(1) FM Assignment-2

1) loan - ₹20,000
Monthly instalment = 427.9
Yrly instalment = 427.9 X12
= 5134.8

i) $20000 = 5134.8\ a_{\overline{5}|}^{(12)}$

$$\frac{1-(1+i)^{-5}}{12\left((1+i)^{1/12}-1\right)} = 3.894991$$

$\Rightarrow i = 10.80\%$ → APR

ii) Loan left = 20000 - 5134.8
= 14865.2
$i = 10.80\%$
Monthly I = 274.49
Yrly I = 3293.88

$$14865.2 = 3293.88 \times a_{\overline{n}|}^{(12)}$$

$$\frac{1-(1.108)^{-n}}{0.1029961} = 4.5129756$$

$(1.108)^{-n}$ = 0.5

(2)

ii) Loan left after 1st payment

$$20000(1.1080)^1 - 5134.8\,s_{\overline{1}|}$$

$$20000(1.1080) - 5134.85\left[\frac{(1.1080)^1 - 1}{0.1080}\right]$$

$$= 22158.892$$

→ Yrly I = 274.49 × 12

$$22158.892 = 3293.88\,a^{(12)}_{\overline{n}|} \qquad = 3293.88$$

$$6.7272192 = \frac{1-(1.080)^{-n}}{12\left[(1.080)^{1/12}-1\right]}$$

$$(1.080)^{-n} = 0.4805968$$

$$n = 9.5207466 \text{ yrs}$$

→ Term of Total Loan = 10.5207466

iii) Interest of Og. loan = 5134.8 × 5 − 20000

$$= 5675$$

Interest of New loan = 513,4.8 × 1 + 3293.88 × 9.520 − 2000

$$= 16494.99681$$

More Interest = 16494.99681 − 5675

on reconstructed loan = 10819.99681

= 5674

= 5209.128796

Interest is paid more in original loan by

⇒ 464.871204

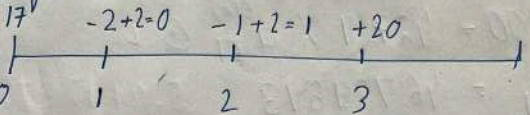
3

2) i) a) Discounted Payback Period - The amount of time it takes for the initial cost of a project to equal to discounted value of expected cash flows, or the time it takes to break even from an investment, considering the time value of money

b) Payback Period - The time required to recoup the funds expanded in an investment, or to reach break even point without discounting cashflows

ii) Payback Period doesn't account for time value of money and therfore discounted payback period is more accurate

iii) Project A →



i) $NPV_A = -17 + 1v^2 + 20v^3 = 0$

$-17 + 1(1+i)^{-2} + (1+i)^{-3} \times 20 = 0$

$i = 7\%$ $\quad LHS = 0.1993$

$i = 8\%$ $\quad LHS = -0.266$

Using interpolation →

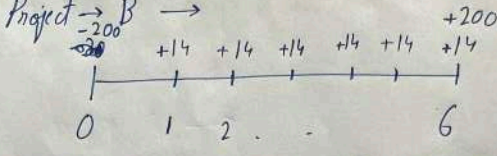
$$i + \frac{y - y_1}{y_2 - y_1} = IRR_A \Rightarrow 7.4\%$$

ii) $NPV_A = -17 + (1.06)^{-2} + 20(1.06)^{-3}$

$= 0.6823821 \times 10000 = 6823.821$

(5)

Project → B →



$NPV_B = 0 = -200 + 14[v + v^2 + v^3 + v^4 + v^5] + 214v^6$

~~$= -200 +$~~

$i = 6\%$ $\quad LHS = 9.8346$

$i = 8\%$ $\quad LHS = -9.245$

Using interpolation

$$i_0 + \frac{Y - Y_1}{Y_2 - Y_1} \Rightarrow IRR_B = 7\%$$

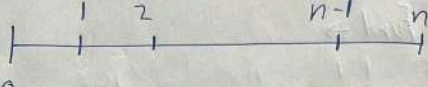
$$NPV_B = -200 + 14[(1.06)^{-1} + (1.06)^{-2} + (1.06)^{-3} + (1.06)^{-4} + (1.06)^{-5}] + 214(1.06^{-6})$$

$$= 9.8346487 \times (1000) = 9834.6487$$

c) Minimum interest rate for A → 7.4%, B → 7%.
He could consider Discounted Payback Period.

(8)

4)



$PV_0 = V + 2v^2 + 3v^3 + \ldots (n-1)v^{(n-1)} + nv^n \quad -i)$

$(1+i)(I_0)_{\overline{n}|} = 1 + 2v + 3v^2 + \ldots (n-1)v^{(n-2)} + nv^{n-1} \quad -ii)$

ii) - i)

$i(I_0)_{\overline{n}|} = 1 + v + v^2 + \ldots + v^{n-1} - nv^n$

$(Ia)_{\overline{n}|} = \dfrac{\ddot{a}_{\overline{n}|} - nv^n}{i}$

$(I\ddot{a})_{\overline{n}|} = 1 + 2v + 3v^2 + \ldots nv^{n-1}$

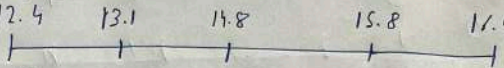
$= (1+i)(I_0)_{\overline{n}|}$

$(I\ddot{a})_{\overline{n}|} = (1+i)\left(\dfrac{\ddot{a}_{\overline{n}|} - nv^n}{i}\right)$

$(I\ddot{a})_{\overline{n}|} = \dfrac{\ddot{a}_{\overline{n}|} - nv^n}{d}$

9

5) i) Property Fund →



$$(1+i) = \frac{13.1}{12.4} \times \frac{14.8}{13.1} \times \frac{15.8}{14.8} \times \frac{16.4}{15.8}$$

$$1+i = \frac{16.4}{12.4} \Rightarrow i = 32.26\%.$$

Equity Fund →

$$1+i = \frac{15.1}{12.1} = 28.10\%.$$

ii) a) $Yield_{PF}$ $\frac{16.4}{12.4}$ → 32.26%.

$Yield_{EF} = \frac{15.5}{12.1}$ → 28.10%.

b) $Yield_{PF} = \frac{13.1B}{12.4A} \times \frac{14.8C}{13.1B} \times \frac{16.4Y}{14.8C}$

$12.4X = 13.1Y = 14.8Z = 15.8A = 16.4B$

6) (10) Loan → 160000 , i = 8%.

i) $160000 = X\, a_{\overline{10}|}$

$$\frac{160000}{1-(1.08)^{-10}} \times 0.08 = X$$

$$X = 23,844.71819$$

ii) ~~160000 − 23844.71819 X~~

Loan after 4th payment $= 160000(1+i)^4 - 23844.71819\, s_{\overline{4}|}$

$$160000(1.08)^4 - 23844.71819 X \left[\frac{(1.08)^4 - 1}{0.08}\right]$$

$$= 110231.2628$$

$110231.2688 = X\, a_{\overline{6}|}$ @ 10%.

$$\frac{110231.2688}{1-(1.1)^{-6}} \times 0.1 = X$$

$$X = 25309.91286$$

Loan after 7th Payment →

iii) $\Rightarrow (110231.2628)(1+i)^3 - 25309.91286 \times s_{\overline{3}|}$

$$110231.2628\,(1.1)^3 - 25309.91286 \left[\frac{(1.1)^3 - 1}{0.1}\right]$$

$$\Rightarrow 62941.99921$$

(1)

$$62941.99921 = X\, a_{\overline{3}|}\ @\ 9\%$$

$$X = \frac{62941.99921}{1-(1.09)^{-3}} \times 0.09$$

$$X = 24865.53622$$

Total $i = ?$

~~160000 = 2486~~

Average Installment $= \frac{23844.7182 \times 4 + 25309.9129 \times 3 + 24865.6362}{10}$

$$= 24590.52202$$

$$160000 = 24590.52202\, a_{\overline{10}|}\ @\ i$$

$$\frac{6.50657192}{} = \frac{1-(1+i)^{-10}}{i}$$

$$i = 8.68\%$$

2)

7) i) Investing in govt. securities is consider to be safer than investing in property as risk of defau from govt. is low. Investing is property has vari disadvantages as it requires costs of maintainance, tr etc and its value could decline or rent could d

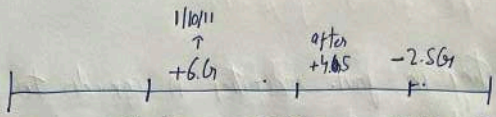
ii) a) Govt. invite bids for large projects that must b submitted within a finite deadline, then up to a particular price (considered lowest price) set by govt.

b)

8)

(13)

9)



$$(1+i)^3 = \frac{33}{30.5} \times \frac{45}{39} \times \frac{47}{48}$$

$$(1+i)^3 = 1.261847618 \quad 1.248423707$$

7.68%.

$i = 8.$ (TWRR)

$$\text{MWRR} - 30.5(1+i)^3 + 6(1+i)^{\frac{27}{12}} + 45(1+i)^{1.5} - 2.5(1+ = 47$$

$i = 7.2\%$.

ii) TWRR is better than MWRR because it takes interest with respect to time in account, whereas MWRR takes money into account, therefore when major chunk of money is used determines MWRR.

10) $i = 12\%$.

PV of Installments $= 180000\, a_{\overline{15}|} + 20000\, (Ia)_{\overline{15}|}$

$$= 180000 \left(\frac{1-(1.12)^{-15}}{0.12} \right) + 20000 \left(\frac{\frac{1-(1.12)^{-15}}{0.12} \times 1.12 - 15 \times (1.12)^{-15}}{0.12} \right)$$

$$= 1225955.608 + 814620.71782$$

$$= 2040576.326 \rightarrow \text{Loan}$$

$80\% \rightarrow 2040576.326$

$100\% \rightarrow \frac{2040576.326}{80} \times 100 = 2550720.408$ ↳ Total cost

ii) ~~Loan at start of 9^{th} yr~~ →

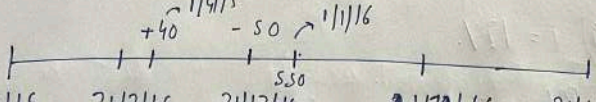
~~$(2040576.336)(1+i)^8$~~

Loan at start of 9^{th} yr $= 340000\, a_{\overline{7}|} + 20000\, (Ia)_{\overline{7}|}$

$$= 340000 \times \left(\frac{1-(1.12)^{-7}}{0.12} \times 1.12 \right) + 20000 \left(\frac{\frac{(1.12)^{-7} \times 1.12}{0.12} - \frac{7}{6} \times (}{0.12} \right.$$

$= 19$

11)



1/1/15	31/3/15	31/12/15	31/12/16	31/12/16
460	500		600	X

i) TWRR → $(1+i)^2 = \frac{500}{460} \times \frac{500}{540} \times \frac{600}{550} \times \frac{X}{600}$

$i = 20\%$

$(1.2)^2 = 0.0018298931X$

$X = 786.9312$

ii) MWRR $= 460(1+i)^2 + 40(1+i)^{21/12} - 50(1+i)^1 = 786.9312$

$= 30.9\%$

1st Y_n → $460(1+i_1) + 40(1+i_1)^{3/4} = 500$

$i_1 = 0\%$

2nd Y_n → $550(1+i_2) = 786.9312$

$i_2 = 43.08\%$

Linked Internal Rate Return $= (1+i)^2 = 1 \times 1.4308$

$i = 19.62\%$

13) Loan - 988000, $i = 7\%$.

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

$$X = \frac{988000}{1-(1.07)^{-25}} \times 12\left[(1.07)^{1/12}-1\right]$$

$$X = 82176.50031$$

Monthly Inst. $= \frac{X}{12} = 6848.041692$

ii) Loan O/s after 138/12 payments →

~~$988000(1.07)^{164/12} - 82176.50031\left[\frac{(1.07)^{164/12}-1}{0.07}\right]$~~

$$L_{138/12} = 82176.50031\, a^{(12)}_{\overline{114/12}|}$$

$$= 82176.50031\left[\frac{1-(1.07)^{-136/12}}{12\left[(1.07)^{1/12}-1\right]}\right]$$

$$= 648575.4677$$

i) $988000 = X\, a_{\overline{25}|}$

$$X = \frac{988000}{1-(1.07)^{-25}} \times \left[12\left[(1.07)^{1/12}-1\right]\right]$$

$$X = 82176.50031$$

Monthly $I = \frac{X}{12} = 6848.041692$

ii)

iii) Loan O/s after $11\frac{2}{12}$ yrs →

$$L_{13\,10/12} = 82176.50031\; a^{(12)}_{\overline{13\,10/12}|}$$

$$= \frac{82176.50031 \times \left(1-(1.07)^{-13\,10/12}\right)}{12\left[(1.07)^{1/12}-1\right]}$$

$$= 736121.1001$$

$$\text{Int} = 736121.1001 \times \frac{i^{(12)}}{12} = 4162.136$$

$$\text{Capital} = 736121.1001 - 4162.136 = 731958.96$$

iv) Installment b/w ~~Loans O/s Bpw at~~ 10th April/33 & 10th March/34

$Loan_{178/12} = X\, a^{(12)}_{7\frac{1}{2}|}$ -i) & $Loan_{188/12} = X\, a^{(12)}_{6\frac{1}{2}|}$ -ii)

~~76/12~~ -88/12

ii) - i) $= 82176.50031 \times \left[\frac{1-(1.07)^{\frac{88}{12}}}{12\left[(1.07)^{\frac{1}{12}}-1\right]}\right] -$

$82176.50031 \times \left[\frac{1-(1.07)^{-\frac{76}{12}}}{12\left[(1.07)^{\frac{1}{12}}-1\right]}\right]$

$= (5.7647655 - 5.1366077) \times 82176.50031$

$= 51619.81$

Interest $= 82176.50031 - 51619.81$

$= 30556.69$

Capital Repaid $= 51619.81 - 30556.69$

$= 21063.12281$