

5. Insurance And Annuity

A. Activities

1. Let cost of machinery = ₹ 10,00,000
 Scrap value of machinery = ₹ 50,000
 Effective life of machinery = 12 years
 Rate of interest = 5% p.a.

$$\therefore i = \frac{r}{100} = \frac{5}{100} = 0.05, n = 12 \text{ years}$$

$$A = 1000000 - 50000 = ₹ 9,50,000$$

$$\therefore A = \frac{c}{i} [(1+i)^n - 1]$$

$$9,50,000 = \frac{c}{0.05} [1.797 - 1]$$

$$\therefore c = \frac{9,50,000 \times 0.05}{0.797} = ₹ 59,584.4$$

2. Given $c = ₹ 2,000$

$$\text{Rate of interest per quarter} = \frac{16}{4} = 4\%$$

$$\therefore r = 4\%$$

$$\therefore i = \frac{r}{100} = \frac{4}{100} = 0.04$$

$$\text{No. of quarters (n)} = 4$$

$$\therefore A^1 = \frac{c(1+i)}{i} [(1+i)^n - 1]$$

$$= \frac{2000(1+0.04)}{0.04} [(1+0.04)^4 - 1]$$

$$= \frac{2000(1.04)}{0.04} [1.1698 - 1]$$

$$= 50,000(1.04)(0.1698)$$

$$= ₹ 8829.6$$

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3. Let value of the goods be ₹ x, value of the godown = ₹ 4,000

Premium at the rate of 1% is ₹ 124

$$\therefore \frac{2}{100} \times [\text{Policy Value}] = 124 \quad \therefore \text{Policy value} = 124 \times \frac{100}{2} = 6200$$

$$\therefore 4000 + x = 6200$$

$$\therefore x = 2200$$

\therefore value of the goods = ₹ 2200

4. Let value of the building = ₹ x

$$\therefore \text{Policy value} = \frac{7}{8} \times \text{property value} \\ = ₹ \frac{7}{8} \times x$$

Rate of interest = 2.8%

$$\text{Amount of premium} = \frac{2.8}{100} \times \frac{7}{8} \times x$$

Rate of commission = 15%

Amount of commission = ₹ 882

$$\therefore \text{Amount of commission} = \frac{15}{100} \times \text{Premium}$$

$$\therefore 882 = \frac{15}{100} \times \frac{2.8}{100} \times \frac{7x}{8}$$

$$\therefore x = \frac{882 \times 10,000 \times 8}{15 \times 2.8 \times 7} = ₹ 2,40,000$$

\therefore value of the building is ₹ 2,40,000

B. Solve the Following

Q.1 Stock worth ₹ 3,75,000 was insured for ₹ 2,25,000. Stock worth ₹ 1,50,000 was burnt completely due to fire and the balance was reduced to 75% of its value. What sum can be claimed under the policy?

Solⁿ: Property value = ₹ 3,75,000

\therefore Policy value = ₹ 2,25,000

Complete loss = 1,50,000

Partial loss = 75% [3,75,000 - 1,50,000]

$$= \frac{75}{100} [2,25,000]$$

$$= 1,68,750$$

$$\text{Total loss} = 1,50,000 + 1,68,750$$

$$= 3,18,750$$

$$\text{Claim} = \frac{\text{Policy Value}}{\text{Property value}} \times \text{Loss}$$

$$= \frac{2,25,000}{3,75,000} \times 3,18,750$$

$$= ₹ 19,125$$

Q.2 A person buys a television paying ₹ 20000 in cash and promising to pay ₹1000 at the end of every month for the next two years. If money is worth 12% p.a., converted monthly, what is the cash price of the television?

Soln: Down payment = ₹ 20,000 Given: $(1.01)^{-24} = 0.7880$

∴ $n = 2$ years.

But EMI Payable monthly

$$\therefore n = 2 \times 12 = 24$$

∴ $r = 12\%$ p.a. compounded monthly

$$\therefore r = \frac{12}{12} = 1\%$$

$$\therefore i = \frac{r}{100} = \frac{1}{100} = 0.01$$

$$\therefore P = \frac{C}{i} [1 - (1+i)^{-n}]$$

$$\therefore P = \frac{1000}{0.01} [1 - (1+0.01)^{-24}]$$

$$\therefore P = 1,00,000 [1 - 0.7880]$$

$$\therefore P = 1,00,000 \times 0.2120 = ₹ 21,200$$

cash price = Present value + Down payment

$$= 21,200 + 20,000$$

$$= ₹ 41,200$$

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Q.3 The machinery is expected to cost 25% more over its present cost of ₹ 696000 after 20 years. The scrap value of the machinery will realize ₹ 150000. What sum should be set aside at the end of each year at 5% p.a. compound interest for 20 years to replace the machinery? [Given $(1.05)^{20} = 2.655$]

Soln: Present cost = ₹ 6,96,000

Expected cost = $25\% \times 6,96,000 + 6,96,000$

$$= 1,74,000 + 6,96,000$$

$$= ₹ 8,70,000$$

∴ Scrap value = ₹ 1,50,000

∴ Sinking fund = $8,70,000 - 1,50,000$

$$= ₹ 7,20,000$$

∴ $A = ₹ 7,20,000$, $n = 20$ yrs, $r = 5\%$ p.a.

$$\therefore i = \frac{r}{100} = \frac{5}{100} = 0.05$$

$$\therefore A = \frac{C}{i} [(1+i)^n - 1]$$

$$7,20,000 = \frac{C}{0.05} [(1+0.05)^{20} - 1]$$

$$\therefore 7,20,000 \times 0.05 = C [(1.05)^{20} - 1]$$

$$\therefore 36,000 = C [2.655 - 1]$$

$$\therefore 36,000 = C \times 1.655$$

$$\therefore \frac{36,000}{1.655} = C$$

$$\therefore C = ₹ 21,752.27$$

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