

Assignment # 02 CLO-1

Instructors: Dr. Syed Irfan Shah

MT-104 Linear Algebra EE (A, B)

Issue date: 18-03-2021

Due date: 03-04-2021

Marks: 80 + 20 (Presentation) = 100

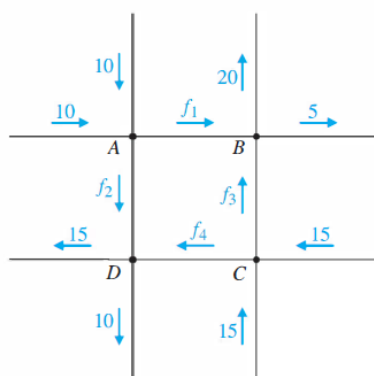
Note: Attempt all Eight questions. **Attempt each question on separate sheet with signature on it, otherwise marks will be deducted.**

Assignment must be neat and well presented.

Q.NO.1

The following diagram shows part of the central section of UC Davis campus. Assume that the streets are one way, and f_1, \dots, f_4 represent the average numbers of vehicles per minute entering and leaving intersections A, B, C, and D during business hours.

- (a) Set up and solve a system of linear equations to find the possible flows f_1, \dots, f_4 .
- (b) If traffic is regulated on CD so that $f_4 = 10$ vehicles per minute, what will the flows on the other streets be?



Q.NO.3 For what value(s) of k , if any, will the systems have (a) no solution, (b) a unique solution, and (c) infinitely many solutions?

$$\begin{aligned}x + y + kz &= 1 \\x + ky + z &= 1 \\kx + y + z &= -2\end{aligned}$$

Q.NO.4 Find a 5×4 matrix $A = [a_{ij}]$ whose entries satisfy the condition

$$a_{ij} = i^{(j-1)}.$$

Q.NO.5 Balance the given chemical equations.



Q.NO.6

Determine whether the solution space of the system $Ax = 0$ is a line through the origin, a plane through the origin, or the origin only. If it is a plane, find an equation for it. If it is a line, find parametric equations for it.

$$A = \begin{bmatrix} 1 & -2 & 3 \\ 2 & -4 & 6 \\ 3 & -6 & 9 \end{bmatrix}$$

Q.NO.7

A soap manufacturer decides to spend 600,000 rupees on radio, magazine and TV advertising. If he spends as much on TV advertising as on magazines and radio together, and the amount spent on magazines and TV combined equal five times that spent on radio, what is the amount to be spent on each type of advertising? Solve by **Gauss-Elimination method**.

Q.NO.8

A dietitian wishes to plan a meal around three foods. The percent of the daily requirements of proteins, carbohydrates, and iron contained in each ounce of the three foods is summarized in the following table:

	Food I	Food II	Food III
Proteins (%)	10	6	8
Carbohydrates (%)	10	12	6
Iron (%)	5	4	12

Determine how many ounces of each food the dietitian should include in the meal to meet exactly the daily requirement of proteins, carbohydrates, and iron (100% of each). Solve by **Gauss method for elimination**.