Assignment - 1

Question 1

⇒ Given,

Future Amount (F) = \$ 10,000
Time in yrs. (N) = 6
Rate of interest (i) = 10%
Present Amount (P) = ?

then,
we know that,

$$P = F(1+i)^{-N}$$
$$= \$10{,}000 \times (1.1)^{-6}$$
$$= \$10{,}000 \times 0.56447$$
$$= \$5644.7$$

∴ Investor should be willing to pay \$ 5644.7 now for this property.

Question 2

⇒ Given,

Present Amount (P) = \$ 1.07
Future Amount (F) = \$ 2.31
Time in years (N) = 2010 - 2000 = 10

then,

$$P = F(1+i)^{-N} \Rightarrow 1+i = \sqrt[N]{\frac{F}{P}} \Rightarrow i = 1 - \sqrt[10]{\frac{2.31}{1.07}}$$

Date
Page

$\therefore i = 0.0799$

Hence, average annual rate of increase in price of gasoline is $7.99\% \approx 8\%$.

3)
a) Given;

Principal $(P) = \$10,000$

Time in months $(T) = 51$ months

Rate of interest $(R) = (10/12)\%$ per month

then,

$$\text{Interest } (I) = \frac{PTR}{100} = \frac{10,000 \times 51 \times 10/12}{100}$$

$$= \frac{425000}{100} = \$4250.$$

4)
a) Sol^n:-

Given,

$P = \$12,000$

$i = 6\%$ per year

$N = 5$ yrs.

then,

$F = P(1+i)^N$

$= 12,000\,(1+0.06)^5$

$= 12,000\,(1.06)^5$

$= \$16058.7069$

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Date ____ Page ____

$\therefore$ Juanita will owe $\$16058.7069$ to Sim in 5 years.

5)

$\Rightarrow$ Soln.:- Given,

$A = \$23000$

$i = 6\%$ per year

$N = 40$ yrs.

$F = ?$

Then

$F = A \times (F/A, i\%, N)$

$= A \times (F/A, 6\%, 40)$

$= \$23000 \left[\frac{(1+i)^N - 1}{i} \right]$

$= \$23000 \left[\frac{(1.06)^{40} - 1}{0.06} \right]$

$= \$23000 \times 154.7619$

$\therefore F = \$3,559,525.2092$

6)

$\Rightarrow$ Given,

$A = \$30$

$i = 2\%$ per quarter

$T = 5 \times 4 = 20$ quarters

Now,

$P = A \times (P/A, 2\%, 20)$

$= 30 \times \left[\frac{(1+0.02)^{20} - 1}{(1+0.02)^{20}\, 0.02} \right] = \frac{30 \times 24.2973}{(1.02)^{20}} = \frac{\$728.921}{(1.02)^{20}}$

Date
Page

$\therefore P = \$490.5\cancel{1}43$

$\therefore$ The oil changes are worth \$490.543 at the time of buying the car.

7) Soln:- Given,

$P = \$15000$

$i = 0.25\%$ per month

$n = 36$

$A = ?$

Then,

$A = P \times (A|P, 0.25\%, 36)$

$= \$15000 \times \left[\frac{i(1+i)^N}{(1+i)^N - 1}\right]$

$= \$15000 \times \left[\frac{0.0025 (1.0025)^{36}}{(1.0025)^{36} - 1}\right]$

$= \$15000 \times 0.029081$

$= \cancel{\$3751.2173}$ \$436.2181

\$436.2181

$\therefore$ The monthly payment of \$ ~~3751.2173~~ has to be made.

Date ____
Page ____

8)

Given

$P = \$100,000$

$A = 8880$ per year

$i = 8\%$ per year

$T = 30$ yrs.

then, $A' = 10,000$

$$P = A' \times (P/A, 8\%, N)$$

or, $$100,000 = 10,000 \times \frac{(1+i)^N - 1}{i(1+i)^N}$$

or $$\frac{100,000}{10,000} = \frac{(1.08)^N - 1}{0.08 \times (1.08)^N}$$

or $$10 = \frac{1 - (1.08)^{-N}}{0.08}$$

or $$1 - (10 \times 0.08) = (1.08)^{-N}$$

or $$(1.08)^N = \frac{1}{0.2}$$

or $$N = \log_{1.08} 5$$

$\therefore$ $N = 20.91$ yrs.

9).

a)

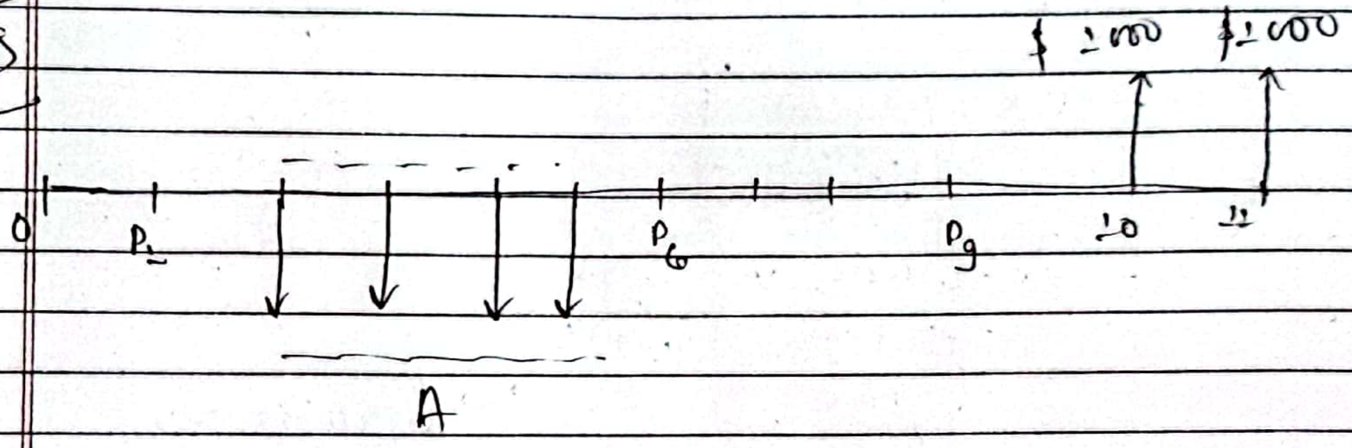

Fig.:- cash-flow diagram.

$i = 12\%$ per year

b)

$$P_9 = 1000 \times (P/A, 12\%, 2)$$

$$= 1000 \times \left[\frac{(1+i)^N - 1}{i(1+i)^N}\right]$$

$$= 1000 \times \frac{(1.12)^2 - 1}{0.12 \times (1.12)^2}$$

$$= \$1690.051.$$

$$P_5 = \$1690 \times (F/P, 12\%, 4)$$

$$= 1690 \times (1.12)^{-4}$$

$$= \$1074.0255$$

Date
Page

$A = 1074.0255 \times (\cancel{A/P}, A/F, 12\%, 4)$

$= 1074.0255 \times \left[\frac{i}{(1+i)^N - 1}\right]$

$= 1074.0255 \times \left[\frac{0.12}{(1.12)^4 - 1}\right]$

$= \$ 224.7231.$

i).

→ Amount at end of 11 yrs. $= -P_5 \overset{(F/P, 12\%, 6)}{\times} + P_9 (\cancel{F/P}, 12\%, 2)$

$\cancel{= -224.7231 \overset{(F/P,12\%,6)}{\times} + 1690.051 \times (1.12)^2}$

$\cancel{= 224.7231 (1.12)^6 + 2119.999}$

$= -1074.0255 (1.12)^6 + 1690.051 (1.12)^2$

$= \$ 0.064$

Although the value should be zero, but round of error in in interest factors cause a small difference of $0.06.

(b)

3)

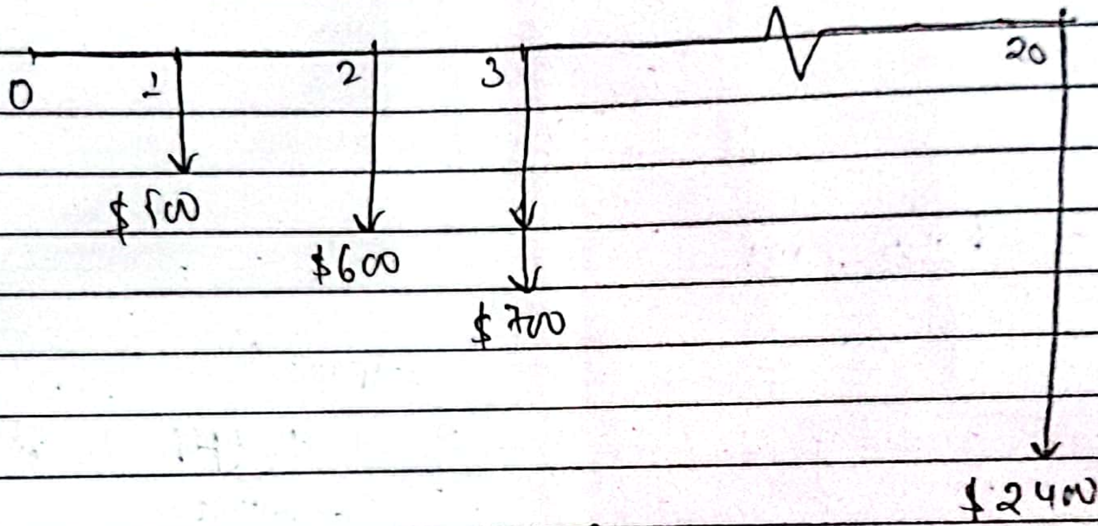

Fig.:- cash-flow diagram.

$i = 8\%$ per year

then

$$A_T = A + A_G$$

$$= \cancel{A\,10{,}000}\; 500 + 100\,(A/G,\ 8\%,\ 20)$$

$$= 500 + 100\left[\frac{1}{0.08} - \frac{20}{(1.08)^{20} - 1}\right]$$

$$= 500 + 100 \times (7.03695)$$

$$= \$1203.6947$$