7. Solve the following transportation problem :

	W_1	W_2	W_3	Supply
F_1	6	8	4	14
F_2	4	9	3	12
F_3	1	2	6	5
Demand	6	10	15	

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INTER B. SC. (SUBSIDIARY) EXAMINATION, 2019

(1st year, 1st Semester, Old Syllabus)

INT. TO LINEAR ALGEBRA & LINEAR PROGRAMMING

PAPER : 9S

Time : Two hours　　　　Full Marks : 50

(25 marks for each part)

Use a separate answerscript for each part.

PART - I

(symbols / Notations have their usual meaning)

Answer ***any two*** questions.

1. a) Define subspace of a vector space.

Let $V = \{(x, y, z) ; \ x, y, z \in \mathbb{R} ; \ \mathbb{R}$ is the field of real numbers)

and $W = \{(x, y, z) ; \ x - 3y + 4z = 0\}$

verify W is a subspace of V or not.

b) Examine if the set of vectors $\{(2,1,1), (1,2,2), (1,1,1)\}$ is linearly independent or not. 5+5

2. a) Let U & W be two subspaces of a finite dimensional vector space V over a field F. Show that

$$\dim(U + W) = \dim U + \dim W - \dim(U \cap W)$$

[Turn over

b) Suppose U and W are subspaces of the vectorspace $\mathbb{R}^4$ over $\mathbb{R}$ generated by the sets

B_1={1,1,0,–1), (1,2,3,0), (2,3,3–1)

B_2 = {(1,2,2–2), (2,3,2,–3), (1,3,4,–3)} respectively.

Find $\dim(U+W), \dim(U \cap W)$. 5+5

3. a) Define inner product space. Prove that in an inner product space

$$\|\alpha+\beta\|^2+\|\alpha-\beta\|^2=2\left(\|\alpha\|^2+\|\beta\|^2\right)$$

where α, β are two vectors in a Euclidean space.

b) Prove that $\|c\alpha\|=|c|\ \|\alpha\|$, c being a real number and α is a vector in a Euclidean space V. 5+5

PART - II

Answer ***any three*** questions.

4. a) Food X contains 6 units of vitamin A and 7 units of vitamin B per gram and costs Rs. 12 gram. Food Y contains 8 units and 12 units of vitamin A and vitamin B per gram respectively and costs Rs. 20 per gram. The daily requirements of vitamin A and B are at least 100 units and 120 units respectively. Formulate the above problem as an L.P.P to minimize the cost of food.

b) Find the dual of the LPP formulated above.

c) Solve graphically the problem formulated in 4(a).

4+3+3

5. Find all the basic solutions of the system

$$2x_1+x_2+4x_3=11,$$
$$3x_1+x_2+5x_3=14.$$

which of them are feasible ? 8+2

6. Solve the following L.P.P

Maximize $Z=3x_1+x_2+3x_3$

subject to $2x_1+x_2+x_3 \leq 2$

$x_1+2x_2+3x_3 \leq 5$

$2x_1+2x_2+x_3 \leq 6$

$x_1, x_2, x_3 \geq 0$ 10