Dept. Mathematics   Second class   Subject: Linear algebra   Time: 90 minutes

Q1. A. Prove or disprove: (5+5 Marks)

1. The intersection of two subspaces of a vector space is subspace.

2.The set The $M = \{a + b\,x + cx^2 : b\,c = 0\}$ is a basis of vector space $P_2(\mathbb{R})$ over a field $\mathbb{R}$.

B. Show that vector $(-11,3,-26)$ is a linear combination of vectors $\{(2,3,-7),(5,1,4)\}$ in vector space $\mathbb{R}^3$.

Q2. A. Let $V = \mathbb{R}^+$ set of all positive real numbers, with addition defined by

$$x + y = x\,y,$$

and scalar multiplication defined by

$$rx = x^r, r \in \mathbb{R}.$$

Prove that V is a vector space over a field of real numbers. (10 Marks)

B. If V is a vector space over a field $\mathbb{R}$ and $M = \{A, B, C\}$is linearly independent set. Prove that a set $\mathrm{S} = \{\mathrm{A}+\mathrm{B}, \mathrm{A}+\mathrm{C}, \mathrm{B}+\mathrm{C}\}$ is linearly independent set in V. (5 Marks)