1. Find the accumulated amount of the ordinary annuity paying an amortization of 1000P per month at a rate of 12% compounded monthly for 5 years.

GIVEN: A = 1000P ; j = 12% → i = 1% ≈ 0.01 ; n = 5 years ≈ 60 months

REQUIRED: F =?

SOLUTION:

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

$$F = 1000\left(\frac{(1+0.01)^{60} - 1}{0.01}\right)$$

F= 81670 P

2. What present sum is equivalent to a series of 1000P annual end-of-year payments, if a total of 20 payments are made and interest is 12%?

3. A man made ten annual-end-of year purchases of 1000P common stock. At the end of 10th year he sold all the stock for 12000P. What interest rate did he obtain on his investment?

GIVEN: n= 10 years ; A= 1000 P ; F= 12 000

REQUIRED: i=?

SOLUTION:

$$12000 = 1000\left(\frac{(1+i)^{10} - 1}{i}\right)$$

By shift solve,

i = 0.039

i = 3.9% ≈ 4%

4. A piece of property is purchased for 10000P and yields a 1000P yearly profit. If the property is sold after 5 years, what is the maximum price to break-even if the interest is 6% per annum?

5. A condominium unit can be bought at a down payment of 150000P and a monthly payment of 10000P for 10 years starting at the end of 5th year from the date of purchase. If money is worth 12% compounded monthly, what is the cash price of the condominium unit?

GIVEN: $A_1 = 150{,}000P$ $A_2 = 10{,}000P$; $n = 10$; $i = \frac{0.12}{12} = 0.01$

REQUIRED: $P_T = ?$

SOLUTION:

$$P_1 = A_2\left(\frac{1-(1+i)^{-n}}{i}\right)$$

$$P_1 = 10{,}000\left(\frac{1-(1+0.01)^{-10}}{0.01}\right)$$

$$P_1 = 94{,}713.04531\,P$$

$$P_2 = P_1\left(\frac{1-(1+0.01)^{-4}}{0.01}\right)$$

$$P_2 = 369.566.8633\,P$$

$$P_T = A_1 + P_2$$

$$P_T = 150{,}000\,P + 369{,}566.8633\,P$$

$$P_T = 519{,}566.8633\,P$$

$$P_T = 519{,}567\,P$$

6. The owner of the quarry signs a contract to sell his stone on the following basis. The purchaser is to remove the stone from the certain portion of the pit according to a fixed schedule of volume, price and time. The contract is to run 18 years as follows. Eight years excavating a total of 20,000 m per year at 10P per meter, the remaining ten years, excavating a total of 50,000 m per year at 15P per meter. On the basis of equal year-end payments during each period by the purchaser, what is the present worth of the pit to the owner on the basis of 15% interest?

7. A wealthy man donated a certain amount of money to provide scholarship grants to deserving students. The fund will grant 10,000P per year for the first 10 years and 20,000P per year on the years thereafter. The scholarship grants started one year after the money was donated. How much was donated by the man if the fund earns 12% interest.

8. What amount of money deposited 40 years ago at 12% interest would now provide a perpetual payment of 10,000P per annum?

GIVEN: i= 0.12 ; A= 10000

REQUIRED: P=?

SOLUTION:

$$(1.12)^{40}=\frac{10000}{0.12}$$

P= 896

9. A company rent a building for 50,000P per month for a period of 10 years. Find the accumulated amount of the rentals if the rental for each month is being paid at the start of each month and money is worth 12% compounded monthly.

10. The amount of the perspective investor pay for a bond if he desires an 8% return on his investment and the bond will return 1000P per year for 20 years and 20,000P after 20 years is

GIVEN: i= 8% return on investment ; I= 1000 P ; n= 20 ; C=F=20000

REQUIRED: P=?

SOLUTION: $$P=1000\left(\frac{1-(1+0.08)^{-20}}{0.08}\right)+20000(1+0.08)^{-20}$$

P = 14109.11156

11. A machine costs 50,000P. Find the capitalized cost if the annual maintenance and operational cost is 5000P and money worth 15% per annum.

GIVEN: FC = 50,000P ; MC = 5,000P ; i = 15% ; CR = 0 ; RC = 0

REQUIRED: CC = ?

SOLUTION:

$$CC=FC+\frac{MC}{i}+\frac{CR}{(1+i)^k-1}+\frac{RC}{(1+i)^L-1}$$

$$CC=50{,}000+\frac{5{,}000}{0.15}+\frac{0}{(1+i)^k-1}+\frac{0}{(1+i)^L-1}$$

$$CC=83{,}333.33333\,P$$

12. A machine cost 50,000P. Find the capitalized cost if the annual maintenance cost is 5000P and cost of repair is 4000P every 4 years and money worth 12% per annum.

GIVEN: FC= 50kP ; CR= 4 kP ; i= 12% ; MC= 5kP/yr ; RC=0

REQUIRED: CC=?

SOLUTION:

$$CC = FC + \frac{MC}{i} + \frac{CR}{(1+i)^k - 1} + \frac{RC}{(1+i)^L - 1}$$

$$CC = 50\,000 + \frac{5000}{0.12} + \frac{4000}{(1+.12)^4 - 1} + \frac{0}{(1+i)^L - 1} \qquad CC = ¿\ 98.64114788 \text{ kP}$$

$$CC = 98641\,P$$

13. A building cost 10 million and the salvage value is 150,000P after 25 years. The annual maintenance cost is 60,000P costs of repair is 200,000P every 5 years. Find the capitalized cost if money worth 15% per annum.

GIVEN: FC= 10 million ; SV= 150,000P ; L= 25 years

MC= 60,000P ; CR= 200,000P ; $i = 15\%$ per year

REQUIRED: CC=?

SOLUTION:

$$RC = FC - SV - CR =$$

$$10\,000\,000 \text{ -150 000-200 000= 9 650 000}$$

Substitute value

$$CC = FC + \frac{MC}{i} + \frac{CR}{(1+i)^k - 1} + \frac{RC}{(1+i)^L - 1}$$

$$CC = 10\,000\,000 + \frac{60000}{0.15} + \frac{200000}{(1+0.15)^5 - 1} + \frac{9650000}{(1+i)^L - 1} \qquad CC = ¿$$

98.64114788 kP

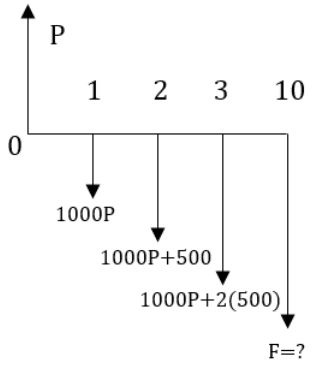
$$CC = 98641\,P$$

14. A salesman earns 1000P on the 1st month, 1500P on the 2nd month, 2000P on the 3rd month and so on. Find the accumulated amount of his income at the 10th month if money worth 12% compounded monthly.

GIVEN: i=12% compounded monthly ; G=500P

REQUIRED: F=?

ILLUSTRATION:



SOLUTION:

$$F = F_A + F_G$$

$$1+\frac{0.12}{12}¿^{10}-1$$

$$¿$$

$$(¿\frac{0.12}{12}¿)=10462.21254$$

$$¿$$

$$F_A = 1000¿$$

$$1+\frac{0.12}{12}¿^{10}-1$$

$$¿$$

$$(¿\frac{0.12}{12}-10¿)=23110.62706$$

$$¿$$

$$F_G = \frac{500}{\frac{0.12}{12}}¿$$

$$F = 33572.8396\,P$$

15. A man wishes to accumulate a total of 500,000P at the age of 30. On his 20th birthday, he deposited a certain amount of money at a rate of 12% per annum. If he increases his deposit by 10% each year until the 30th birthday, how much should his initial deposit be?

GIVEN: i= 12% ; r= 10%

REQUIRED: P=?

SOLUTION:

16. If 2000P is deposited in a savings account at the beginning of each of 15 years and the account draws interest at 7% per year, compounded annually. Find the value of the account at the end of 15 years.

GIVEN: A= 2000P ; n= 15 ;

i= 7% ; i= $\frac{7}{1}$ = i = 7% or 0.07

REQUIRED: F= ?

SOLUTION:

$$F=2000\left(\frac{(1+0.07)^{16}-1}{0.07}-1\right)$$

F= 53776 P

17. A man deposits 1000P every year for 10 years in a bank. He makes no deposit during the subsequent 5 years. If the bank pays 8% interest, find the amount of the account at the end of 15 years.

18. Twenty-five thousand pesos is deposited in a savings account that pays 5% interest, compounded semi-annually. Equal annual withdrawals are to be made from the account, beginning one year from now and continuing forever. Find the maximum amount of the equal annual withdrawal.

GIVEN: $i=\frac{5}{2}=2.5\%; P=25000\,P$

SOLUTION:

$$P=\frac{A}{i}; A=Pi$$

$$A=25000(0.025)=625$$

$$1+0.025¿^{2}-1$$
$$¿$$
$$(¿0.025¿)$$
$$¿$$
$$F=625¿$$

$$F=1265.625\,P$$

19. What amount of money deposited 50 years ago at 8% interest would now provide a perpetual payment of 10000P per year?

GIVEN: A= 10000P ; i = 8% or 0.08 per year ; n = 50

REQUIRED: P = ? (50 years ago)

ILLUSTRATION:

SOLUTION:

set-up EV at 50

Σ↑ = Σ↓ $\frac{A}{i}=P(1+0.08)^{50}$

$$\frac{10000}{0.08}=P(1.08)^{50}$$

0

$$P=2665.153569P$$

$$P=2{,}665.15P$$

20. A man buys a motor cycle. There will be no maintenance cost the first year as the motor cycle is sold with one year free maintenance. The 2nd year the maintenance is estimated at 2000P. In subsequent years the maintenance cost will increase by 2000P per year. How much would need to be set aside now at 5% interest to pay the maintenance costs of the motor cycle for the first 6 years of ownership?

GIVEN: A = 0P ; i = 5% or 0.05 ; n = 6 ; G = 2000

REQUIRED: P = P_G = ?

ILLUSTRATION:

0

10k

SOLUTION: