National University of Computer and Emerging Sciences, Lahore Campus

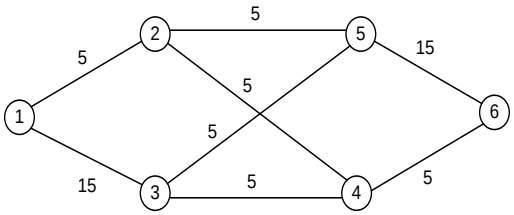
Course Name:	Operations Research	Course Code:	MT 4031
Degree Program:	BS	Semester:	Spring 2024
Exam Duration:		Total Marks:	20
Submission Date:	13-05-2024	Weight	3
Section:	G	Page(s):	
Exam Type:	Assignment-3		

Reference book: Hamdy A. Taha, Operations Research, An Introduction (10th Edition)

Instruction:

- **Clearly write your name, roll no, section, Course title and assignment title on the first page.**
- **Use A4 size sheets only. Use both sides of paper.**
- **Late submission will have no credit.**

Questions 1: Determine the maximum flow and optimum flow in each arc of the network given below, where all the arcs allow positive flow from node i to node j and zero flow in the opposite direction. **[5]**

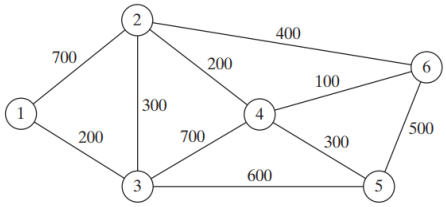


Questions 2: The National Park Service plans to develop a wilderness area for tourism. Four locations in the area are designated for automobile access. These sites and distances between them are listed as:

	Entrance	A	B	C	D
Entrance	---	7	20	19	26
A	7	---	8	16	13
B	20	8	---	18	5
C	19	16	18	---	17
D	26	13	5	17	---

To inflict the least harm on the environment, the Park Service wants to minimize the miles of roadway required to provide the desired accessibility. Draw the network connecting the 4 areas to the park entrance and determine how the roads should be built to achieve the objective. **[5]**

Questions 3: Find shortest route from node 1 to node 6 using excel solver. **[5]**



Question 4: Develop a branch and bound tree for the following problem. Use simplex method to find the solution to each subproblem. **[5]**

$$\text{Max } z = 2x_1 + 2x_2$$

subject to

$$2x_1 + 5x_2 \leq 27$$

$$6x_1 + 5x_2 \leq 16$$

$$x_1, x_2 \geq 0 \text{ and integers.}$$