Total No. of printed pages = 4

CSE 181502

Roll No. of candidate | | | | | | | | | | |

2021

B.Tech. 5th Semester End-Term Examination

Computer Science and Engineering

DESIGN AND ANALYSIS OF ALGORITHMS

(New Regulation w.e.f. 2017-18) &

(New Syllabus 2018-19)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

PART A

Answer *all* questions.

Each question carries 1 mark.

1. Answer the following questions : (10 × 1 = 10)

(i) Which of the given options provides the increasing order of asymptotic complexity of functions f1, f2, f3 and f4?

f1(n) = 2^n

f2(n) = n^(3/2)

f3(n) = nLogn

f4(n) = n^(Logn)

Select one :

(a) f3, f2, f1, f4

(b) f2, f3, f1, f4

(c) f2, f3, f4, f1

(d) f3, f2, f4, f1

(ii) The complexity of three algorithms is given as: O(n), O(n2) and O(n3). Which should execute slowest for large value of n?

(a) Consid...

(iii) What are the steps of Divide and Conquer Algorithm?

(iv) Which case of Master's theorem is applicable in the recurrence relation T(n)=0.5*T(n/2)+ 1/n ?

(v) Which of the following sorting algorithms does not have a worst case running time of O(n2) ?

(vi) Merge Sort divides the list in Select one:

(a) N equal parts Incorrect

(b) Two equal parts

(c) Two parts, may not be equal

(d) N parts, may not be equal

(vii) What is the time complexity of LCS?

(viii) Time complexity of knapsack 0/1 where n is the number of items and W is the capacity of knapsack. Select one:

(a) O(W)

(b) O(n)

(c) O(nW)

(d) None of these

(ix) What is NP Complete and NP Hard class?

(x) What is tractable and non-tractable problem?

PART B

Answer any *four* questions.

Each question carries 15 marks.

2. (a) What do you mean by a good algorithm? What are the properties of a good algorithm? (5 + 2 + 3 + 3+ 2)

(b) What are the difference between algorithm and program?

(c) Are case based algorithm analysis and asymptotic notation same? Can we represent worst using omega and theta? Which asymptotic notation is best for algorithm analysis?

(d) If $F(n) = O(n^2)$ then can we represent it as $F(n) = O(n^3)$? If yes then why?

(e) Show that $(n+a)^b$ =then (n^b).

3. (a) $F(n) = n!$, Express it in terms of Big oh (O), Omega (Ω), and Θ. (3 + 8 + 4)

(b) $T(n) = T(n/4) + T(n/2) + n^2$; solve using recursion tree method.

(c) Can we solve these (i) $T(n) = 2T(n/2) - n$ (ii) $T(n) = 0.5T(n/2) + n$ using Mater Theorem? If not then Why?

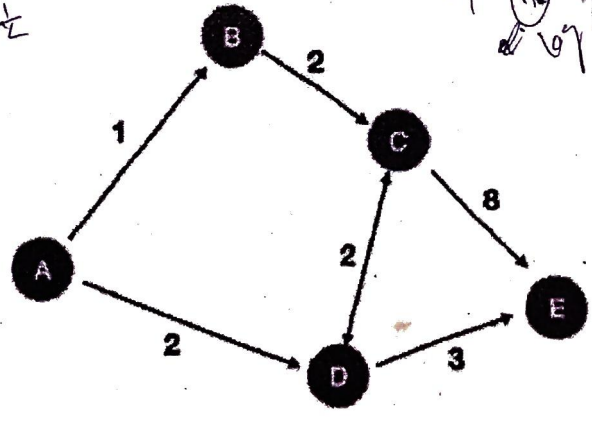
4. (a) Explain the best worst case and best analysis of Quick Sort. (5 + 4 + 6)

(b) Design a divide and conquer type algorithm to compute the maximum of n numbers.

(c) Why Binary search is mor efficient than linear search? Explain the recursive algorithm for Binary search?

5. (a) What is the difference between dynamic programming and D & C. (3 + 8 + 4)

(b) Explain Bellman Ford algorithm for the following graph and show its complexity.



(c) Is LCS is 1D or 2D dynamic programming? Consider the strings "PQRSTPQRS" and "PRATPBRQRPS". What is the length of the longest common subsequence?

6. (a) What is the greedy criterion for knapsack problem? (3 + 5 + 7)

(b) Can we solve TSP using greedy method? What is the difference between of solving using TSP using Greedy and dynamic programming?

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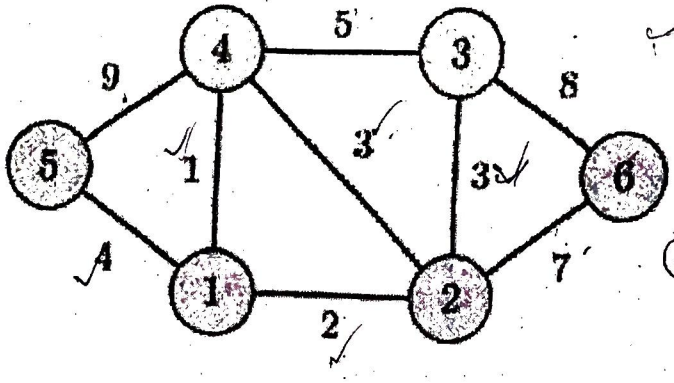
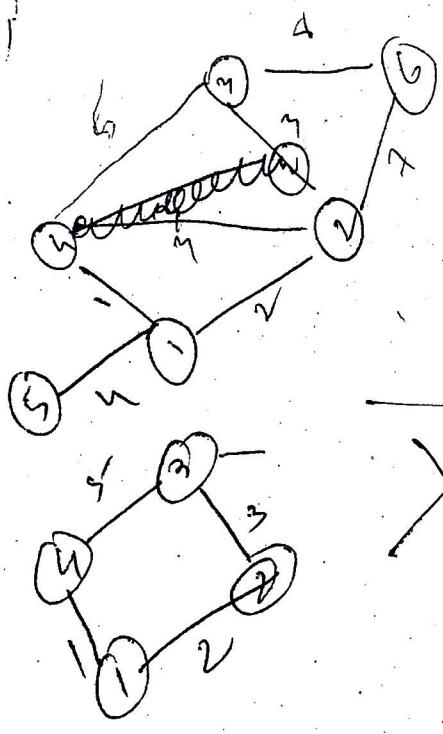
(c) Find the MST using Prims's Algorithm (Step By Step)

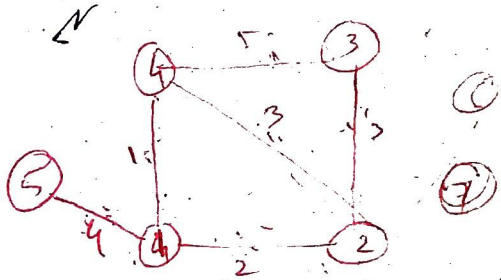


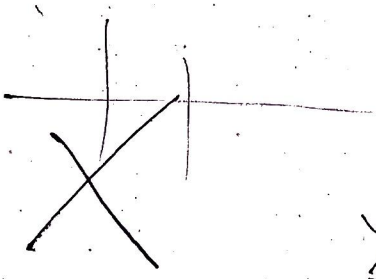
7. (a) Solve the following 0/1 Knapsack problem using dynamic programming P= (20, 18, 15), W= (60, 14, 10), C = 10, n=3. (8 + 4 + 3)

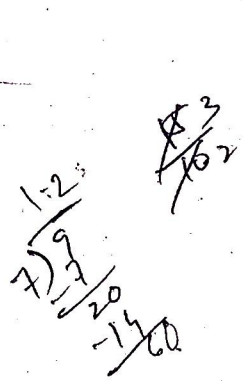
(b) Explain backtracking approach for 4 queen problem.

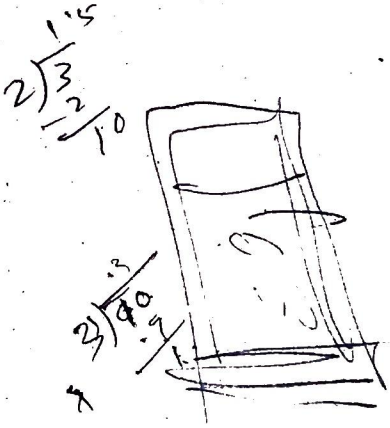
(c) Explain the DFS algorithm with an example.











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