

MATHEMATICS (Honours)

Paper :- MATH-H-DC-06

Time :- 1 h.

Full Mark :- 14

1. Answer the following questions:

6 × 1 = 6

(a) Write a statement of Replacement theorem.

(b) Find the dimension of the vector space $\mathbb{R}^n$.

(c) Write a definition of Linear transformation.

(d) Examine the set $S = \{(x, y, z) \in \mathbb{R}^3 : x + y + z = 1\}$ is a subspace of $\mathbb{R}^3$?

(e) Define Basis and dimension of a vector space.

(f) Examine if the set of vectors $S = \{\alpha, 2\alpha, \beta\}$ is linearly dependent.

2. Answer the following questions:

2 × 4 = 8

(a) Prove that the set $S = \{(0, 1, 1), (1, 0, 1), (1, 1, 0)\}$ is a basis of $\mathbb{R}^3$.

(b) Find a basis and the dimension of the subspace W of $\mathbb{R}^3$ where $W = \{(x, y, z) \in \mathbb{R}^3 : x + 2y + z = 0, 2x + y + 3z = 0\}$.