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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Make-Up Examinations

Programme: B.E. **Semester: V**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 20CS5PEAAG **Max Marks: 100**
Course: Advanced Algorithms **Date: 17.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

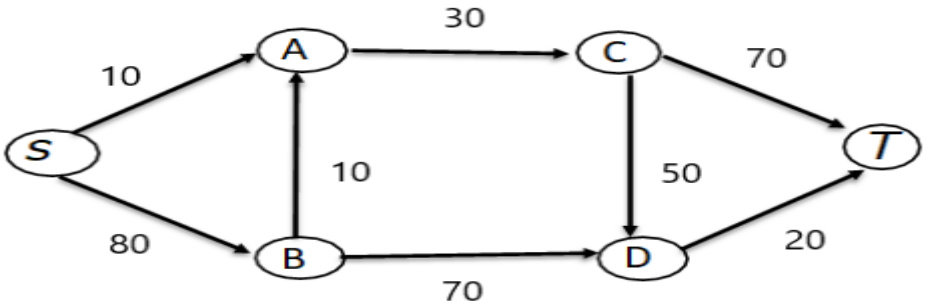
UNIT - I

1 a) Apply dynamic programming technique for matrix multiplication, determine the minimum number of multiplications required for the instance given below. **10**
A1 *A2*A3*A4
A1=5*4 A2=4*6 A3=6*2 A4=2*7
Give the optimal parentesization solution.

b) Design an algorithm to find the Longest Common Subsequence. Apply the same to obtain the LCS of the two strings x = BACDB y = BDCB. **10**

UNIT - II

2 a) Apply Ford Fulkerson Method to find maximum flow in the below flow network by showing the augmenting paths. Also prove that minimum cut is equal to the max flow, by performing min cut on the below flow network. **8**



b) The boss of a car manufacturering unit has 4 employees A, B, C and D. Draw a bipartite graph using the following table which gives expertise of each of the employees: **6**

Employee	Job
A	Brakes
B	Brakes and Gears
C	Brakes and Engine
D	Brakes and Gears

The boss wants to assign one job to each employee. Solve this problem by creating a flow network out of the above bipartite graph to find the job assignment.

c) Describe the Ford-Fulkerson algorithm. **6**

OR

3 a) Design and describe the multithreaded algorithm for merge sort and compute the work, span and parallelism achived. **12**

b) With an example code, explain how determinancy race condition occurs when using the keyword parallel in a multithreaded algorithm. **8**

UNIT - III

4 a) Design Rabin Karp matching algorithm. Apply the algorithm when T=ababaabbab and P= baab. **10**

b) Design pseudocode/program for string matching using Horspool's technique. Apply the same to search for P="ACAGTA" in T="ATCGCAGAGAGTATACAGTA" **10**

OR

5 a) Design an algrothim for string matching using Boyer Moore approach. Apply the same to search for P="ATGTA" in T="GTACTAGAGACGTATGTACTG". **10**

b) Describe the algorithm for string matching using Finite Automata. Design a state transition diagram for the string matching automaton that accepts all string ending in the string "ababaca". **10**

UNIT - IV

6 a) Solve the below linear programming problem using Simplex method. **10**

Maximise: $3x_1+x_2+2x_3$

Subject to: $x_1+x_2+3x_3 \leq 30$

$2x_1+2x_2+5x_3 \leq 24$

$4x_1+x_2+2x_3 \leq 36$

With non negativity constraint : $x_1, x_2, x_3 \geq 0$

b) A manufacturer produces nuts and bolts. It takes 1 hour of work on machine A and 3 hours on machine B to produce a package of nuts. It takes 3 hours on machine A and 1 hour on machine B to produce a package of bolts. He earns a profit of Rs 17.50 per package on nuts and Rs 7.00 per package on bolts. How many packages of each should be produced each day so as to maximise his profit, if he operates his machines for at the most 12 hours a day? Given the above linear programming problem, determine the expressions for constraints and objective in order to maximize the profit. Solve this linear programming problem using graphical method. **10**

UNIT - V

7 a) Describe the Graham's scan algorithm for finding the convex hull. Apply the same to find convex hull for the points : {(0,0), (10,0), (20,10), (15,10), (20,30), (35,20)}. **10**

b) Design pseudo code/ program for checking whether a pair of line segments intersects or not. Apply the same to check line segment (p1,p2) intersects with(p3,p4). p1=(15,10) p2=(45,25), p3=(20,35) and p4=(30,10). **10**

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