

## EXAM QUESTIONS

TOPICS COVERED : NORM, INNER PRODUCT, VECTOR SPACES

- 1) IF  $x, y \in \mathbb{R}^n$ , then  $x$  and  $y$  are called perpendicular (or orthogonal) if  $\langle x, y \rangle = 0$ . IF  $x$  and  $y$  are perpendicular, prove that  $\|x+y\|^2 = \|x\|^2 + \|y\|^2$
- 2) IF  $x, x_1, x_2$  and  $y, y_1, y_2$  are vectors in  $\mathbb{R}^n$  and  $a \in \mathbb{R}$   
Prove that  $\|x\| = \sqrt{\langle x, x \rangle}$
- 3) Prove that  $|\|x\| - \|y\|| \leq \|x - y\|$