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

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

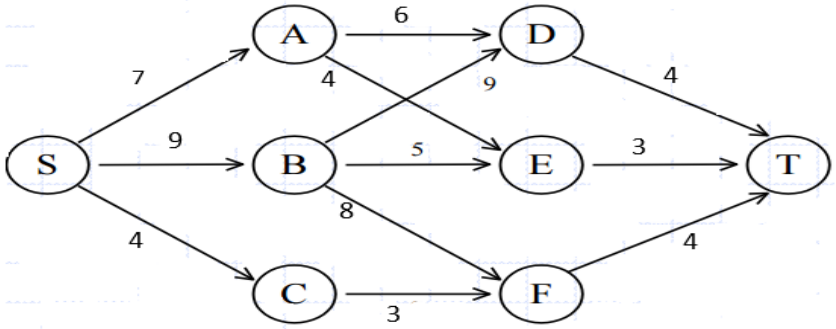
Programme: B.E. **Semester: V**
Branch: Computer Science And Engineering **Duration: 3 hrs.**
Course Code: 20CS5PEAAG **Max Marks: 100**
Course: Advanced Algorithms

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

UNIT - I

1 a) Design an algorithm to find the Longest Common Subsequence. Apply the same to obtain the LCS of the two strings x = bacbffcb and y = dabeabfbc. **10**

b) Solve the following multi stage graph to find shortest path from source vertex 'S' to destination vertex 'T' by applying Dynamic programming technique using forward approach. **8**

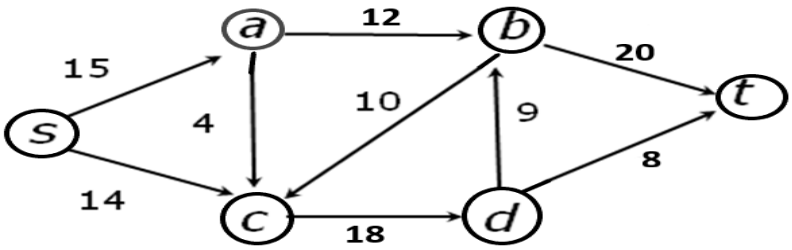


c) Given three matrices A1, A2 and A3 with dimensions A1=2*3, A2 = 3*4 and A3 = 4*2. Compute the number of multipliations needed when multiplied in the order given below: **2**
i) (A1*A2)*A3 ii) A1 * (A2*A3)

UNIT - II

2 a) What are augmenting paths and residual graphs? Describe the Ford-Fulkerson algorithm and how augmenting paths and residual graphs are used in determining the max flow of a network. **10**

b) 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. **10**



OR

3 a) Design a multithreaded algorithm for matrix multiplication and determine the work and span parameters to compute the parallelism(speed-up) achieved. **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 pseudocode/program to for string matching using Horspool's technique. **10**
Apply the same to search for P="ACAGTA" in
T="GENE SEQUENCE IS ACAGTA"

b) Design an algorithm for string matching using Rabin karp approach. Also apply the same to search for P="cab" in T="cadbcab". **10**

OR

5 a) Design an algorithm for string matching using Finite Automata. Also apply the same to search for P="aabb" in T="aababaabaaabbab". **10**

b) Design pseudocode/program for string matching using Boyer Moore approach. Apply the same to search for P="ATGTA" in T="GTACTAGAGACGTATGTACTG". **10**

UNIT - IV

6 a) Solve the below linear programming problem using Simplex method. **10**
Maximize $3x_1+x_2$
Subject to: $x_1+x_2 \leq 30$
$2x_1+2x_2 \leq 24$
$4x_1+x_2 \leq 36$
With non-negativity constraint : $x_1, x_2 \geq 0$

b) Describe the two canonical forms used in linear programming: Standard form and Slack form. Convert the following problem to Standard form and Slack form: **10**
Minimize $-2x_1+3x_2$
Subject to: $x_1 + x_2 = 7$
$x_1 - 2x_2 \leq 4$
With non-negativity constraint : $x_1 \geq 0$

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: {(5,5), (15,10), (25,8), (30,10), (30,20), (35,20), (20,35), (10,35)}.	**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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