CE 231
ENGINEERING ECONOMY

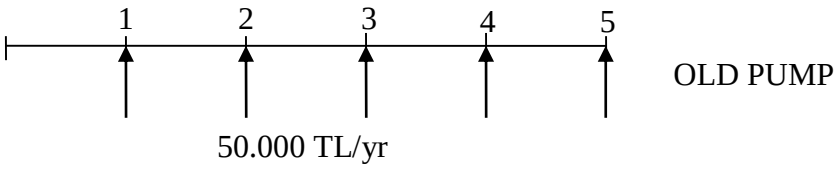
PROBLEM SET 4

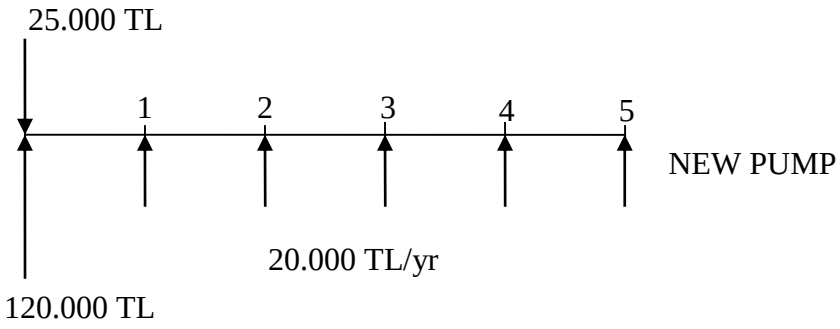
PROBLEM 1

A construction company is considering the replacement analysis of a pump. The old pump has annual operating and maintenance costs of 50.000 TL/yr. It can be kept for 5 years more. The old pump can be sold to the manufacturer of the new pump for 25.000 TL.

The new pump will have a purchase price of 120.000 TL, it will have a value of 50.000 TL in five years time; and it will have annual operating and maintenance costs of 20.000 TL/yr.

Using a MARR of 20%, evaluate the investment alternative comparing the present worths in the **Receipts and Disbursements Method**.





$PW_{OLD}(20) = -50.000\ (P/A, 20\%, 5)$
$= -50.000 \times 2,991$
$= -149.550$ TL

$PW_{NEW}(20) = 25.000 - 120.000 - 20.000\ (P/A, 20\%, 5) + 50.000(P/F, 20\%, 5)$
$= -95.000 - 20.000 \times 2,991 + 50.000 \times 0,4019$
$= -95.000 - 59.820 + 20.095$
$= -134.725$ TL

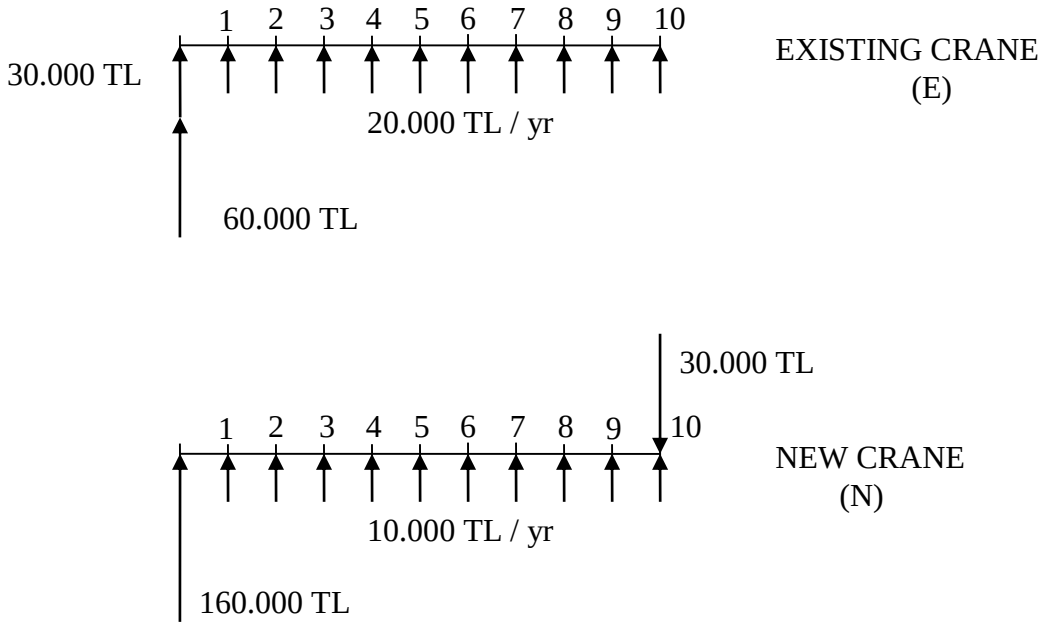
$\therefore$ CHANGE THE OLD PUMP

PROBLEM 2

The ABC company has a tower crane that has an estimated remaining life of 10 years. The crane can be sold for 60.000 TL. If the crane is kept in service it must have a major repair immediately at a cost of 30.000 TL. Operating and maintenance costs will be 20.000 TL/yr after the crane is repaired. After being repaired, the crane will have a zero salvage value at the end of the 10 year period.

A new crane will cost 160.000 TL, will last for 10 years, and will have 30.000TL salvage value at that time. Operating and maintenance costs are 10.000 TL/yr for the new crane.

The company uses a MARR of 10% in evaluating investment alternatives. Should the company buy the new crane? Compare the annual equivalents in the "**Outsider Viewpoint**" method.



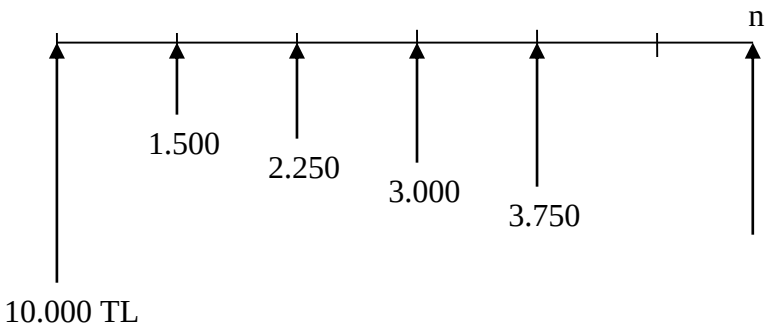
$AE_E(10) = -20.000 - (60.000 + 30.000)\ (A/P, 10\%, 10)$
$= -20.000 - (90.000)\ (0{,}16275)$
$= -20.000 - 14.647{,}50$
$= -34.647{,}50$ TL/yr

$AE_N(10) = -10.000 - 160.000(A/P, 10\%, 10) + 30.000\ (A/F, 10\%, 10)$
$= -10.000 - 160.000 \times 0{,}16275 + 30.000 \times 0{,}06275$
$= -10.000 - 23.040 + 1.882{,}50$
$= -34.157{,}50$ TL/yr

$\therefore$ BUY THE NEW CRANE

PROBLEM 3

A small compressor can be bought for 10.000 TL. The salvage value is assumed to be negligible regard less of the replacement interval. Annual operating and maintenance costs are expected to increase by 750 TL/yr, with the first years cost anticipated to be 1.500 TL. Using a MARR of 8%, determine the years at which replacement should take place.



MARR = 8%
LET N = 1
AE(8) = – 10.000 (A/P, 8%, 1) – 1.500
= – 10.000 x 1,08000 – 1.500
= – 10.800 – 1.500
= – 12.300 TL/yr

LET N = 2
AE(8) = – 10.000 (A/P, 8%, 2) – 1.500 – 750 (A/G, 8%, 2)
= – 10.000 x 0,56077 – 1.500 – 750 x 0,48
= – 5.607,70 – 1.500 – 360
= – 7.467,70 TL/yr

LET N = 3
AE(8) = – 10.000 (A/P, 8%, 3) – 1.500 – 750 (A/G, 8%, 3)
= – 10.000 x 0,38803 – 1.500 – 750 x 0,95
= – 3.880,30 – 1.500 – 712,50
= – 6.092,80 TL/yr

LET N = 4
AE(8) = – 10.000 (A/P, 8%, 4) – 1.500 – 750 (A/G, 8%, 4)
= – 10.000 x 0,30192 – 1.500 – 750 x 1,40
= – 3.019,20 – 1.500 – 1.050
= – 5.569,20 TL/yr

LET N = 5
AE(8) = – 10.000 (A/P, 8%, 5) – 1.500 – 750 (A/G, 8%, 5)
= – 10.000 x 0,25046 – 1.500 – 750 x 1,85
= – 2.504,60 – 1.500 – 1.387,50
= – 5.392,10 TL/yr

LET N = 6
AE(8) = – 10.000 (A/P, 8%, 6) – 1.500 – 750 (A/G, 8%, 6)
= – 10.000 x 0,21632 – 1.500 – 750 x 2,28
= – 2.163,20 – 1.500 – 1.710
= – 5.373,20 TL/yr

LET N = 7
AE(8) = – 10.000 (A/P, 8%, 7) – 1,500 – 750 (A/G, 8%, 7)
= – 10.000 x 0,19207 – 1.500 – 750 x 2,69
= – 1.920,20 – 1.500 – 2.017,50
= – 5.438,20 TL/yr

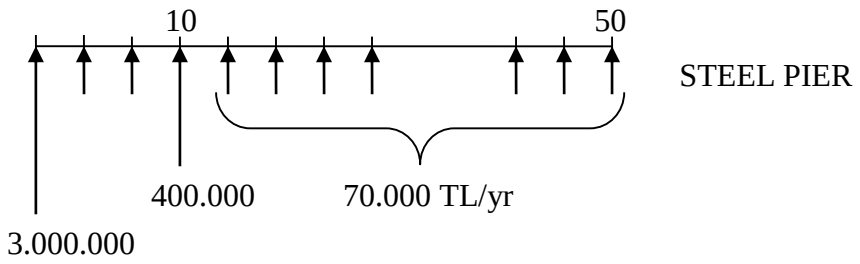
We see that the annual equivalent of costs reaches a MINIMUM when N=6 years, and that it starts climbing again starting on the 7th year. Therefore, it is best to replace the compressor at the end of 6^{th} year.

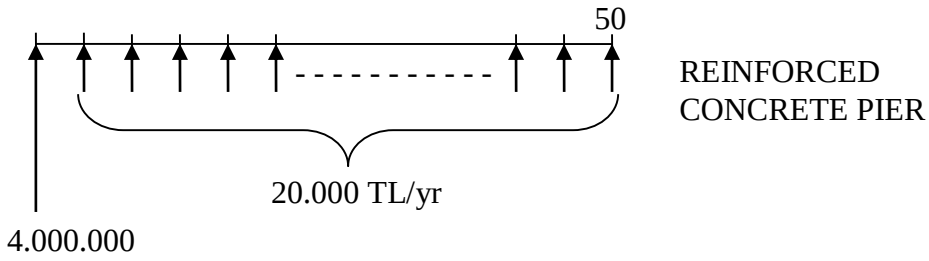
PROBLEM 4

Ten years ago, the port of Fethiye built a new pier containing a large amount of steel work, at a cost of 3.000.000 TL, estimating that it would have a life of 50 years. The annual maintenance cost, much of it for painting and repair caused by the environment, has turned out to be unexpectedly high, averaging 70.000 TL/yr.

The port manager has proposed to the port commission that this pier be replaced immediately with a reinforced concrete pier at an initial cost of 4.000.000 TL. He assumes them that this pier will have a life of at least 50 years with annual maintenance costs of not over 20.000 TL. He estimated that the net present salvage value of the existing pier would amount to 400.000 TL.

Assuming a MARR of 10%, what should the port commission's decision be? Use the "**Outsider Viewpoint**" method.





$AE_{STEEL}(10)$ = –70.000 – 400.000 (A/P, 10%, 40)
= –70.000 – 400.000 x 0,10226
= –70.000 – 40.904
= –110,904 TL/yr

$AE_{REINF}(10)$ = –20,000 – 4,000,000 (A/P, 10,50)
= –20,000 – 4,000,000 x 0,10086
= –20,000 – 403,440
= –423,440 TL/yr

∴ SELECT STEEL PIER

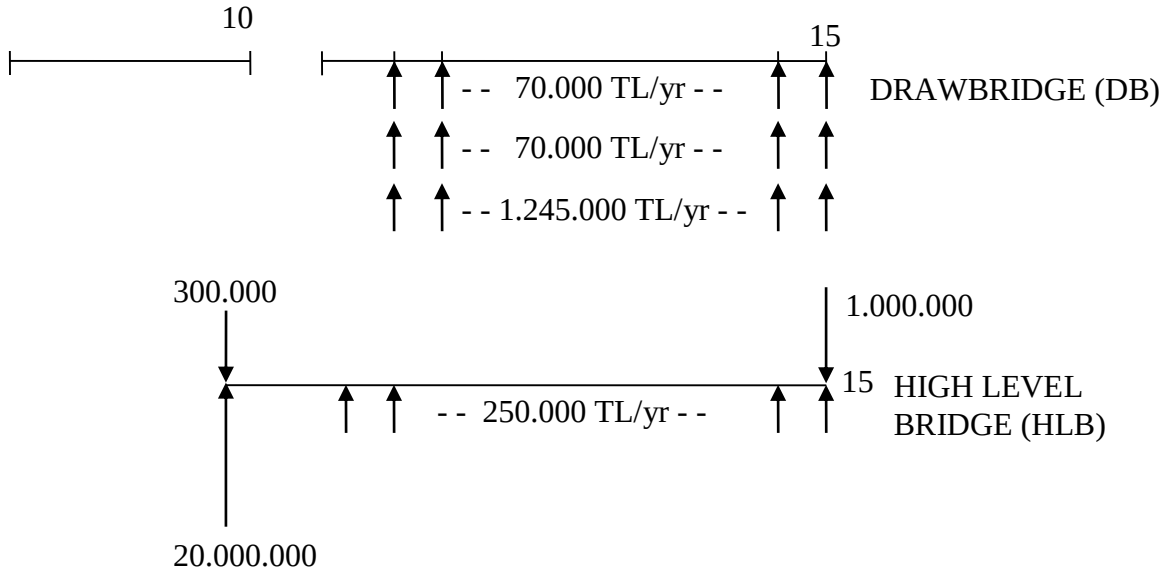
PROBLEM 5

A drawbridge must be raised each time a ship passes through. As a result of this there has been an average of 2 fatal and 7 nonfatal automobile accidents each year. Consequently, considerable public discussion has arisen regarding replacing this drawbridge with a high-level bridge which would eliminate those accidents, and delays caused by each opening.

An engineering study shows that the drawbridge, which was built 10 years ago at a cost of 12.000.000 TL has a net present salvage value of 300.000 TL. A new high-level bridge would cost 20.000.000 TL and it probably would have a salvage value 1.000.000 TL at the end of 15 years. The remaining useful life of the drawbridge is also 15 years with no salvage at the end of this period. Annual operation and maintenance costs for the drawbridge are 70.000 TL and for the high-level bridge 250.000 TL.

The cost incurred in the bridge due to opening delays amounts to 70.000 TL/year. The cost of each fatal accident has arbitrarily been put at 500.000 TL and for each non-fatal accident at 35.000 TL.

If MARR=5% calculate whether the drawbridge should be replaced by the high-level bridge. Use the "receipts and disbursements" method. (Attention: This is not a benefit/cost problem, i.e. there are only costs and incomes)



Cost of accidents: 2 x 500.000 + 7x 35.000

= 1.245.000 TL/yr

$AE_{DB}(5)$ = – 70.000 – 70.000 – 1.245.000

= – 1.385.000 TL/yr

$AE_{HLB}(5)$ = – 250.000 – (20.000.000 – 300.000) (A/P, 5%, 15) + 1.000.000 (A/F, 5%, 15)

= – 250.000 – 19.700.000 x 0,09664 + 1.000.000 x 0,04634

= – 250.000 – 1.897.898 + 46.340

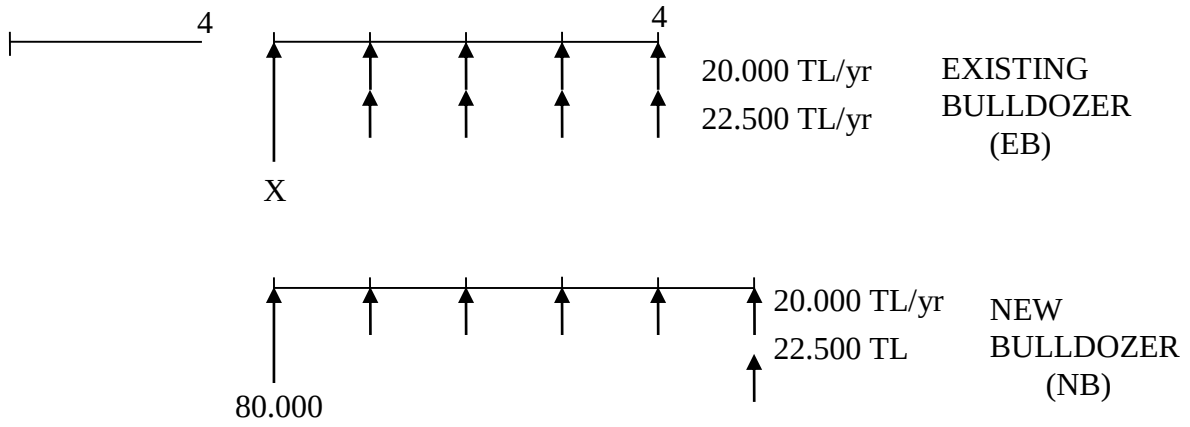
= – 2.101.558 TL/yr

∴ SELECT DRAWBRIDGE

PROBLEM 6

Four years ago an excavation contractor purchased a bulldozer for 70.000 TL estimating that it would have an economic life of 8 years, with no salvage value. Present salvage value (book value) of the existing machine is 10.000 TL. Out-of-pocket disbursements for operation and maintenance are about 20.000 TL per year; and in addition, because of repeated breakdowns, the company has had to rent another bulldozer for 45 days each year at 500 TL per day.

The company is planning to buy a new bulldozer at a cost of 80.000 TL. The economic life of the new bulldozer is 5 years with no salvage. Operation and maintenance costs for the new machine would be the same as for the old machine. The purchase of a new machine would eliminate the need for renting a bulldozer for 4 years necessitating the rental of an extra bulldozer only on the 5th year. Determine if the machine should be replaced or not by using **Comparative Use Value Method** and **Annual Equivalent** values. MARR = 10%.



MARR = 10%

$AE_{EB}(10) = - 20.000 - 22.500 - X\ (A/P, 10\%, 4)$

$= - 20.000 - 22.500 - X\ (0,31547)$

$= - 20.000 - 22.500 - 0,315470\ X$

$= - 0,315470\ X - 42.500$ TL/yr

$AE_{NB}(10) = - 20.000 - 22.500\ (A/F, 10\%, 5) - 80.000\ (A/P, 10\%, 5)$

$= - 20.000 - 22.500 \times 0,16380 - 80.000\ (0,26380)$

$= - 44.789,5$ TL/yr

$$AE_{EB} = AE_{NB}$$

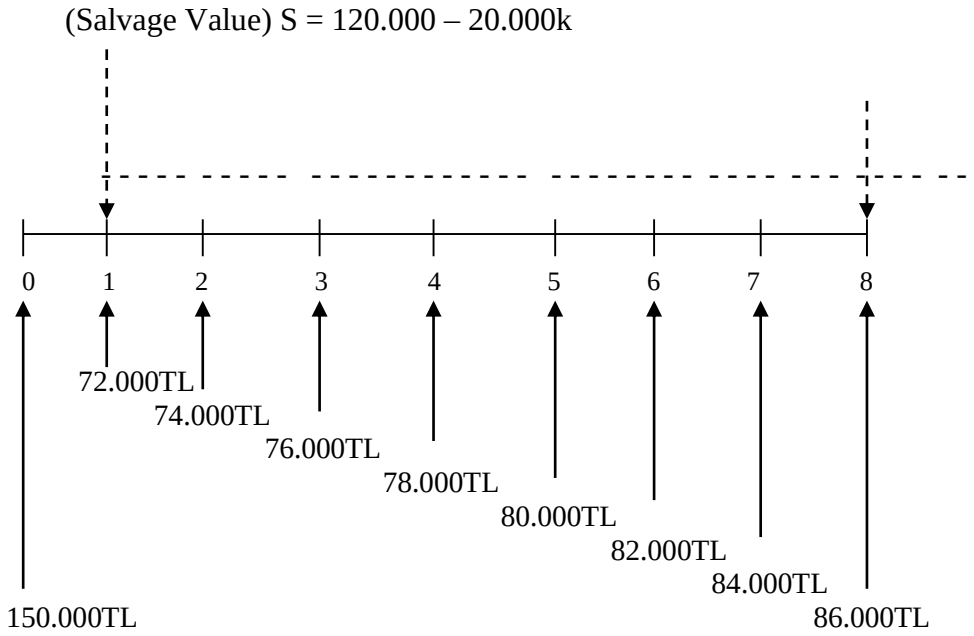
$$- 0,315470\ X - 42.500 = - 44.789,5$$

$$X = 7.257,4 \text{ TL}$$

$X < 10.000$ TL → Existing machine worths less than its market price, so replace it!

PROBLEM 7

Given the cash flow of an equipment which has a first cost of 150 000 TL and a salvage value described by S= 120.000 – 20.000k, where k is the number of years since it was purchased. The salvage value does not go below zero. Determine its economic service life at an interest rate of 15% per year. Note that the equipment will have a maximum service life of 8 years.



For n=1

AE_1 = -150.000(A/P, 15%, 1) – 72.000 + 100.000(A/F, 15%, 1) = AE_1 = -144.500 TL

For n=2

AE_2 = -150.000(A/P, 15%, 2) – [72.000 + 2.000(A/G, 15%, 2)] + 80.000(A/F, 15%, 2)

AE_2 = -127.987 TL

For n=3

AE_3 = -150.000(A/P, 15%, 3) – [72.000 + 2.000(A/G, 15%, 3)] + 60.000(A/F, 15%, 3)

AE_3 = -122.234 TL

For n=4

AE_4 = -150.000(A/P, 15%, 4) – [72.000 + 2.000(A/G, 15%, 4)] + 40.000(A/F, 15%, 4)

AE_4 = -119.186 TL

For n=5

AE_5 = -150.000(A/P, 15%, 5) – [72.000 + 2.000(A/G, 15%, 5)] + 20.000(A/F, 15%, 5)

AE_5 = -117.225 TL

For n=6

AE_6 = -150.000(A/P, 15%, 6) – [72.000 + 2.000(A/G, 15%, 6)] + 0

AE_6 = -115.824 TL

For n=7

AE_7 = -150.000(A/P, 15%, 7) – [72.000 + 2.000(A/G, 15%, 7)] + 0

AE_7 = -112.959 TL

For n=8

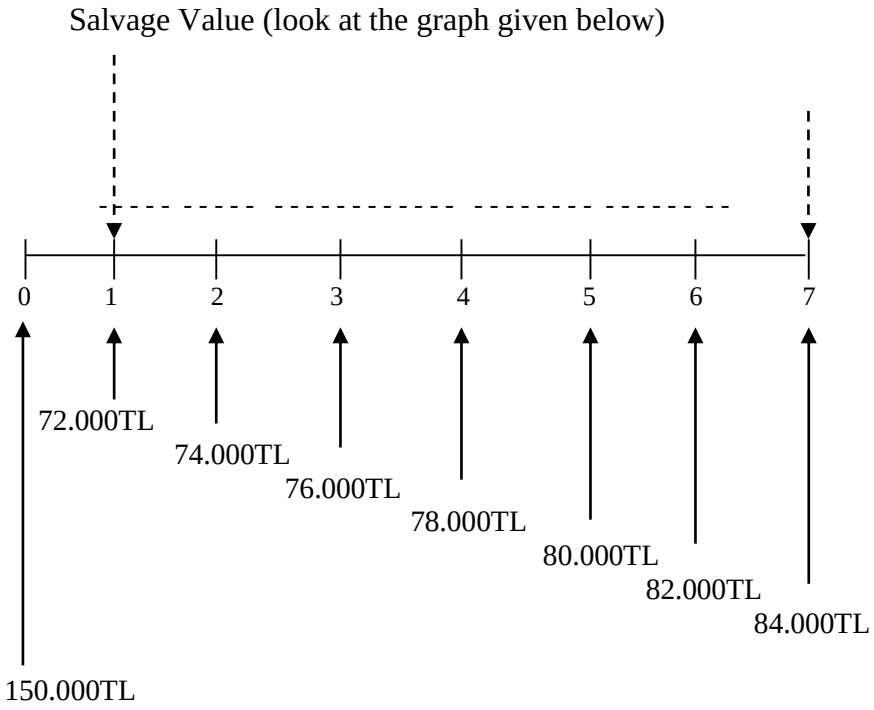
AE_8 = -150.000(A/P, 15%, 8) – [72.000 + 2.000(A/G, 15%, 8)] + 0

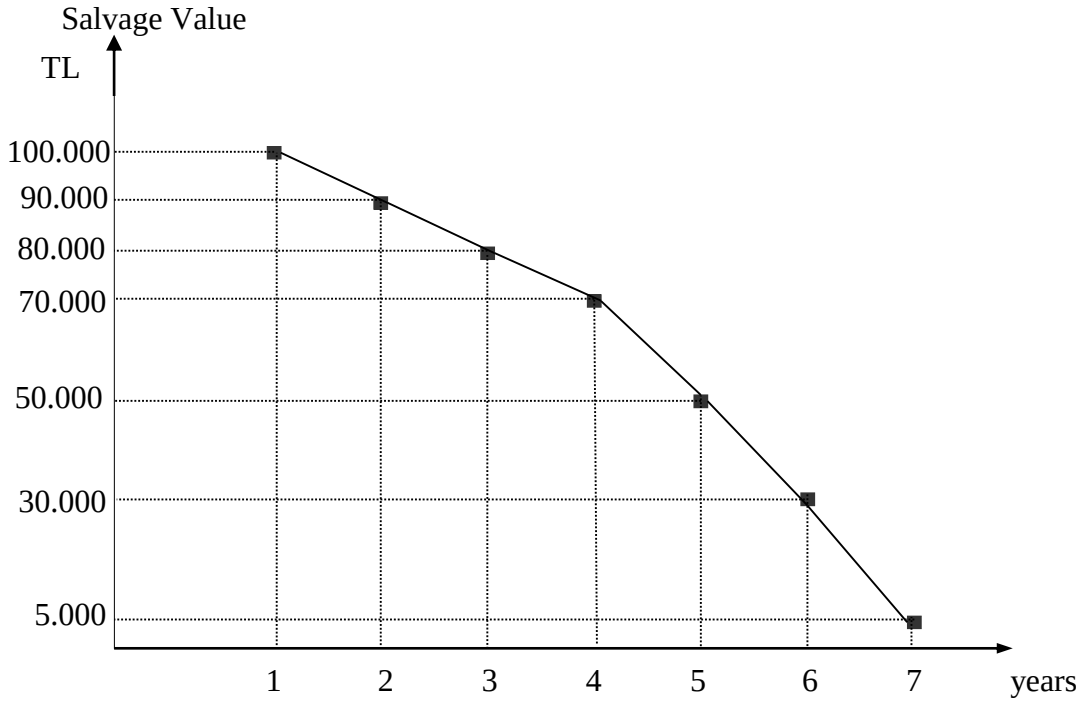
AE_8 = -110.997 TL

Therefore, economic service life is 8 years with AE = -110.997 TL

PROBLEM 8

The cash flow diagram of an equipment which has a first cost of 150.000 TL is given below. A graph which shows the salvage value of the equipment at the end of each corresponding year is also given. Determine the economic life of this equipment if the interest rate is 15% per year.





For n=1

AE_1 = -150.000 (A/P, 15%, 1) – 72.000 + 100.000 (A/F, 15%, 1)

AE_1 = -144.500 TL

For n=2

AE_2 = -150.000 (A/P, 15%, 2) – [72.000 + 2.000 (A/G, 15%, 2) + 90.000 (A/F, 15%, 2)

AE_2 = -123.336 TL

For n=3

AE_3 = -150.000 (A/P, 15%, 3) – [72.000 + 2.000 (A/G, 15%, 3) + 80.000 (A/F, 15%, 3)

AE_3 = -116.474 TL

For n=4

AE_4 = -150.000 (A/P, 15%, 4) – [72.000 + 2.000 (A/G, 15%, 4) + 70.000 (A/F, 15%, 4)

AE_4 = -113.177 TL

For n=5

AE_5 = -150.000 (A/P, 15%, 5) – [72.000 + 2.000 (A/G, 15%, 5) + 50.000 (A/F, 15%, 5)

AE_5 = -112.776 TL

For n=6

AE_6 = -150.000 (A/P, 15%, 6) – [72.000 + 2.000 (A/G, 15%, 6) + 30.000 (A/F, 15%, 6)

AE_6 = -112.398 TL

For n=7

AE_7 = -150.000 (A/P, 15%, 7) – [72.000 + 2.000 (A/G%, 15, 7) + 5.000 (A/F, 15%, 7)

AE_7 = -112.508 TL

Therefore, economic service life is **6 years** with **AE = -112.398 TL**

PROBLEM 9

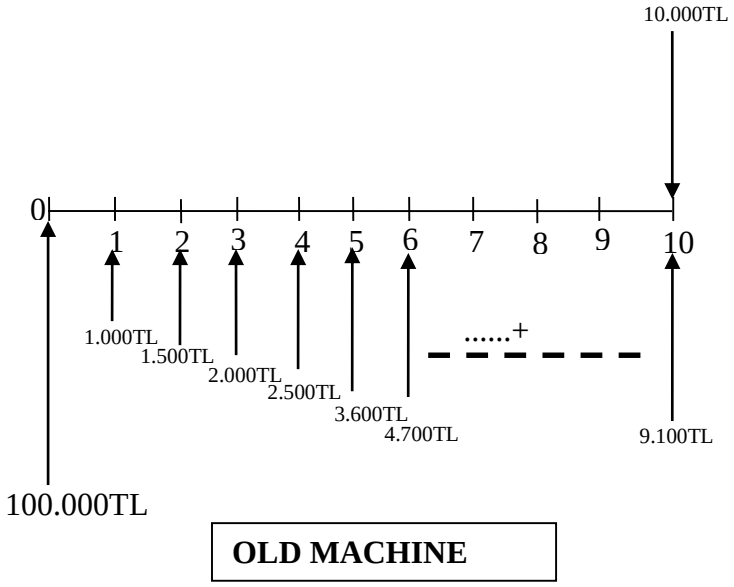
A machine was bought for 100.000TL four years ago. Today, the owner carries out an economic analysis to decide whether he should sell the old machine and buy a new one.

The old machine has a useful life of 10 years and its salvage value at the end of its useful life is 10.000TL. If the owner wants to sell it today, assume that its market value will be equal to its book value which can be calculated by considering its depreciated amount according to Straight Line Depreciation Method. The annual Operation and Maintenance Cost was 1.000TL/ year at the first year of its operation and increases by 500TL for the first 4 years and increases by 1.100TL in the remaining 6 years.

The new machine can be purchased for 80.000TL now and it has a useful life of 7 years. The annual Operation and Maintenance Cost is 2.000TL/ year for the first 3 years and increases by 1.000TL in the remaining 4 years. It has a salvage value of 15.000TL at the end of its useful life. Use MARR=10%.

a) Use the **OUTSIDER VIEWPOINT** to decide if the owner shall replace or keep the old machine now (USE PRESENT WORTH APPROACH).

b) Find the economic life of the old machine (ASSUME THAT ITS MARKET/SALVAGE VALUE IS EQUAL TO ITS BOOK VALUE AT THE END OF EACH YEAR). Use the STRAIGHT LINE DEPRECIATION METHOD for depreciation calculations.

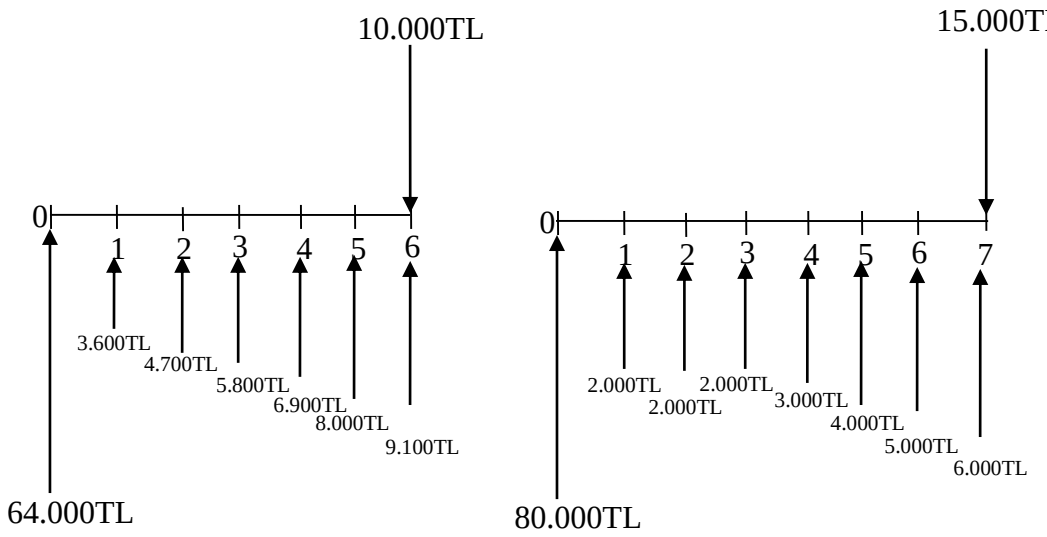


DEPRECIATION= $\frac{(100.000-10.000)}{10} = 9.000$ TL/year

After 4 years, the Market Value of Machine;

S_4=100.000 – 9.000*4= 64.000TL

a)



Common multiple of lives is 42 years. MARR= 10%

$\mathbf{AE_{OLD}}(10)$= -64.000(A/P,10%,6) – 3.600 – 1.100(A/G,10%,6) + 10.000(A/F,10%,6)

$\mathbf{AE_{OLD}}(10)$= -64.000*0,2296 – 3.600 – 1.100*2,2236 + 10.000*0,1296= -19.444,36TL

$\mathbf{PW_{OLD}}(10)$= -19.444,36(P/A,10%,42)= -19.444,36*9,81258= **-190.799,34TL**

$$(P/A,10\%,42)= 9,7791+\frac{(9,8628-9,7791)}{5}*2=9,81258$$

$\mathbf{AE_{NEW}}(10)$= -80.000(A/P,10%,7) – 2.000(P/A,10%,3)(A/P,10%,7) –
[3.000+1.000(A/G,10%,4)](F/A,10%,4) (A/F,10%,7) + 15.000(A/F,10%,7)

$\mathbf{AE_{NEW}}(10)$= -80.000*0,2054–2.000*2,4869*0,2054–[3.000+1.000*1,3812]*4,641*0,1054

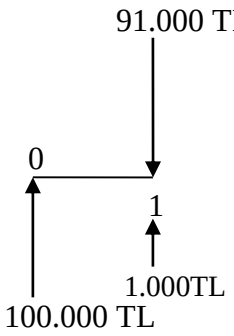
+15.000*0,1054= -18.015,73TL

$\mathbf{PW_{NEW}}(10)$=-18.015,73(P/A,10%,42)= -18.015,73*9,81258= **-176.780,79TL**

Since $\mathbf{PW_{OLD}}(10) > \mathbf{PW_{NEW}}(10)$ CHOOSE **THE NEW MACHINE!!!!!!**

b)

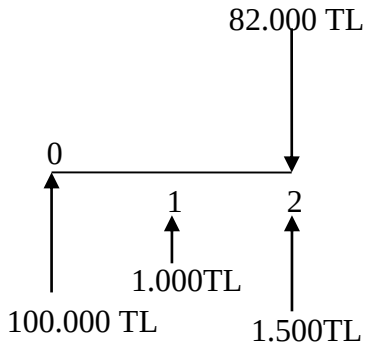
* n=1 year



AE(10) = - 100.000 (A/P, 10%, 1) + 91.000(A/F,10%,1)-1.000

AE(10) = -20.000TL

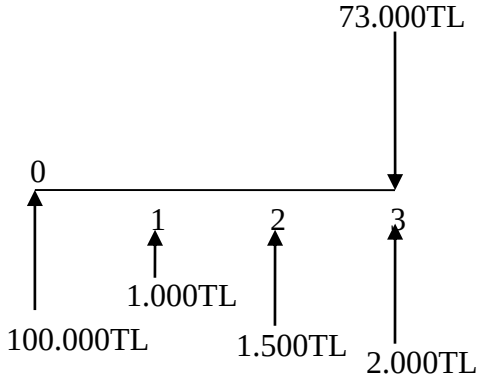
* n = 2 years



AE(10) = - 100.000 (A/P,10%,2)+82.000(A/F,10%,2)-1000-500(A/G,10%,2)

AE(10) = -19.809,52TL

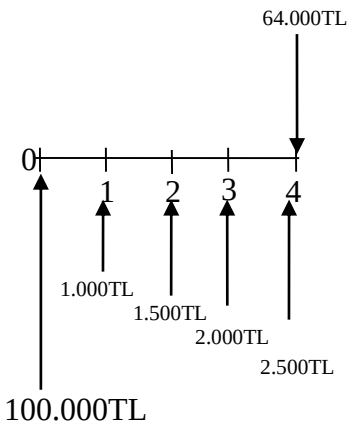
* n = 3 years



AE(10) = -100.000(A/P,10%,3)+70.000 (A/F,10%,3)- 1.000-500(A/G,10%,3)

AE(10) = -19.625,38TL

* n = 4 years

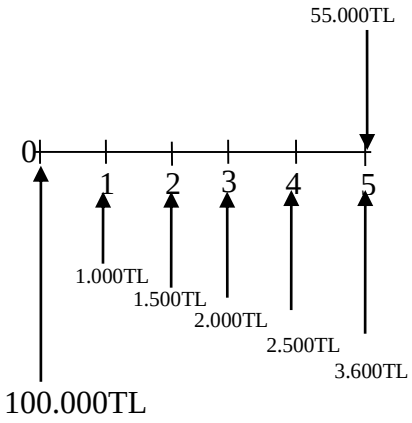


AE(10) = -100.000(A/P,10%,4)+64.000(A/F,10%,4)-

1.000-500(A/G,10%,4)

AE(10) = <u>-19.447,53TL</u>

* n = 5 years

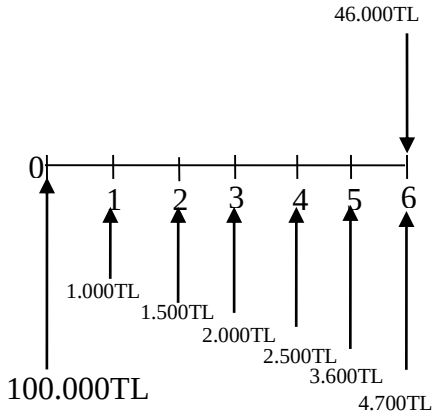


AE(10) = -100.000(A/P,10%,5)+55.000(A/F,10%,5)-

[1.000-500(A/G,10%,4)](P/A,10%,4)(A/P,10%,5)-
3.600(A/F,10%,5)

AE(10) = <u>-19.374,23TL</u>

* n = 6 years



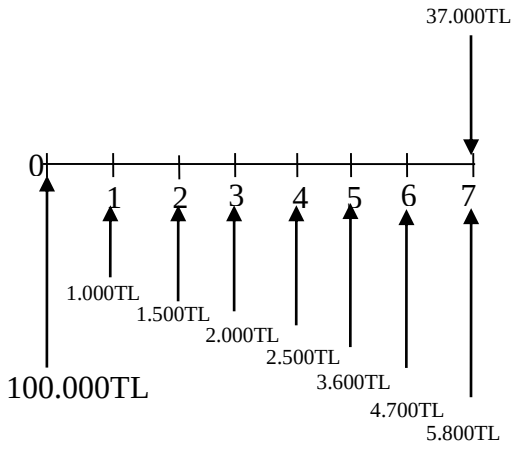
AE(10) = -100.000(A/P,10%,6)+46.000(A/F,10%,6)-

[1.000-500(A/G,10%,4)](P/A,10%,4)(A/P,10%,6)-

[3.600+1.100(A/G,10%,2)](F/A,10%,2) (A/F,10%,6)

AE(10) = <u>-19.351,65TL</u>

* n = 7 years



AE(10) = -
100.000(A/P,10%,7)+37.000(A/F,10%,7)-

[1.000-500(A/G,10%,4)](P/A,10%,4)

(A/P,10%,7)[3.600+1.100(A/G,10%,3)]

(F/A,10%,3) (A/F,10%,7)

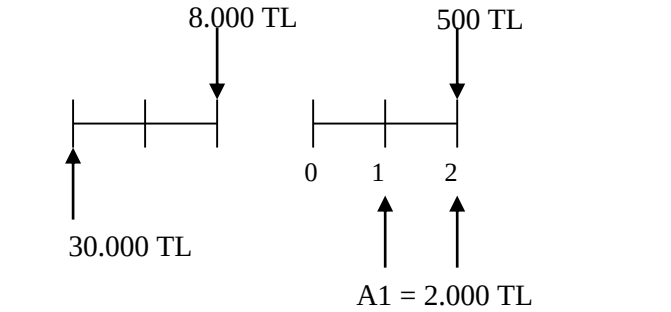
AE(10) = <u>-19.356,74TL</u>

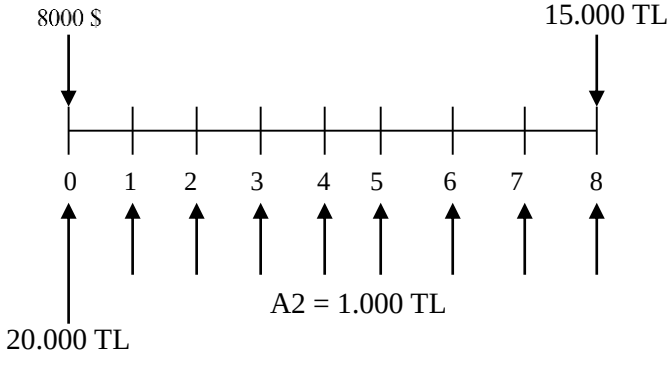
Since the annual cost started to increase at 7th year, **ECONOMIC LIFE** is 6 years.

∴ **<u>Economic life is 6 years.</u>**

<u>PROBLEM 10</u>

Your company has a construction machine that cost 30.000 TL purchased 2 years ago. It has a present salvage value of 8.000 TL. The machine has a useful life of 4 years and a salvage value of 500TL at the end of its useful life. Operating costs are 2.000TL/year. You are considering replacing this machine with a new model that will cost you 20.000 TL now. It has an annual operating cost of 1.000 TL with a useful life of 8 years and 15.000 TL salvage value at the end of its life. If MARR is 10%, what should you do? (**Use Receipts and Disbursements Method**)





AE_1 (10) = -2.000 + 500 (A/F, 10%, 2)

= -2.000 + 500 * 0,4762 = -2.000 + 238

= -1.762 TL

AE_2 (10) = -1.000 – (20.000 – 8.000) * (A/P, 10%, 8) + 15.000 * (A/F, 10%, 8)

= -1.000 – (20.000 – 8.000) * (0,1874) + 15.000 * (0,0874)

= -1.000 – 2.249 + 1.311

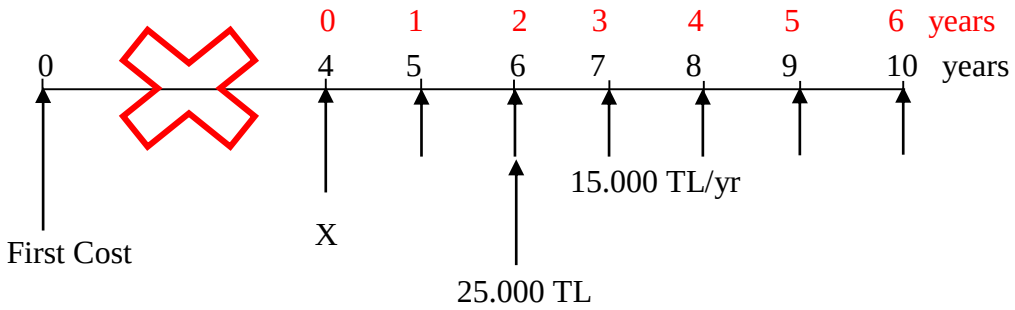
= -1.938 TL

Therefore, keep the existing machine.

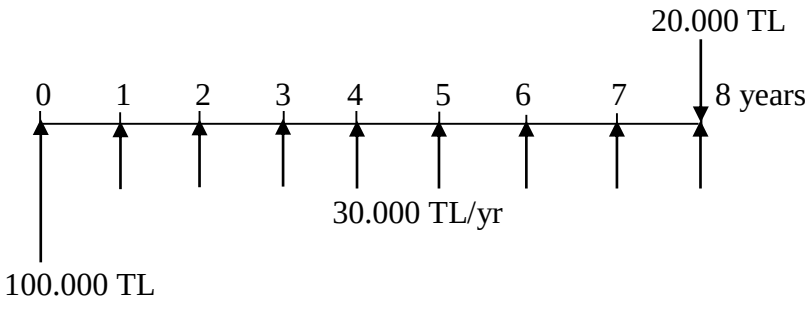
PROBLEM 11

A machine is purchased 4 years ago with a service life of 10 years. The current book value of the existing machine is 80.000 TL. The company is considering replacement of the machine with a new one which will be purchased for 100.000 TL with an 8 years of service life.
Annual expenses of the existing machine is 15.000 TL and it requires a repair cost of 25.000 TL at 2 years time from now on, it has no salvage value at the end of its service life. Annual expenses of the new machine is 30.000 TL and it has a salvage value of 20.000 TL at the end of its service life. Determine if the machine should be replaced or not by using **Annual Equivalent** values and **Comparative Use Value Method** (MARR = 10%).

Existing Machine



New Machine



AEex = - X (A/P,10%,6) – 15.000 – 25.000 (P/F,10%,2) (A/P,10%,6)

AEex = - X (0,22961) – 15.000 – 25.000 (0,8264) (0,22961)

AEex = - 0,22961 X – 19.743,74

AEnew = - 100.000 (A/P,10%,8) – 30.000 + 20.000 (A/F,10%,8)

AEnew = - 100.000 (0,18744) – 30.000 + 20.000 (0,08744)

AEnew = - 46.995,2 TL

$$AEex = AEnew$$

$$- 0{,}22961\ X - 19.743{,}74 = - 46.995{,}2$$

$$- 0{,}22961\ X = - 27.251{,}46$$

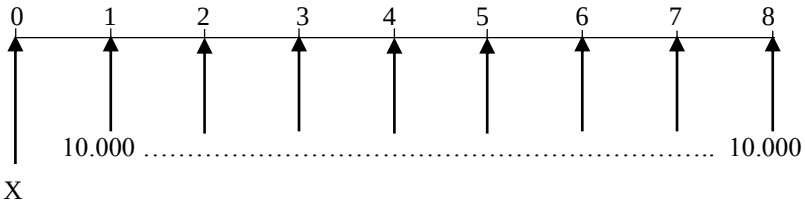
$$X = 118.685{,}86\ TL$$

X > 80.000 TL → Existing machine worths more than its market price, so keep it!

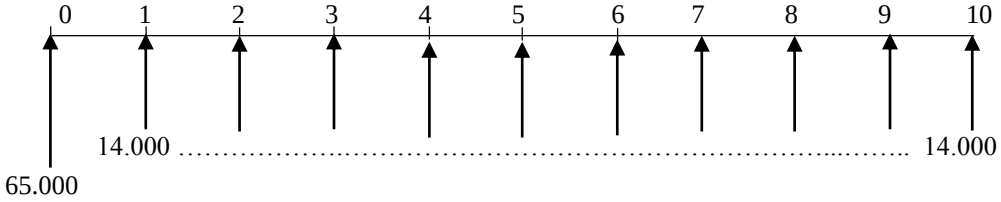
PROBLEM 12

An existing machine can be used for another 8 years if it is maintained every year. Operation and maintenance cost is estimated to be about 10.000 TL per year. On the other hand, a new machine, which can do the same service, can be purchased for 65.000 TL with a useful life of 10 years, and its operation and maintenance cost is estimated to be 14.000 TL per year.
If the company expects to have 6% MARR from its investments, determine the minimum selling price of the existing machine so that purchasing the new machine will be more economical (No salvage value is to be considered for either machine). Use **Comparative Use Value Method** and **Annual Equivalent** values.

Existing Machine



New Machine



$$[- 65.000\ (A/P,6\%,10) – 14.000] = [- X\ (A/P,6\%,8) – 10.000]$$

$$[- 65.000\ (0,13587) – 14.000] = [- X\ (0,16104) – 10.000]$$

$$- 12.831,55 = - 0,16104\ X$$

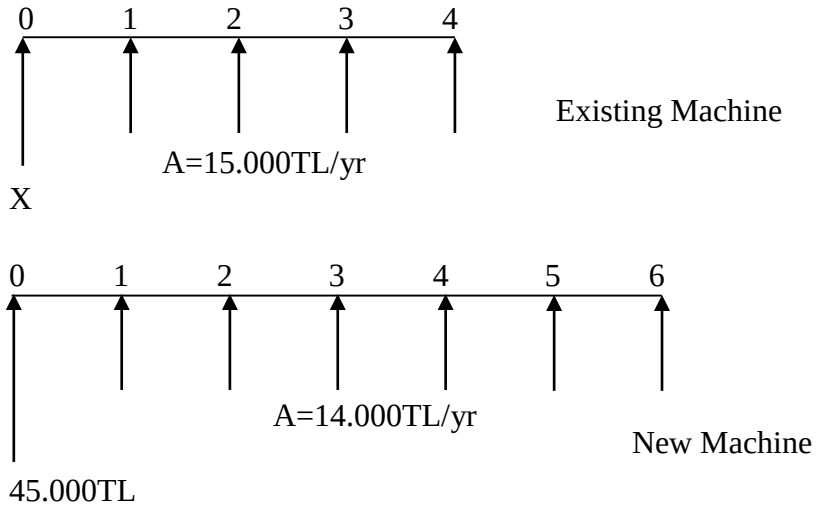
$$X = 79.679,27\ TL$$

If the selling price is minimum 79.679,27 TL, in other words X ≥ 79.679,27 TL, then it would be feasible to replace it!

PROBLEM 13

An existing machine which worth 35.000 TL today can be used for another 4 years if it is maintained every year. Operation and maintenance cost is estimated to be 15.000 TL per year. On the other hand, a new machine, which can do the same service, can be purchased for 45.000 TL with a useful life of 6 years and its operation and maintenance cost is estimated to be 14.000 TL per year.

If the company expects to have 12% MARR per year from its investments, decide whether the existing machine is to replaced with the new machine or not. No salvage value is to be considered for either machine. Use **Comparative Use Value Method** with **Annual Equivalent** values.



$$- X\ (A/P,12\%,4) – 15.000 = - 45.000\ (A/P,12\%,6) – 14.000$$

$$- X*0,32923 = - 45.000*0,24323 – 14.000 + 15.000$$

$$- 0,32923\ X = - 9.945,35$$

X = 30.207,91 TL < 35.000 TL → Existing machine worths less than its market price, so replace it!

PROBLEM 14

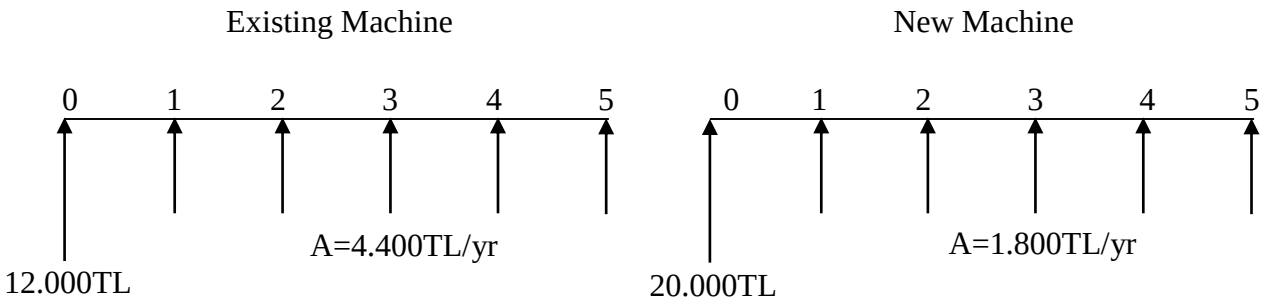
A soft drink bottler purchased a bottling machine 2 years ago for 16.800 TL, and has a current book value of 12.000 TL. At that time it was estimated to have a service life of 7 years with no salvage value. Annual operating cost of the machine amounted to 4.400 TL. A new bottling machine is being considered which would cost 20.000 TL but would match the output of the old machine for an annual operating cost of 1.800 TL. The new machine's service life is 5 years with no salvage value. MARR is 6%.

a) Take the **Outsider Viewpoint** and calculate the equivalent annual cost for each of the two alternatives.

b) What is the **Comparative Use Value** of the old machine in comparison with the new machine? Use annual equivalent values.

c) Compare present worth of the machines according to **Receipts and Disbursements Method**.

a) Outsider Viewpoint Method

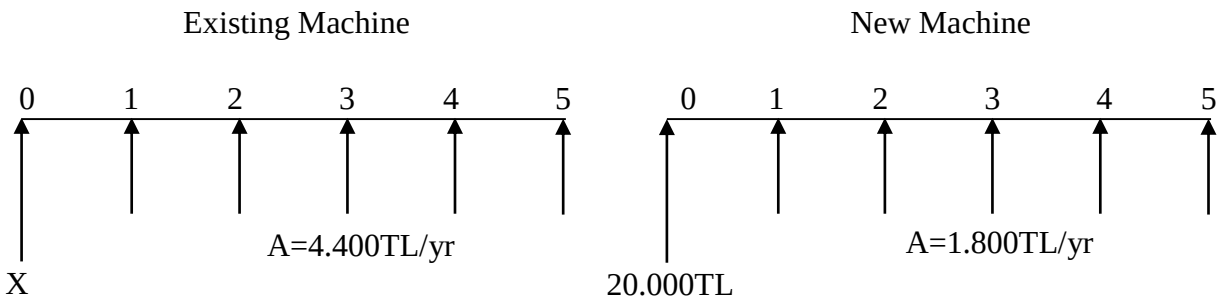


AEex = - 12.000 (A/P,6%,5) – 4.400 = - 12.000 (0,23740) – 4.400 = - 7.248,8 TL

AEnew = - 20.000 (A/P,6%,5) – 1.800 = - 20.000 (0,23740) – 1.800 = - 6.548,0 TL

Therefore replace the existing machine!

b) Comparative Use Value Method



AEex = - X (A/P,6%,5) – 4.400 = - 0,23740 X – 4.400

AEnew = - 20.000 (A/P,6%,5) – 1.800 = - 20.000 (0,23740) – 1.800 = - 6.548,0 TL

AEex = AEnew

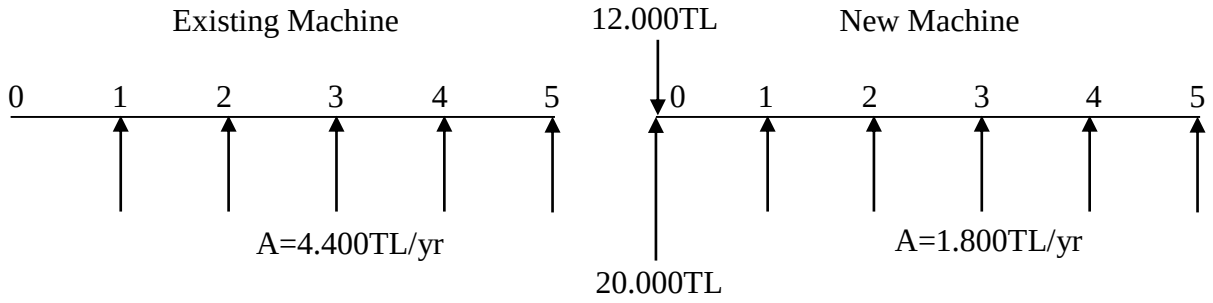
- 0,23740 X – 4.400 = - 6.548

X = 9.048,02 TL

X < 12.000 TL

Therefore replace the existing machine!

c) Receipts and Disbursements Method



PWex = - 4.400 (P/A,6%,5) = - 4.400*4,2124 = - 18.534,56 TL

PWnew = - (20.000-12.000) – 1.800 (P/A,6%,5) = - 8.000 – 1.800 (4,2124) = - 15.582,32 TL

Therefore replace the existing machine!