CE 231 – RATE OF RETURN EXAMPLE

QUESTION: Two equipments are being considered for an excavation job:

<u>Alternative A:</u> Initial cost of equipment A is 100 $ and it has 3 years of useful life. Annual maintenance cost for 3 years is 20 $/year. The salvage value at the end of its life is 35 $.

<u>Alternative B:</u> Initial cost of equipment B is 80 $ and it has 4 years of useful life. Annual maintenance cost for 4 years is 30 $/year. The salvage value at the end of its life is 25 $.

If MARR is 15%, select the best alternative by the <u>RATE OF RETURN METHOD</u> using <u>PRESENT WORTH AMOUNTS.</u>

SOLUTION:

STEP 1: Rank the alternatives: Initial cost of equipment B is smaller than equipment A, so;

Current Best = B

Challenger = A

STEP 2: Draw the net cash flow diagram of challenger of (Challenger - Current Best) = (A - B)

As the present worth method will be used and lives of alternatives are different, common multiple lives (CML) should be calculated. The net cash flow diagram shall be drawn for 3 x 4=12 years.

(CH-CB) cashflow
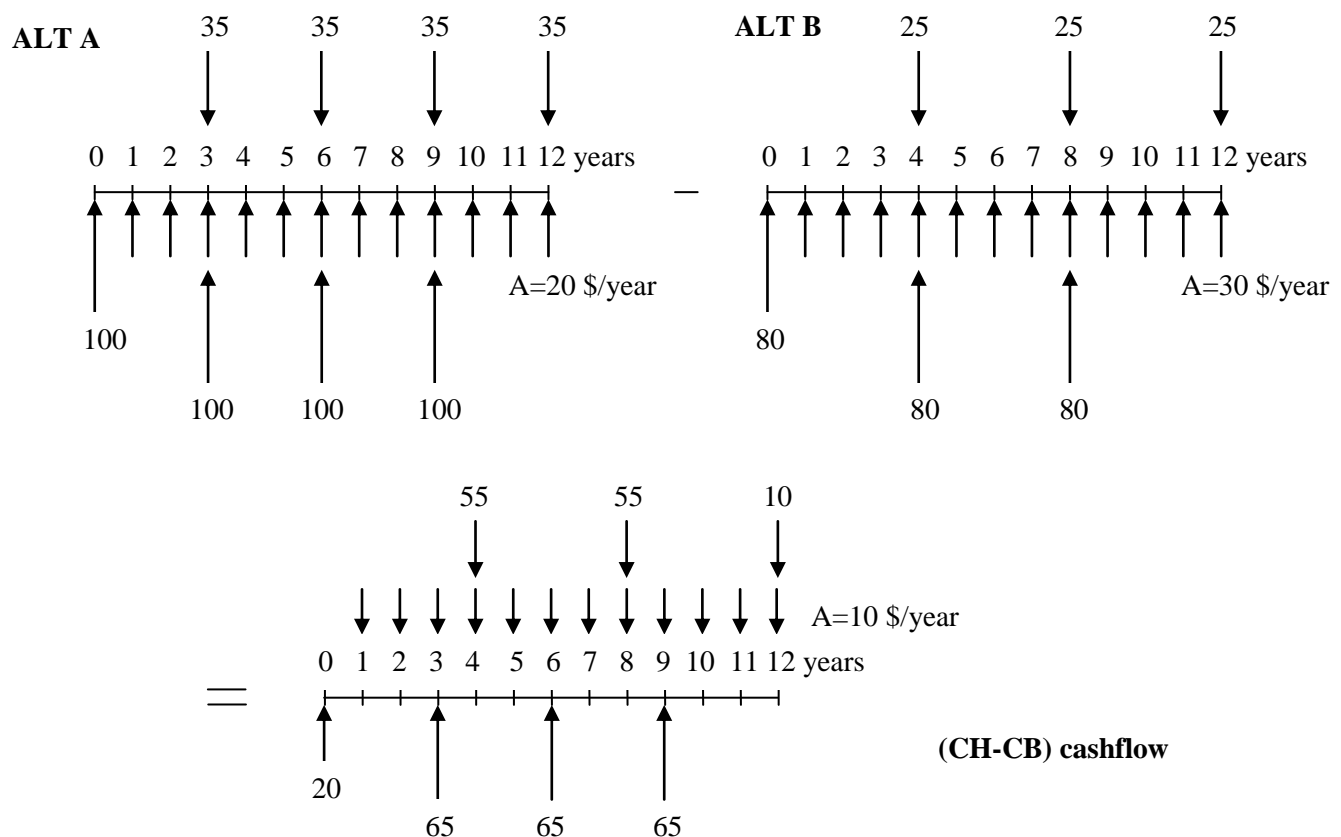
PW(i*) = -20 + 10(P/A, i*, 12) - 65(P/F, i*, 3) - 65(P/F, i*, 6) - 65(P/F, i*, 9) + 55(P/F, i*, 4) + 55(P/F, i*, 8) + 10(P/F, i*, 12) = 0

Try i* = 10%, PW (10%) = 1.451 $

Try i* = 12%, PW (12%) = -0.956 $

i* is between 10% and 12%, as a result of linear interpolation, **i*=11.21%**

i*<MARR, then challenger is eliminated, current best alternative is chosen.

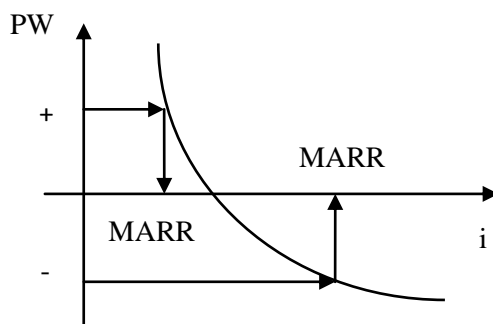## SELECT ALTERNATIVE B

OR

SHORT CUT METHOD

Put MARR (15%) in PW formula given above;

PW (15%) = -3.812

If PW of (CH-CB) is negative, i*<MARR, Select CB

If PW of (CH-CB) is positive, i*>MARR, Select CH

PW(15%) is negative, the i*<15%, CH is eliminated, CB is chosen.

SELECT ALTERNATIVE B