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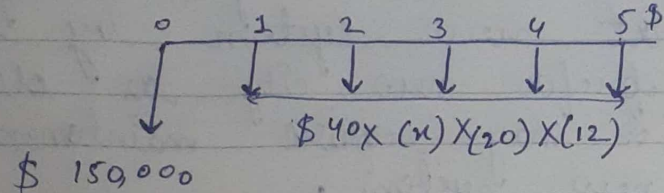
1)

a) Cash flow diagram of new system

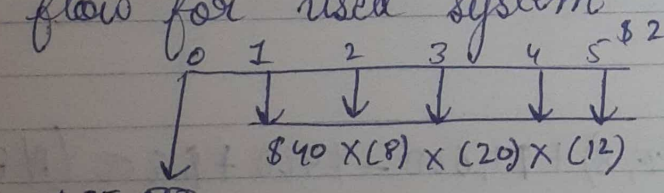
Assumption- x = hours per day for new system



Now calculating EUAC (Equivalent Uniform Cost) For new system

$$EUAC_{new} = \$150,000\,(A/P\ 12\%, 5) - \$50,000\,(A/F, 12\%, 5) + (\$40)(x)(20)(12)$$

Cash flow for used system



$$EUAC_{used} = \$75,000\,(A/P, 12\%, 5) - \$20,000\,(A/F, 12\%, 5) + (\$40)(8)(20)(12)$$

For breakeven point

Putting $EUAC_{new} = EUAC_{used}$

$\$150,000 \times 0.2774 - \$50,000 \times 0.1574 + 40 \times 20 \times 12 \times x = \$75000 \times 0.2774 - \$20,000 \times 0.1574 + 40 \times 8 \times 20 \times 12$

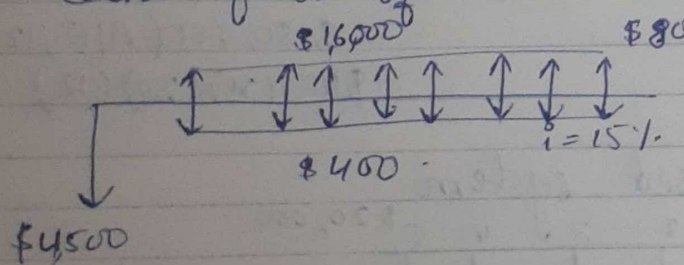
Saving we get $x = 6.32$ hours.

So percent reduction for break even = $\left(\frac{8.632}{8}\right) \times 100$

= 21% reduction in labour hour

b) If we go by break even analysis we will choose used system. But the used system only managed to beat new system by very small margin. JO can prefer new city as old system is less reliable & may require maintenence cost in near. Also with new system.

2) a) Cash flow of Alternative 1

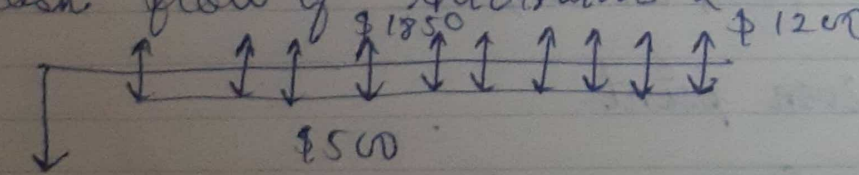


$AW_1 = -\$4,500(A/P, 15\%, 8) + \$1,600 - \$400 + \$800(A/F, 15\%, 8)$

$= -\$4,500(0.2229) + \$1200 + \$800(0.0729)$

$\doteq \$255$

Cash flow of Alternative 2



$AW_2 = -\$6000(A/P\ 15\%, 10) + \$1850 - \$500 + \$1200(A/F, 15\%, 10)$

$= -\$6000(0.1993) + \$1350 + \$1,200(0.0493)$

$= \$213$

So, we will select Alternative 1.

Now, initial investment in Alternative 2 to reverse the selection we will find breakdown point.

$$\$255 = -I_2 (A/P, 15\%, 10) + \$1350 + \$1,200 (A/F, 15\%, 10)$$
$$\$255 = -I_2 (0.1993) + \$1350 + \$1200 (0.00493)$$

$$\boxed{I_2 = \$5791}$$

b) Let life be 'N' for alternative 1

For annual worth to be equal

$$-\$4500 (A/P, 15\%, N) + \$1200 + \$800 (A/F, 15\%, N) = \$213$$
$$-\$4540 (A/P, 15\% N) + \$987 + \$800 (A/F, 15\%, N) = 0$$

By trial & Error $N = 7.3$ years.