

GUJARAT TECHNOLOGICAL UNIVERSITY
ME – SEMESTER – II(New)• EXAMINATION – SUMMER - 2020

Subject Code:3720216

Date: 26/10/2020

Subject Name: Advance Algorithms

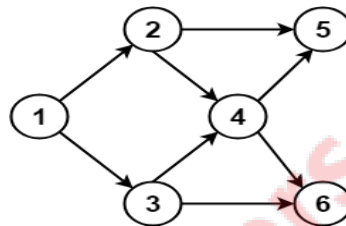
Time: 02:30 AM To 05:00 PM

Total Marks: 70

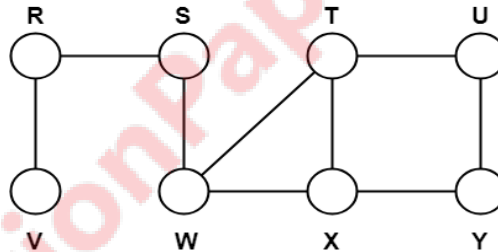
Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Describe divide and conquer paradigm with any one of algorithm. **07**
 (b) Write all the different topological orderings for the following graph. **07**



- Q.2** (a) Traverse the following graph using Breadth First Search Technique. Consider vertex S as the starting vertex. **07**



- (b) Describe Edmond's Blossom algorithm to compute augmenting path. **07**

OR

- (b) What is dynamic programming? Explain one of the problem that can be solved using dynamic programming. **07**

- Q.3** (a) Discuss the aggregate analysis method for amortized analysis **07**

- (b) Solve the following system of linear equations by Crout's Method. **07**

(LU factorization or decomposition method)

$$9X_1 + 3X_2 + 3X_3 + 3X_4 = 24$$

$$3X_1 + 10X_2 - 2X_3 - 2X_4 = 17$$

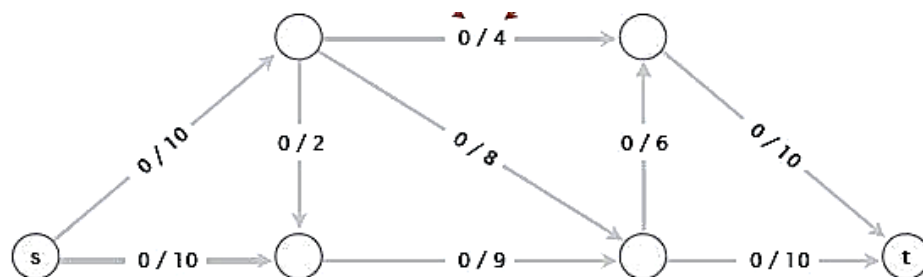
$$3X_1 - 2X_2 + 18X_3 + 10X_4 = 45$$

$$3X_1 - 2X_2 + 10X_3 + 10X_4 = 29$$

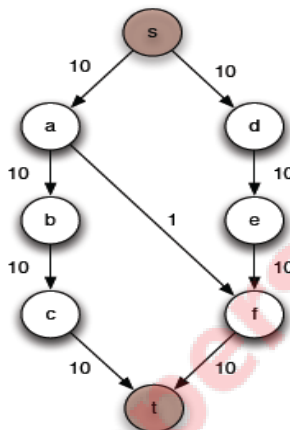
OR

- Q.3** (a) Write and explain Strassen's Algorithm. **07**

- (b) Calculate the maximum flow for the following graph using Ford-Fulkerson Method. Mention step by step procedure and also draw residual network of a graph. **07**

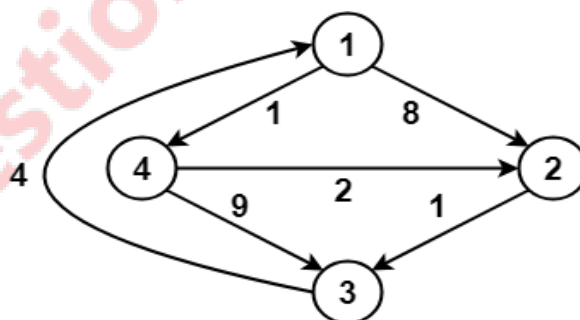


- Q.4** (a) Explain Chinese remainder theorem. **07**
 (b) Calculate the maximum flow for the following graph using Edmond-Karp maximum-flow algorithm. Mention step by step procedure and also draw residual network of a graph. **07**



OR

- Q.4** (a) Consider the following directed weighted graph. Using Floyd-Warshall Algorithm, find the shortest path distance between every pair of vertices. **07**



- (b) Solve the following linear program using simplex method. **07**
 maximize: $Z = 8 + 5X_2 - 4X_6$
 subject to: $X_1 = 2 + X_2 - X_6$
 $X_3 = 6 - X_2$
 $X_4 = 6 - 2X_2 + X_6$
 $X_5 = 2 - X_2 + X_6$
 $X_1, X_2, X_3, X_4, X_5, X_6 \geq 0$

- Q.5** (a) Describe Advanced Number Theoretic Algorithm. **07**
 (b) Explain Randomized Algorithms with its application. **07**

OR

- Q.5** (a) Explain any advanced sorting technique along with algorithm by applying recently proposed data structures. **07**
 (b) Write a short note on NP-completeness. **07**
