Date: _____

Assignment No : 03

Engineering Economics

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Section: B

Submitted

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Date: 4/03/2022

Date:

Question No (3.1)

Given:

Present worth = PW = $10,000
Interval = N = 6
Interest Rate = i = 12%

Required

Future Worth = FW = ?
(simple interest).

Sol

As we know That,

FW = PW + PW(i)(N) PCA Values

FW = $1000 + $1000 (12/100)(6)

FW = $ 1720 Ans

Question No (3.2)

Given

Present worth = PW = $10,500
Interest rate = i = 15%
Interval = N = 6

Required

FW = ?

P P I P O

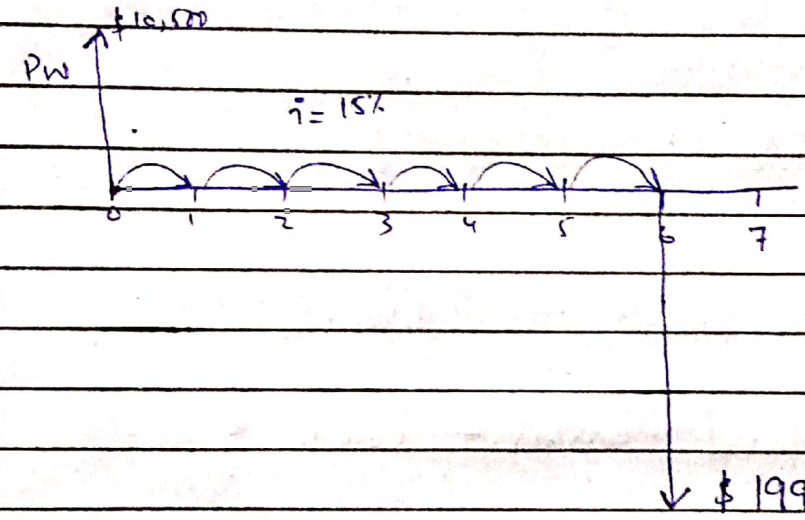
As we know

$$FW = PW + PW(N)(i)$$

$$FW = \$10,500 + \$10500(6)(0.15)$$

$$\boxed{FW = \$19950}$$

Cash flow diagram:



Question (3.4)

Given: (Simple Interest question)

Present worth = PW = $2000

Interest = i = 10% = 0.1

Interval = N = 6

Required:

a) Interest amount each year

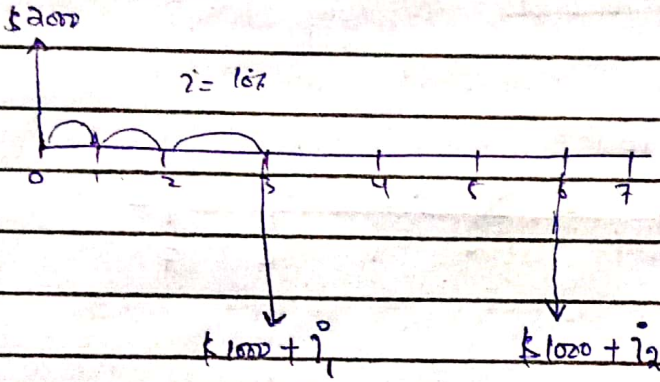
b) Total Interest amount such that half loan

P . T P O

will be repaid in one lump-sum amount at the End 3 years and the remaining half will be repaid in one lump-sum at the End of 6 years.

Sol

Cash flow



a) Interest amount each year = ?

$$i_{EY} = P_W (i)$$

$$i_{EY} = \$2000 (0.1)$$

$$\boxed{i_{EY} = 200}$$

b) Interest amount over 6 years

$i_{Total} = ?$

$$i_1 = \$1000 (0.1)(3)$$

$$i_1 = \$300$$

P + Tp o

Now

$$i_2 = \$1000(0.1)(6)$$

$$i_2 = \$600$$

Now

$$i_{Total} = i_1 + i_2$$

$$i_{Total} = \$300 + \$600$$

$$\boxed{i_{Total} = \$900}$$

↳ Total Interest amount in Six years.

— XP —— XP ——— PP —— PP —

Question (3.5)

Given

Problem (3.4) Repeated for Compound Interest.

Sol

Now in Compound case

$$FW_3 = \$1000(1.1)^3$$

$$FW_3 = \$1331$$

P.T.O

Now

$$FW_6 = \$1000(1.1)^6$$

$$FW_6 = \$1771.6$$

Now

~~$P_{FA} = P_i$~~

$$FW_{Total} = FW_3 + FW_6$$

$$FW_T = \$1331 + 1771.6$$

$$\boxed{FW_T = 3102.6}$$

↳ Total FW in Compound case

and Total Future worth in Simple Interest case was

$$FW_T = 2000 + 900$$

$$FW_T = 2900$$

Difference:

$$\text{Difference} = 3102.6 - 2900$$

$$\boxed{\text{Difference} = 202.6}$$

Reason:

This Difference is because, in case of Simple Interest, Interest rate is always applied on Principle amount but in case of compound Interest, Interest rate Applied on lump-sum amount at the End of each year.

Question No: (3.9)

Given:

Future worth = FW = $10,000

Interest rate = i = 5%

Annuity = AW = ?

Interval = N = 15

Sol

As we know,

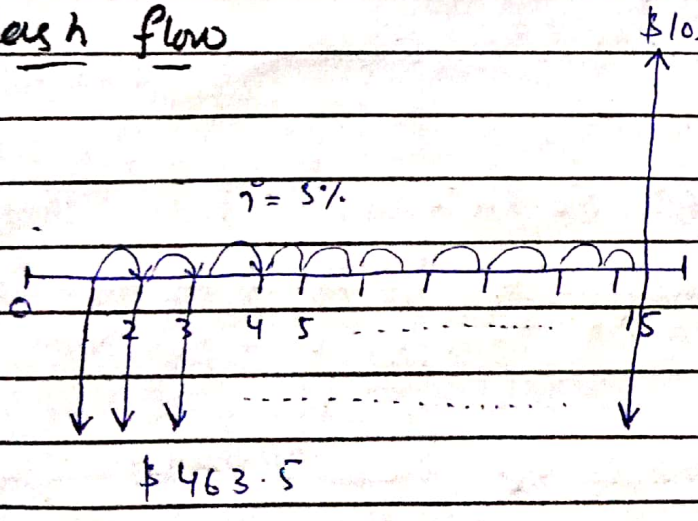
$$AW = (A/F, i, N)$$

$$AW = FW\left(\frac{i}{(1+i)^N - 1}\right) \quad \text{Put values.}$$

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

$$\boxed{AW = \$463.5}$$

Cash flow



P & TP

Question No (3.10)

Given

Present worth = PW = $1500

Interval = N = 8 years

Interest = i = 12% per year.

Required

Future worth = FW = ?

Sol

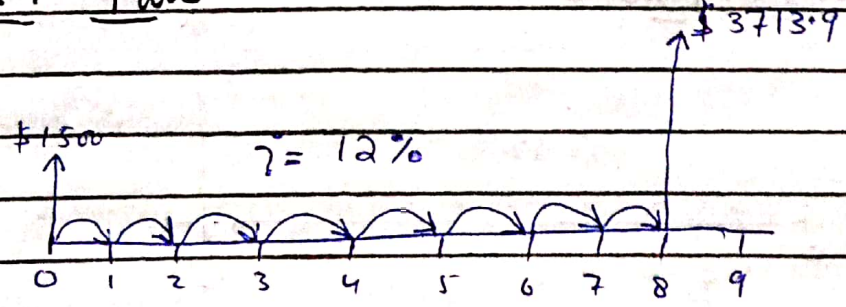
As we know,

$FW = PW(1+i)^N$ put values

$FW = \$1500(1.12)^8$

$\boxed{FW = \$3713.9}$ Ans

Cash flow



P.T.O

Question No (3.12)

Given:

Present worth = PW = $20,000

Principle amount = P = $4000 per year

Interest rate = i = 10%

Interval = N = 5

Required

Total amount of Interest = ?

Sol

According to plan "Pay Principle amount plus Interest interest due at the End of each year".

Year	Amount owed at BOY	Interest amount for Year	Total amount at EOY	Principle amount	Total EOY payment
1	$20000	$2000	$22000	$4000	$6000
2	$16000	$1600	$17600	$4000	$5600
3	$12000	$1200	$13200	$4000	$5200
4	$8000	$800	$8800	$4000	$4800
5	$4000	$400	$4400	$4000	$4400

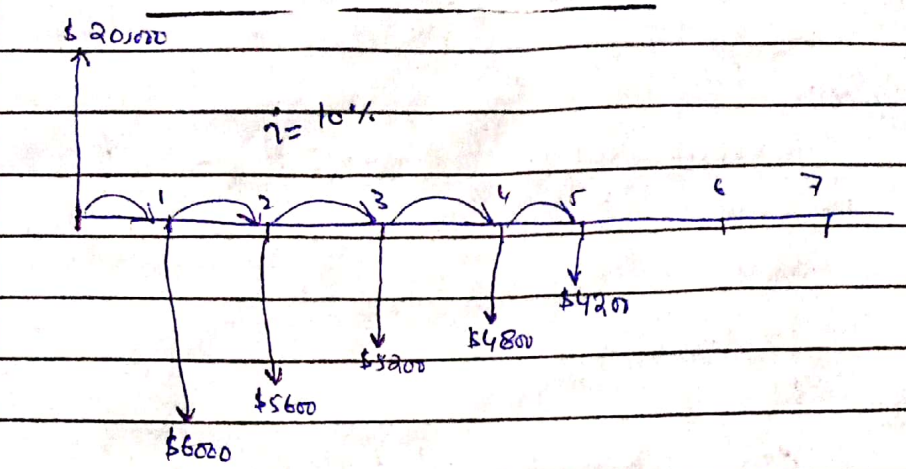
Total amount of Interest ~~Pay~~ Paid:

= $2000 + $1600 + $1200 + $800 + $400

= $6000

P + TPO

Cash flow of Question (3.12)



xp xp xp eve

Question No (3.15)

Given:

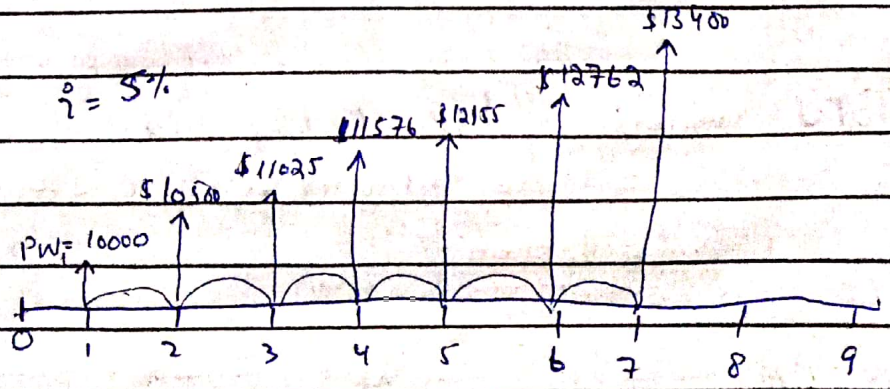
Present worth = PW_1 = 105,000 tons
↳ at EOY 1

Interest rate = i = 5%

Interval = N = 6 (1–7).

Required

a, cash flow diagram



$FW_2 = 10000(1.05) = 10500$ $FW_6 = 12155(1.05) = 12762$

$FW_3 = 10500(1.05) = 11025$ $FW_7 = 12762(1.05) = 13400$

$FW_4 = 11025(1.05) = 11576$

$FW_5 = 11576(1.05) = 12155$

(b)

Profit per ton = $12

Profit 10,000 tons = $12 x 10000

" " = 120,000

So

PW = 120,000

i° = 12%

FW = ?

N = 6

Sol

$$FW = PW(1+i)^N$$

$$FW = 120,000(1.12)^6$$

$$FW = 168591.36$$ Ans

Question NO (3.18)

Given

Annuity = A = $6000

Interval = N = 5 years

Interest = i° = 20%

Required

Present worth = PW = ?

P P T P O

Sol^n

As we know

$$P_{W/} = \left(P_{V/A}, N, i\%\right)$$

$$P_{W/} = A\left(\frac{(1+i)^N - 1}{i(1+i)^N}\right)$$ Put values

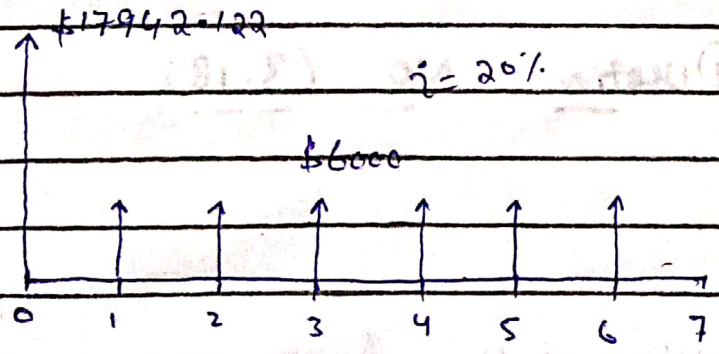
$$P_{W/} = \$6000\left(\frac{(1.2)^5 - 1}{0.2(1.2)^5}\right)$$

$$P_{W/} = \$6000\left(\frac{1.488}{0.4976}\right)$$

$$\boxed{P_W = \$17942.122}$$

Present worth of Equipement.

Cash flow:



Question No: (3.21)

Given

Present worth = P_W = $100,000

Annuity = A = $10,000

Interval = N = 4 years

Interest rate = i = 15%

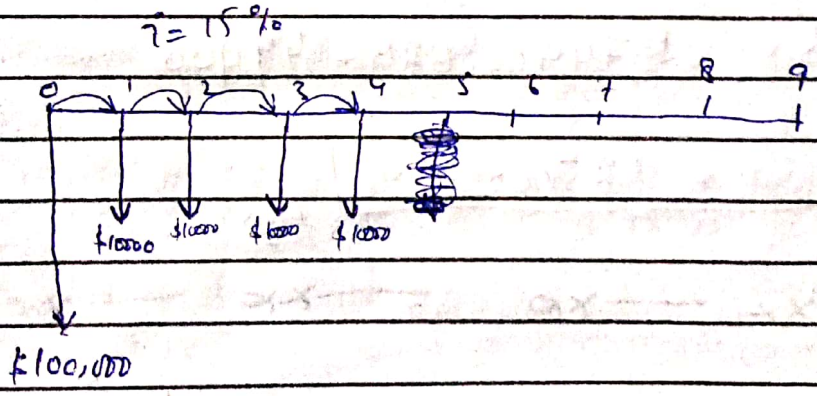
Required

Future worth = F_W = ?

↳ According to Investment.

Sol

Cash flow:



First we find future worth of given P_W

$$F_{W_1} = \$100000\ (1.15)^4$$

$$\boxed{F_{W_1} = \$174900.629}$$

P e T p o

Now we have to find FW of given Annuities

$$FW_2 = A\left(\frac{(1+i)^N - 1}{i}\right)$$

$$FW_2 = \$10000\left(\frac{(1.15)^4 - 1}{0.15}\right)$$

$$FW_2 = \$10000\left(\frac{0.749}{0.15}\right)$$

$$FW_2 = \$10000\,(4.99)$$

$$\boxed{FW_2 = \$49,900}$$

Now the Salvage value of machine is,

$$S.V = FW_1 - FW_2$$

$$S.V = \$174900.629 - \$49900$$

$$\boxed{S.V = 125000.629}$$

Ans

Date:

Question NO (3.27)

Given:

Interval for deposition = N_1 = 12 years

withdraw Annuity = A_2 = $309

Interval for withdraw = N_2 = 4 years

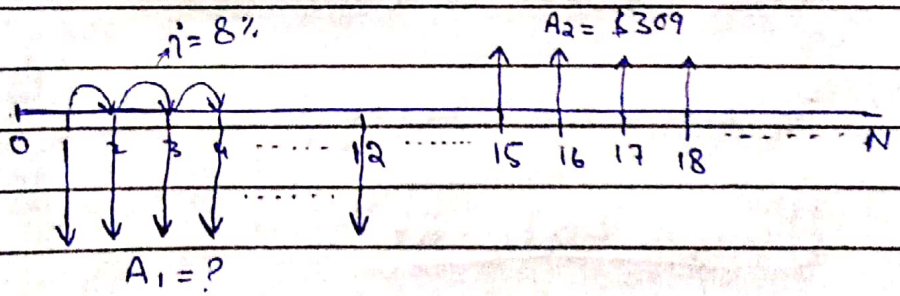
Interest rate = i = 8% Per year

Required

deposited Annuity = A_1 = ?

Sol

Cash flow:



first we find present worth of given A2 Annuity

So

$P_{W/4} = A_2(P/A, N_2, i\%)$

P o T pu

$$PW_{14} = \$309\left(\frac{(1+i)^{N_2}-1}{i(1+i)^{N_2}}\right)$$

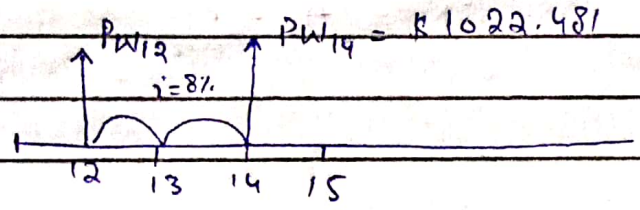
$$PW_{14} = \$309\left(\frac{(1.08)^4-1}{0.08(1.08)^4}\right)$$

$$= \$309\left(\frac{0.36}{0.1088}\right)$$

$$= \$309(3.309)$$

$$\boxed{PW_{14} = \$1022.481}$$

Now we have ◉ Shift back it to N = 12th Year



So

$$PW_{12} = \$1022.481\,(1.08)^{-2}$$

$$PW_{12} = \$1022.481\,(0.857)$$

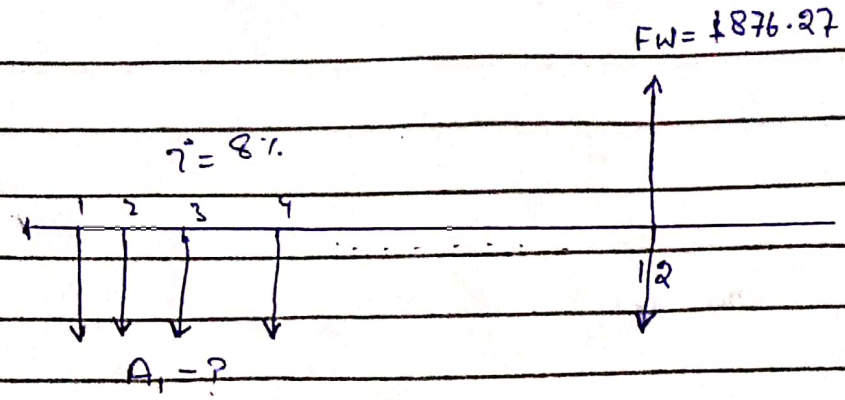
$$\boxed{PW_{12} = \$876.27}$$

Now this Present worth became equal to Future worth for depositing series. So

$$FW = PW_{12} = \$876.27$$

P P T P O

Date:



So we know That

$$A_1 = FW\left(\frac{A}{F}, N, i\%\right)$$

$$A_1 = FW\left(\frac{i}{(1+i)^{N_1}-1}\right)$$

$$A_1 = \$876.27\left(\frac{0.08}{(1.08)^{12}-1}\right)$$

$$A_1 = \$876.27\left(\frac{0.08}{1.518}\right)$$

$$A_1 = \$876.27\,(0.0527)$$

$$\boxed{A_1 = \$46.179}$$

→ Required amount that should be deposited each year for 12 years.

— xx — xx — xx — xx — x1

END of Assignment ⇒ 3

⇒ will miss your teaching method for ever and your Sincerity with students.