

Matrix Theory(EE5609) Assignment 2

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Abstract—This Assignment finds investment to be made in two different bonds to get the desired interest.

Download all python codes from

<https://github.com/anshum0302/EE5609/blob/master/assignment2/solu2.py>

and latex-tikz codes from

<https://github.com/anshum0302/EE5609/blob/master/assignment2/assign2.tex>

Now, total annual interest = Interest per Bond x Investment per Bond

$$= \mathbf{I}^T \mathbf{P} \quad (2.0.4)$$

$$= \begin{bmatrix} \frac{5}{100} & \frac{7}{100} \end{bmatrix} \begin{bmatrix} x \\ 30000 - x \end{bmatrix} \quad (2.0.5)$$

$$= \frac{5}{100}x + \frac{7}{100}(30000 - x) \quad (2.0.6)$$

$$= \frac{210000 - 2x}{100} \quad (2.0.7)$$

Now in part (a) total annual interest = ₹1800. So using (2.0.7)

$$\frac{210000 - 2x}{100} = 1800$$

$$210000 - 2x = 180000$$

$$x = \frac{30000}{2}$$

$$x = 15000$$

Thus, in part (a) investment in bond paying 5% interest is ₹15000 and investment in bond paying 7% interest is ₹(30000-15000) = ₹15000. In part (b) total annual interest = ₹2000. So using (2.0.7)

$$\frac{210000 - 2x}{100} = 2000$$

$$210000 - 2x = 200000$$

$$x = \frac{10000}{2}$$

$$x = 5000$$

Thus, in part (b) investment in bond paying 5% interest is ₹5000 and investment in bond paying 7% interest is ₹(30000-5000) = ₹25000.

1 PROBLEM STATEMENT

A trust fund has ₹30000 that must be invested in two different types of bonds. The first bond pays 5% interest per year, and the second bond pays 7% interest per year. Using matrix multiplication, determine how to divide ₹30000 among the two types of bonds. If the trust fund must obtain an annual total interest of : a) ₹1800 b) ₹2000.

2 SOLUTION

Let ₹x be invested in bonds of the first type. Thus ₹(30000-x) will be invested in the other type. We represent investment per bond by matrix \mathbf{P} .

$$\mathbf{P} = \begin{bmatrix} x \\ 30000 - x \end{bmatrix} \quad (2.0.1)$$

The first bond pays 5% interest per year and the second bond pays 7% interest per year. We represent interest per year per bond by matrix \mathbf{I}

$$\mathbf{I} = \begin{bmatrix} 5\% \\ 7\% \end{bmatrix} \quad (2.0.2)$$

$$= \begin{bmatrix} \frac{5}{100} \\ \frac{7}{100} \end{bmatrix} \quad (2.0.3)$$