# Assignment 1

## AI1110: Probability and Random Variables

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**Question 1(b)** A man invests ₹ $4500$ in shares of a company which is paying $7.5\%$ dividend. If ₹ $100$ shares are available at a discount of $10\%$, find:

(i) the number of shares he purchases
(ii) his annual income

**Solution.**
Total investment made by the man, $P =$ ₹ $4500$
Face value of a share, $F =$ ₹ $100$
Discount on shares, $d = 10\%$
Dividend, $D = 7.5\%$

(i) Market value of a share, $M = F\left(1 - \frac{d}{100}\right)$

The number of shares purchased is given by:

$$\begin{aligned} N &= \frac{P}{M} \\ &= \frac{P}{F\left(1 - \frac{d}{100}\right)} \\ &= \frac{P}{F\left(\frac{100-d}{100}\right)} \\ \therefore\ N &= \frac{100P}{F(100-d)} \end{aligned}$$

On substituting the values, we get:

$$N = \frac{100 \times 4500}{100(100-10)} = \frac{4500}{90} = 50$$

$\therefore$ The man purchased $50$ shares.

(ii) His annual income is given by:

$$\begin{aligned} A &= F \times N \times \frac{D}{100} \\ &= F \times \frac{100P}{F(100-d)} \times \frac{D}{100} \\ \therefore\ A &= \frac{PD}{100-d} \end{aligned}$$

On substituting the values, we get:

$$A = \frac{4500 \times 7.5}{100-10} = \frac{4500 \times 7.5}{90} = 50 \times 7.5 = 375$$

$\therefore$ The annual income of the man is ₹ $375$

Table 1: Various parameters along with their corresponding symbols or formulae and their numerical values

| **Parameter** | **Symbol/Formula** | **Value** |
|---|---|---|
| Total investment | $P$ | $4500$ |
| Face value of a share | $F$ | $100$ |
| Discount on shares | $d$ | $10$ |
| Dividend | $D$ | $7.5$ |
| Number of shares | $N = \frac{100P}{F(100-d)}$ | $50$ |
| Annual income | $A = \frac{PD}{100-d}$ | $375$ |