301

Subject: Algorithm Design & Analysis

Time : 3 Hours

Maximum Marks : 75

Note: Attempt all questions as directed. Internal choice is indicated.

- Q1. a) Define asymptotic notations? (2.5x10=25)
b) What is substitution method?
c) Explain Hashing and elaborate its advantages over linear and binary search.
d) Differentiate between Dynamic programming and Divide and conquer approach.
e) Explain the concept of overlapping subproblems.
f) What are the advantages of optimal binary search tree over binary search tree?
g) Explain 0-1 Knapsack problem.
h) What are the elements of Greedy strategy?
i) Define matroid with an example.
j) Explain P and NP briefly.
- Q2. a) Explain Quick sort and compute the analysis of quick sort perform quick sort on following data.
14, 15, 25, 28, 30, 32, 35, 40.
What is the problem with quick sort, if the data is already sorted? Discuss. (6)
b) Sort the following numbers using Merge sort. (6.5)
13, 19, 9, 5, 12, 8, 21, 11, 56, 19,
OR
- Q3. a) Explain data structures for Disjoint set, its operations and its applications. (4)
b) Solve the following recurrence relation (8.5)
i) $T(n) = 4T(n/2) + n^2$ (Using recursion-tree)
ii) $T(n) = 5T(n/4) + \theta(n^3)$ (Using master theorem)
- Q4. a) What are the basic steps of Dynamic programming? (4)
b) Find an optimal parenthesization of a matrix chain product whose sequence of dimension is $\langle 2, 4, 6, 8, 12, 10 \rangle$ (8.5)
OR
- Q5. a) Compute binomial coefficient using Dynamic programming. (6)
b) Explain the Floyd warshal algorithm and discuss its complexity. (6.5)
- Q6. a) Explain the difference between Dijkstra's and Bellman Ford algorithm with the help of example. (6)
b) Find the optimal schedule for the following jobs with profit ($p_1, p_2, p_3, p_4, p_5, p_6$) = (3, 5, 17, 20, 6, 10) and deadlines ($d_1, d_2, d_3, d_4, d_5, d_6$) = (1, 3, 3, 4, 1, 2) (6.5)
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OR

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Q7. a) Explain Prim's algorithm for finding the minimum spanning tree and analyze its complexity. (6.5)

b) Consider six items along their respective weights and values: (6)
 $w = (5, 10, 20, 30, 40, 15)$ $v = (30, 20, 120, 90, 180, 120)$.

The capacity of Knapsack is 60. Find the solution to fractional Knapsack problem.

Q8. a) Differentiate between P and NP problems. Explain Polynomial time verification with an example. How it is different from polynomial time solutions. (5)

b) Illustrate string matching with Finite Automation. (7.5)

OR

Q9. a) Explain NP hard and NP complete problems with the help of ~~any~~ suitable example. (5)

b) Explain KNUTH-MORRIS-PRATT string matching algorithm. (7.5)

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