

Q No 3: 1

①

Given

$$\text{Principle Amount} = P = \$ 10,000$$

$$\text{Interest Rate} = i = 12\%$$

$$\# \text{ of Periods} - N = 6$$

Required:

$$\text{Paid Amount of Interest} = I = ?$$

Solution:-

As we know that for simple interest

$$I = P \times N \times i$$

$$\Rightarrow I = 10,000 \times 6 \times \frac{12}{100}$$

$$\Rightarrow I = 600 \times 12$$

$$\Rightarrow I = \$ 7200 \quad \text{Ans}$$

$$\Rightarrow F = P + I = \$ 17,200 \quad \text{Ans}$$

Q NO 3.2

Given

Simple Interest rate = 15%

Principle amount = $P = \$10,500$

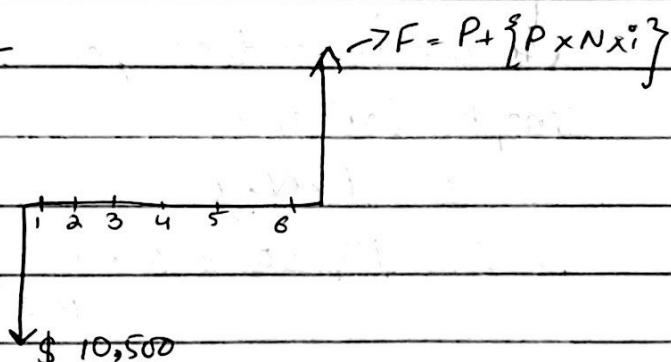
\Rightarrow no. of Periods = $N = 6$ yrs

Required :-

\rightarrow Cash flow Diagram

\rightarrow Interest amount to be repaid?

Solution :-



Now :-

As we know that

$$I = P \times N \times i$$

$$= 10,500 \times 6 \times \frac{15}{100}$$

$$= 630 \times 15$$

$$= I = \$9450 / Ans$$

$$\Rightarrow F = I + P = \$19950 / Ans$$

Q no: 3.4

Given

Principle Amount: $P = \$200$

Interest Amount: $i = 10\%$

No of Periods: $N = 6 \text{ yrs}$

Half of P is Paid after 3 years =

Required :-

Interest Payable each yr = ?

Total Interest amount = ?

Solution:-

First find Interest Amount for each

$$\Rightarrow I_a = \frac{P \times N \times i}{100} \Rightarrow \frac{200 \times 3 \times 10}{100}$$

$$\Rightarrow I_a = \$600$$

$$I_b = \left(\frac{1}{2}P\right) \times 3 \times \frac{10}{100} \Rightarrow \$300$$

Total Interest Amount to be repaid

$$\Rightarrow I_a + I_b = 600 + 300 \Rightarrow \$900 \text{ Ans}$$

$$\Rightarrow F = P + I = \$2900$$

→ for 1st 3 year \$200 Interest is payable
each year

→ for the rest 3 years, \$100 interest amount is payable each year.

Q: No; 3.5

Given :-

Same as Q No 3.4 but here the interest rate is compound.

Required :-

Interest amount at the end of the 6 years? How much change from Problem 3.4? Reason of that change?

Solution :-

As we know that

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

for 1st 3 years

$$F_A = \$20000(1.01)^3$$

$$\Rightarrow F_A = \$2060.6$$

Now that half of F_A is repaid & this P becomes $P = \$10303$

for Next 3 years :-

$$F_B = \$1030.3(1.01)^3$$

$$\Rightarrow \$10.61.5$$

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Total amount to be repaid

$$\Rightarrow F = F_a + F_b$$

$$\Rightarrow F = \$3122.1 \quad \text{Ans}$$

change from P3.4

$$\Rightarrow C = \$3122.1 - 2900$$

$$\Rightarrow C = \$222.1$$

Reason :-

B/c here the interest is applied compounding means interest is applied to the new amount at the end of each year
Unlike simple interest which is applied only at 1st principle amount each year

Q NO 8- 3.9

Given

$$\text{Future worth} = F = \$10,000$$

$$\text{Interest rate} = i = 5\%$$

$$\& \text{ no. of periods} = 15 \text{ years}$$

Required:-

$$\text{Annuity} = A = ?$$

Solution :-

As we know that

$$A = F(A/s \cdot i \cdot N)$$
$$\Rightarrow A = F \left\{ \frac{i}{(1+i)^N - 1} \right\}$$

$$\Rightarrow 10000 \left\{ \frac{0.05}{(1.05)^{15} - 1} \right\}$$

$$\Rightarrow 10000 \left\{ 0.04634 \right\}$$

$$A \Rightarrow \$ 463.4 \text{ Ans}$$

Q No 30.10

Given

$$\text{Annuity} = A = \$ 1500$$

$$\text{Interest rate} - i = 12\%$$

$$\therefore \text{No. of periods} = N = 8 \text{ yrs}$$

Required :-

$$\text{Future worth} - F = ?$$

Solution :-

As we know that

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

$$= A \cdot \left\{ \frac{(1+i)^N - 1}{i} \right\}$$

$$= 1500 \left\{ \frac{(1-12)^8 - 1}{0.12} \right\}$$

$$= 1500(12.3)$$

$$\boxed{F = \$18449.5 \text{ Ans}}$$

Q No :- 3812

Given :-

Present worth = $P = \$20,000$

Interest rate = $i = 10\%$

No. of Periods = $N = 5 \text{ yrs}$

Amount Repaid each yr = $\$4000$

Required :-

Total amount of interest

repaid = $I = ?$

Solution:

We have to calculate future worth
at the end of the ^{each} year

Now :

End of 1st year;

$$\text{Interest due} = I_1 = \$20,000 \times 10\%$$

$$= 20,000 \times \frac{10}{100}$$
$$I_1 \Rightarrow \$2000$$

$$\begin{aligned}\text{Amount repaid} &= \$4000 - \$2000 \\ &= \$6000\end{aligned}$$

Now present worth becomes

$$P_1 = (P - \$4000) \text{ in tennet}$$

$$\Rightarrow P_1 = \$16,000 \text{ in tennet}$$

End of 2nd year

$$\text{Interest due} = I_2 = \$16000 \times 10$$

$$= 16000 \times \frac{10}{100}$$

$$I_2 = \$1600 \text{ in tennet}$$

(5)

$$\text{Amount repaid } F_2 = \$4000 + \$1600 \\ \Rightarrow F_2 = \$5600$$

Now Principle Amount becomes

$$P_2 = P_1 - \$4000$$

$$\Rightarrow P_2 = \$12000$$

End of 3rd year :

$$\text{Interest due } I_3 = \$12000 \times \frac{10}{100}$$

$$\Rightarrow \$1200$$

$$\text{Amount Repaid } F_3 = \$4000 + \$1200$$

$$F_3 = \$5200$$

Now principle Amount becomes

$$P_3 = P_2 - \$4000$$

$$\Rightarrow P_3 = \$8000$$

End of 4th year :

$$\text{Interest due } I_4 = \$8000 \times \frac{10}{100}$$

$$\text{Amount Repaid } F_4 = \$4000 + \$800$$

$$= \$4800$$

Now Principle amount becomes

$$P_4 - P_3 - \$4000 \Rightarrow \$4000$$

End of 5th year

$$\text{Interest due} = I_5 = \$4000 \times \frac{10}{100}$$
$$= \$400$$

$$\text{Amount Repaid} = F_5 = \$4000 + \$400$$
$$= \$4400$$

Now

$$\text{Interest Amount} = I_1 + I_2 + I_3 + I_4 + I_5$$
$$= \$6000$$

$$\text{Total Amount} = F_1 + F_2 + F_3 + F_4 + F_5$$
$$= \$26000$$

P 3815

Given :-

→ 10000 tons during coming yr

→ Increase in tons by 5% per year

→ Profit per ton = \$12 (yrs 1-7)

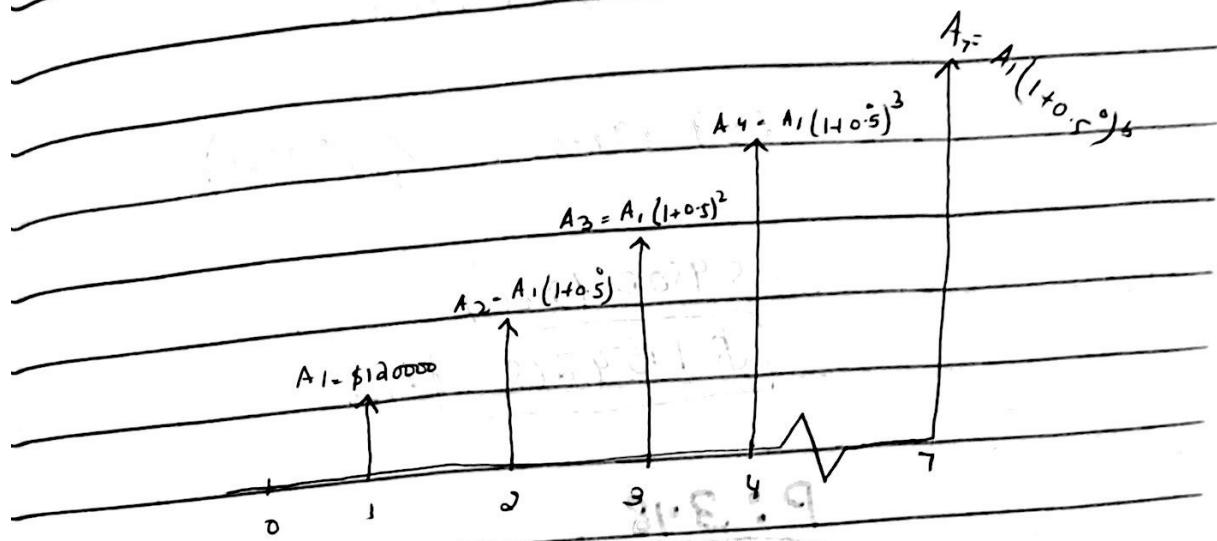
→ N = 7 years

Required :-

(i) Cash flow Diagram

(b) F = ? if i = 12% per yr

Solution:



$$i = 12\% \quad f = 5\%, \quad A = \$12,000 \text{ per ton}$$
$$\Rightarrow 120,000$$

Now to find F 1st finding P

$$\Rightarrow P = A_1 \left\{ \frac{1 - (P/F, 12\%, 7)}{(i-f)\%} \right\}$$

$$\Rightarrow A_1 \left\{ \frac{1 - (P/F, 12\%, 7)(F/P, 5\%, 7)}{0.12 - 0.05} \right\}$$

$$\Rightarrow 120000 \left\{ \frac{1 - (0.3750)(1.4071)}{0.12 - 0.15} \right\}$$

$$\Rightarrow P = \$659499.55$$

Now

$$F = P (F/P, i\%, N)$$

$$\Rightarrow 659499.55 (F/P, 12\%, 7)$$

$$\Rightarrow 659500 (2.66)$$

$$\Rightarrow \boxed{\$ 1754268.81 \text{ Ans}}$$

P : 3.18

Given :-

$$\text{Annuity} = A = \$ 6000$$

$$\text{Interest rate} = i = 20\%$$

$$\text{Periods - } N = 5 \text{ yrs}$$

Required :-

a) Present worth = ?

b) Cash flow Diagram

Solutions -

1st finding the Principle
Investment for Purchasing the
equipment

(4)

Solution :-

As we know that

$$\begin{aligned}
 P &= A \left(\frac{1}{A}, i\%, N \right) \\
 &= 6000 \left(\frac{1 - (1+i)^{-N}}{i} \right) \\
 &= 6000 \left[\frac{(1.12)^5 - 1}{0.12(1.12)^5} \right] \\
 &= 6000 (2.99)
 \end{aligned}$$

\$ 17943.67 Ans.

Here the company should
 Invest \$ 17943.67 in purchasing
 the equipment.

(b) Cash Flow Diagrams-