FM Assignment - 2

1) $L_0 = 20000$, $n = 5yr$, $X = 427.90$ / month

i) $L_n = 427.90\,(12\times 5) = 25674$

∴ Interest paid $= 25674 - 20000 = 5674$.

∴ APR $= \frac{5674}{5\times 20000} =$ ~~28.37%~~ $5.674\,\%$

ii) ~~If interest paid = 5674~~ $X' = 274.49$

~~∴ Ln = 25674~~ APR $= 5.674\%$

~~∴ 274.49 (12 × x) = 25674~~

~~x = 7.794~~

$$10^{-2}\times 5.674 = \frac{(12x)(274.49) + 12(427.9) - 20000}{(1+x)(20000)}$$

$$20000x\,(5.674) = 3293.88x + 5134 - 20000$$

$$113480(x+1) = 3293.88x - 14866$$

$$16000.8 = 2159.08x$$

$$x = 7.41093$$

∴ New term of loan is 8.41093 yrs.

iii) Interest paid $= 427.9(12) + 274.49(12\times 7.41093)$

$= 29545.51411 - 20000$

$= 9545.51411$

∴ $9545.51411 - \cancel{2}5\cancel{7}674 = 3871.514$

∴ The couple will ₹ 3871.514 more interest

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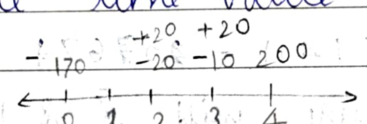
Q.2) a) ~~Discounted payback period is the~~

i) A discounted payback period gives the number of years it takes to break even from undertaking the initial expenditure by discounting future cashflows, and recognizing the time value of money.

b) Payback period of a project is found by counting the no. of years it takes before the cumulative forecasted cashflow equals initial investments.

ii) ~~Time doesn't affect payb~~

Payback periods don't consider the time value of money. Discounted payback periods considers the time value of money. Discounted payback is a superior measure to proceed with an investment project as it considers the time value of money.



iii) Project A :-

PV outgo $= 170 + 10\cancel{0}(1+i)^{-3} + 20(1+i)^{-2}$

PV income $= 20(1+i)^{-2} + 20(1+i)^{-3} + 200(1+i)^{-4}$.

Project B :-

PV outgo $= 200\cancel{4}$.

PV income $= \cancel{20}\ 14\, a_{\overline{6}|}(1+i)^{-1} + \cancel{8}\ 200(1+i)^{-7}$

a) IRR A

$$\left(170 + 10(1+i)^{-3} + 20(1+i)^{-2}\right) - \left(20(1+i)^{-2} + 20(1+i)^{-3} + 200(1+i)^{-4}\right) = 0$$

IRRB :-

$200 - 14\, a_{\overline{6}|} (1+i)^{-1} - 200 (1+i)^{-7} = 0$

NPV :- $(i = 6\%)$.

NPV_A = PVincome − PVoutgo

$= 20(1.06)^{-2} + 20(1.06)^{-3} + 200(1.06)^{-4} - 20(1.06)^{-2} - 10(1.06)^{-3} - 170$

$= 20(1.06)^{-3} + 200(1.06)^{-4} - 10(1.06)^{-3} - 170$

$= -3.1851$

$NPV_B = 14\, a_{\overline{6}|} (1+i)^{-1} + 200 (1+i)^{-7} - 200$

$= 14\, a_{\overline{6}|} @ 6\% \; (1.06)^{-1} + 200 (1.06)^{-7} - 200$

$= 14(4.9173)(1.06)^{-1} + 200(1.06)^{-7} - 200$

$= 253.624717 - 200$

$= 53.624717.$

The maximum interest charged will be equal to the IRR for each ~~proj~~ project. Above this value, the project will be unprofitable. The investor should also consider the factor that project B gives ~~£~~ a series of income and initial amount invested at ~~time~~ end of year 6 on the single outgo of ₹ ~~£~~ 200,000.

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Q. 3) A1 - 200 yearly 1986 - 2007

A2 - 320 quarterly 1st Jan, 1st April, 1st July

1st Oct, 1986 - ~~2002~~ 1st Jan 2002.

A3 - 180 monthly, 1 Jan 1986 - 1 ~~Jan~~ Aug 2004

$i =$ ~~1985~~ 8%.

Q. 4)

1 2 3 4 5 6 7 . n

0 1 2 3 4 5 6 7 8 n

$$Ia_{\overline{n|}} = 1(1+i)^{-1} + 2(1+i)^{-2} + 3(1+i)^{-3} + \dots + n(1+i)^{-n}$$

Multiplying both sides by $(1+i)$

$$Ia_{\overline{n|}} + i\,Ia_{\overline{n|}} = 1 + 2(1+i)^{-1} + 3(1+i)^{-2} + \dots + n(1+i)^{-n+1}$$

$$i\,Ia_{\overline{n|}} = 1 + (1+i)^{-1} + (1+i)^{-2} + \dots + (1+i)^{-n+1} - n(1+i)^{-n}$$

$$i\,Ia_{\overline{n|}} = \ddot{a}_{\overline{n|}} - n(v)^{n}$$

$$Ia_{\overline{n|}} = \frac{\ddot{a}_{\overline{n|}} - nv^{n}}{i}$$

Q. 5) $L_0 = 160{,}000$, $n = 10$ yrs, $i = 8\%$

$L_0 = X\,a_{\overline{10|}}$ @ 8%

$160000 = X\,(6.7101)$

$X = 23844.65209$

i) First repayment - $23844.65209 - (160{,}000 \times 0.08)$

$= 11044.65209$

ii) $L_5 = L_0(1+i)^5 - X\,s_{\overline{5|}}$

$= 160000(1.08)^5 - \cancel{23844.65209}\ 23844.65209\,(5.8666)$

$=$ ~~170297.9363~~ 30410.90039

~~170297.9363~~

$30410.90039 = Y\,a_{\overline{5|}}$ @ 10%.

$Y = 8022.290912.$

iii) $L_8 = L_0(1+i)^8 - Y a_{\overline{3}|} @ 10\% \, (1+i)^{-4} - X a_{\overline{4}|} @ 8\%$

$= 160000(1.85093) - (8022.290912)$

9) TWRR $= (1+i)^3 = \frac{33}{30.5} \times \frac{38.5}{39} \times \frac{41.05}{43} \times \frac{45}{41.05} \times \frac{47}{43.1}$

$= 6.821\%$

MWRR $\Rightarrow (1+i)^3(30.5) + 6(1+i)^{26/12} + 4.5(1+i)^{18/12} - 2.5(1+i)^{6/12} - 47 = 0$

$i = \cancel{7.3\%}\ 7.24\%$

TWRR ~~considers the~~ eliminates the effect of time and cashflows. and thus it is a better measure.

12) Discounted payback period for a project ~~the~~ is the no. of years it takes to break even from undertaking the initial expenditure by discounting future cashflows and recognizing the time value of money.

13) $i = 7\%$

$9{,}88{,}000 = X a^{(12)}_{\overline{25}|} \quad @ \ i = 7\%$

$X = \frac{988000}{a^{(12)}_{\overline{25}|}} = \frac{988000 \ i^{(12)}}{i \, a_{\overline{25}|}}$

$= 82176$

$X/\text{month} = 6848.05758.$