FM Assignment

8) Loan = 20,000, Monthly Amt → 427.90 n = 5 yrs.

$\therefore 20000 = 427.90 \times a_{\overline{60}|}^{@\, i^{(12)}/12}$ let $\frac{i^{(12)}}{12} = B$.

$$20000 = 427.90 \times \frac{1-(1+B)^{60}}{B}$$

$$\therefore 46.73989B = 1-(1+B)^{60}$$

$$0 = 1-(1+B)^{60} - 46.73989B$$

$$B = \frac{i^{(12)}}{12} = 0.0085834$$

$$\therefore i = (0.0085834)^{12} - 1 \qquad \therefore \boxed{i = 10.8\%}$$

For APR:

→ $\text{flat rate} = \frac{\text{Interest paid}}{\text{Loan Amt} \times \text{Years}} = \frac{(427.90 \times 60 - 20{,}000)}{20{,}000 \times 5}$

$\therefore$ Flat Rate = 5.674%

APR = 2 × flat Rate = 11.348 %

ii) NPV / loan O/S after t=1 → $427.90 \times a_{\overline{48}|}^{i=10.8\%}$

$$\rightarrow 427.90 \times \frac{1-\left(\frac{1}{1.0085834}\right)^{48}}{0.0085834} = 16775.8278.$$

New Loan: $16775.8278 = 274.49 \times a_{\overline{N}|}^{i^{(12)}/12 = 0.85834\%}$

$$61.11635 = \frac{1-\left(\frac{1}{1.0085834}\right)^{-N}}{0.0085834} \quad \therefore \frac{1-(1.0085834)^{-N}}{1.608} = 0.47541389$$

$-N = -0.7435694 \quad \therefore N = 7.4356$ yrs.

→ Interest in part 1: 5674 | Int in 2nd: 42790(12) + 274.49(48)

(5134.80) + 24491.97 − 20000 = 9626.77.

Int: More: ₹3952.774

FM Assignment.

Q2

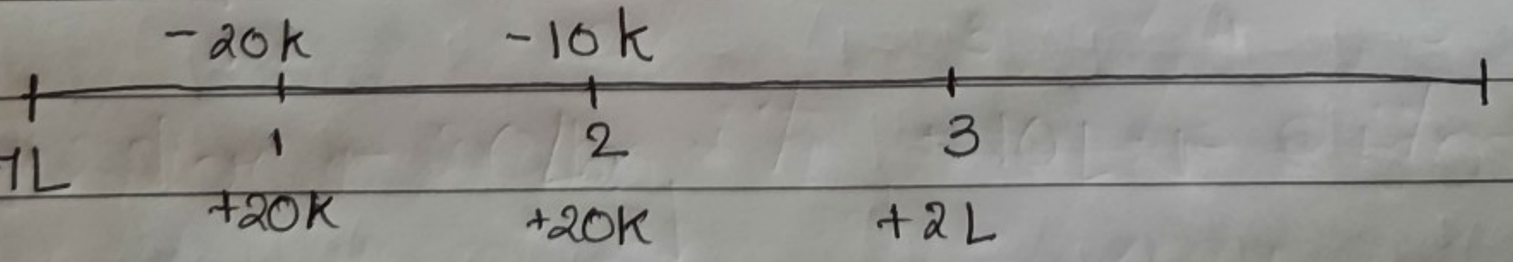
i) a. It is time period or no of years after which the ~~investment~~ forecasted cummulative cash flows equals the ini initial investment, taking interest rate into consideration for both cash flows

b.) Payback Normal of a project is no. of years after it takes for forecasted cummulative cash flow equals initial investment, with no interest element.

ii.) Project being equal in all aspects, a project with as shorter discounted payback period is reperable to a project with longer discounted payback period as it will produce profits earlier.

→ Although, payback period will be less than DPP, to as interest rate is not considered. But DPP is more effective, as a interest rates should be considered due to time value of money. Hence, DPP is more effective.

Project A:



NPV = $-1.7 - 170k - 20k(v^1) - 10kv^2 + 20kv^1 + 20kv^2 + 200v^3$ @ 6%.

$= -170k + 10kv^2 + 200v^3$

$= -170 + 8.899 + 2 \cdot 167.92385$

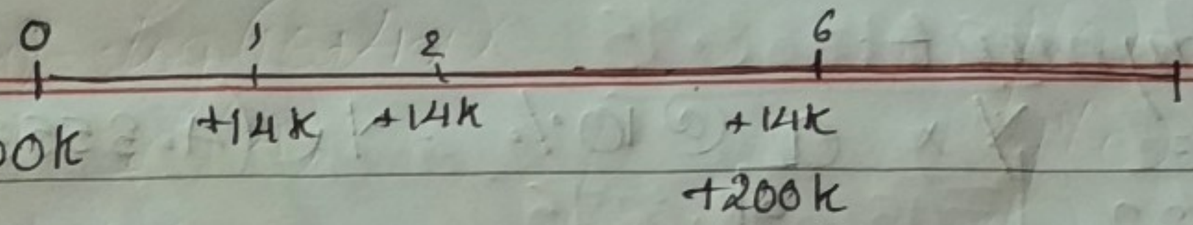
∴ NPV = 6.82285 k

NPV = ₹ 6,822.85

IRR: $PV = 0 = -170 + 10v^2 + 200v^3$

IRR: 7.423%

Project B



NPV = $-200k + 14k \cdot a_{\overline{6}|}$ @6% $+ 200k\,v^6$

$-200 + 14(4.9173) + 200(1.06)^{-6} = -59.0078 + 68.422 =$ **NPV = 9.830k**

IRR: $-200 + 14\left[\frac{(1-(1+i)^{-6})}{i}\right] + 200(1+i)^{-6} = 0 = PV$

IRR = 7%

Proj A: $-170[1+i]^3 + 10v^2 + 200v^3$ **PV = 0**

$170(1+i)^3 = 8.89994 + 167.92385$

$\therefore 176.82381 = 170(1+i)^3$

$\therefore 1.040014 = (1+i)^3 \quad \therefore 1+i = 1.013204 \quad \therefore$ **i = 1.3204 %**

Proj B: $-200(1+i)^6 + 14(4.9173) + 200(1.06)^{-6}$

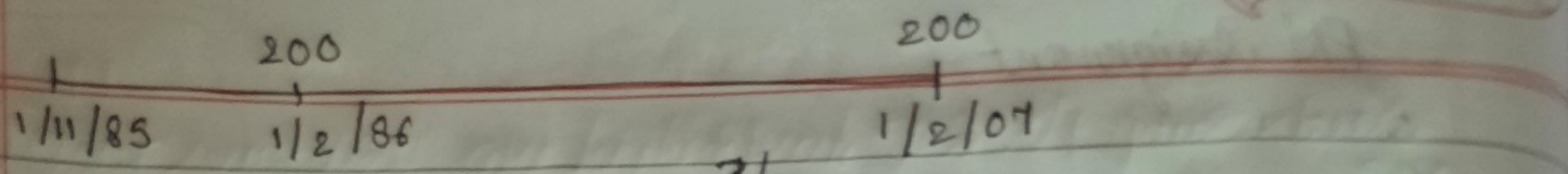
$\therefore 200(1+i)^6 = 68.422 + 140.9921$

$\therefore (1+i)^6 = \frac{209.4141}{200} = 1.047070541$

$\therefore (1+i) = 1.00769551 \quad \therefore$ **i = 0.769551 %**

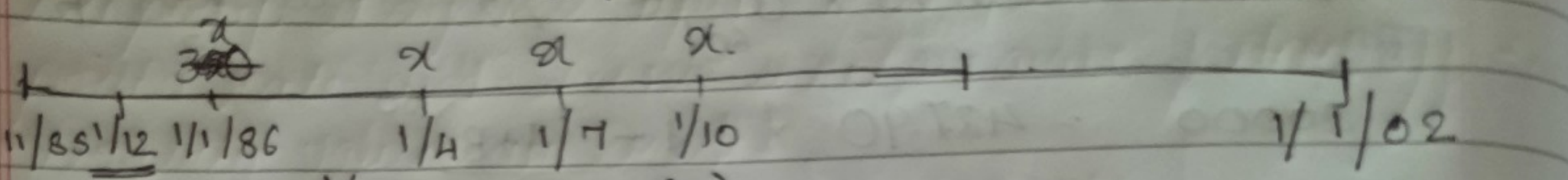
* Factors: Inflation Rate, Borrowing Rate increases.
Certainty on return.

Q3



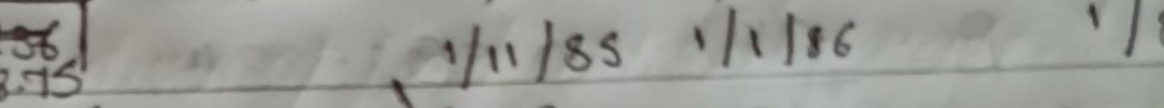
A1 $N = 22 \rightarrow 200 \times \ddot{a}_{\overline{22}|} \times v^{3/12}$

A2:



$= x \times 320 \times v^{3/12} \times \ddot{a}_{\overline{17.25}|@4\%}$ (4)

A3: $180 \times v^{3/12} \times \ddot{a}_{\overline{18.75}|@i\%}$



A1: $200 \times 10.2007 \times (0.925926)^{0.25} \times 0.08 = 2001.2624$ 2161.36

A2: $\frac{1280}{4} \times (0.925926)^{1/2} \times \frac{11758.1149}{4} = 2939.5287$

A3: $180 \times = 1780.664$

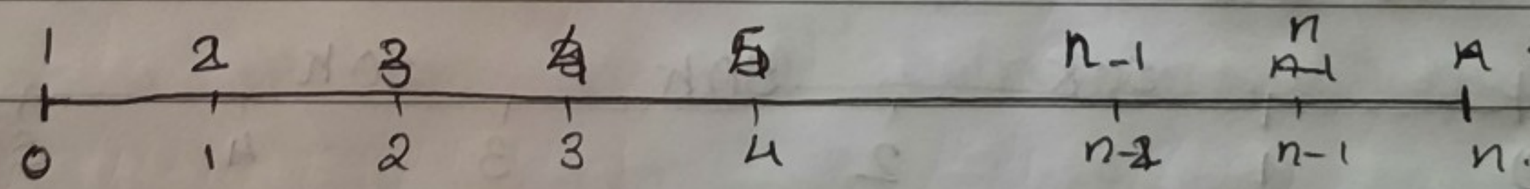
Sum of 3: 6899.9 = ₹ 6900

Revised:

$6900 = X \times \underset{21.5}{a}_{|}(2) \times v^{8/12}$ $\quad \therefore 669.3272 = v^{1/4} \cdot X$

$\therefore X = 682.33$

Q.4 $(I\ddot{a})^{(n)}_{\overline{n}|}$ →



$PV = 1 + 2v + 3v^2 + 4v^3 + 5v^4 + \ldots\ldots\ n \cdot v^{n-1} = (1+i)(I\ddot{a})_{\overline{n}|}$

$= (1+i) \times \left(\dfrac{\ddot{a}_{\overline{n}|} - nv^n}{i} \right)$ $\quad \therefore (I\ddot{a})_{\overline{n}|} = \dfrac{\ddot{a}_{\overline{n}|} - nv^n}{d}$, where $i > 0$

Q.6 i) $160000 = X \cdot a_{\overline{10}|}$ @8% $= X \times 6.7101$ $\quad \boxed{X = 23,844.65}$

ii) Loan O/S after 4th payment: PV of future outflow

$PV = 23,844.65 \times a_{\overline{6}|}$ @8% $= 23,844.65 \times (6.7101)\ (4.6229)$

$\therefore$ Loan O/S = ₹ 1,10,231.4325

Q5. TWRR of:

i) Property: $\frac{16.4}{12.4} = 1+i$ $\quad i = 0.3226806 \rightarrow 32.26806\%$

ii) Equity: $\frac{15.5}{12.1}$ $\quad \therefore i = 0.280991 \rightarrow 28.0991\%$

If Assuming he bought 10 units

So value of prop fund: 124, ~~+3.1~~ 131, 148, 158, 164.
he bought

$\rightarrow 124(1+i)^1 + 131(1+i)^{9/12} + 148(1+i)^{6/12} + 158(1+i)^{3/12} = 164(1+i)^1$
164×4

$\therefore \boxed{i = 29.32\%}$

→ If Amt same: let invested amt = 100

→ Value invested 100 at each quarter:

$\leftrightarrow 400 \times \frac{\ddot{s}}{|4|}(4) = 100$

In Equity

→ same no. of units: let it be 10.

$121(1+i)^1 + 131(1+i)^{9/12} + 148(1+i)^{6/12} + 181(1+i)^{3/12} = 155 \times 4$

$\therefore \boxed{i = 67.3\%}$

→ Amount Same, let it be ₹100

$400 \times \frac{\ddot{s}}{|4|}(4) = 100$ ✗

Doubt

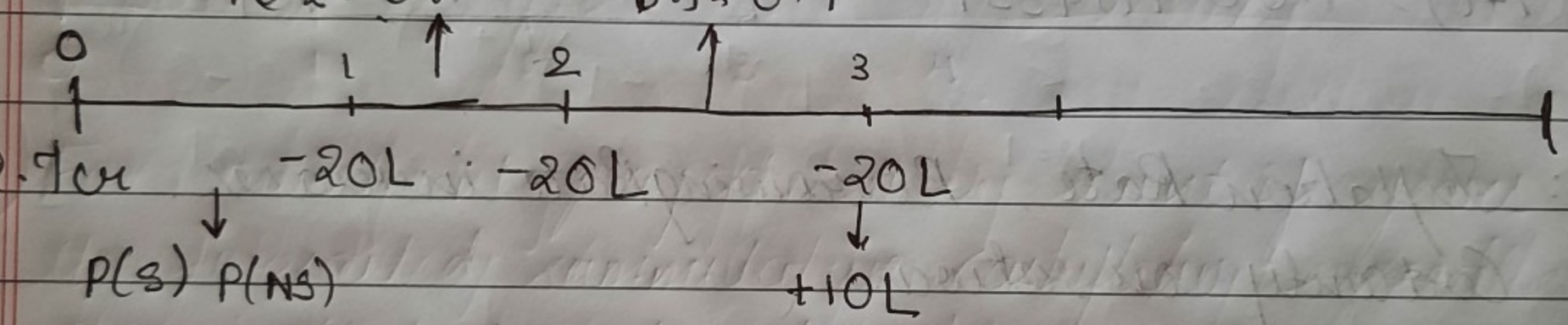
Q.7

i.) Govt securities are highly risk free. It gauranteed a rate of return at end. (fixed return)
Property. It depends upon market conditions and period. rate and income is not fixed as various factors affect. Property value can crash.

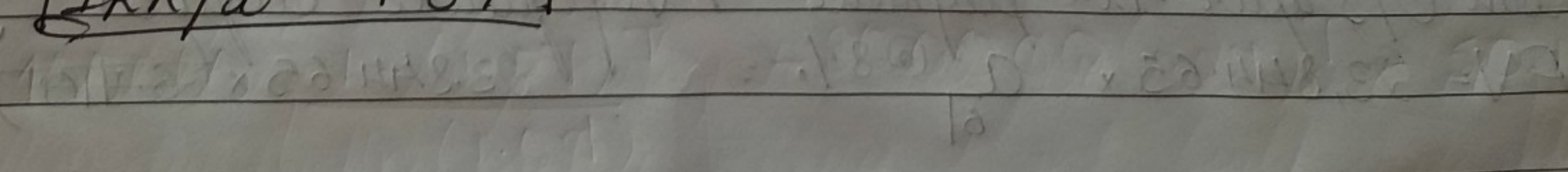
ii.) By tender means, government accept proposals from interested investors about, at what price they would like to invest, given in return of fixed interest rate.
Govt accepts offer which seems feasible

b.) • Adv to Govt: They can choose the highest price at which they want to sell securities
• Disadv: Only those investors capable of such high price investment may be able to invest.
• Adv to Investor: Give them price and they know there is equality as everyone charged same price.
• Disadv: May not be able to buy security due to high prices.

c.) i) Uncertain Income:
• Index Linked Bond: Amount to be received depends upon a particularly price-index, whose value can go up or down.
• Savings A/c: Interest rate on A/c may not remain same. It changes with regulations.
• Shares: Their value is volatile, depends upon market perception of company.



i.)



$NPV_1 = -2.7cr - 20\bar{a}_{\overline{3}|}\, i\%.$ ~~$+10Lv^3$ @ $i\%$~~ → PV of outflow.

Expected Income $PV = 10Lv^3 + \bar{a}_{\overline{10}|}[0.25v + 0.2v^2 + 0.1v^3]$

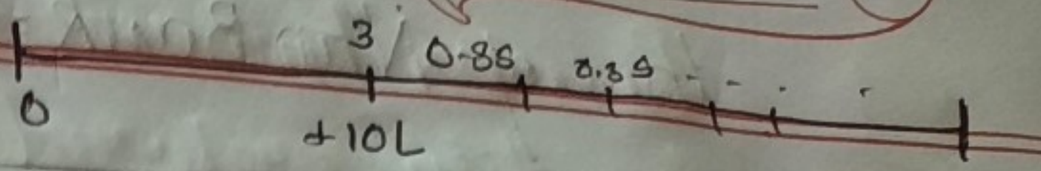
Finding i where.

$2.7 + 0.20\,a_{\overline{3}|} = 0.1v^3 + \bar{a}_{\overline{10}|}[0.25v + 0.2v^2 + 0.1v^3]$

$\boxed{IRR/i = 9.8\%}$

ii) $NPV = 0.1v^3 + 0.85\,\bar{a}_{\overline{10}|} \times v^3$

$i = 10\%$



$NPV = 0.1[1.10]^{-3} + 0.85\,\bar{a}_{\overline{10}|}(1.10)^{-3} - 2.7 - 0.2\,\bar{a}_{\overline{3}|}$

$(0.0751314) + (4.1171088)(0.7513148) - 2.7 - (0.2)(2.4868323)$

$4.1922 - 3.19717 - 0.9950702$

As NPV is +ve, we should invest in this project.

8.9	CF	FV.
1/1/11		30.5
30/9		33
1/10	(+6)	(33+6)
31/12/11		38.5
30/6/12	(+4.5)	
		41.05
1/7/12		45
31/12/12		45.6
30/6/13	-2	
1/7	-2.5	
31/12		47

TWRR: $\frac{33}{30.5} \times \frac{38.5}{33+6} \times \frac{45.6}{41.05} \times \frac{47}{45.6-2.5}$

$= (1+i)^3$

$\therefore 1+i = 0.042940$ $\therefore \boxed{i = 7.294\%}$

MWRR:

$30.5(1+i)^3 + 6(1+i)^{27/12} + 4.5(1+i)^{18/12} - 2.5(1+i)^{6/12} - 47 = 0$

$\boxed{i = 7.21\%}$

- Linked TWRR : LWRR : Jan 11 → Dec 11

30.5 → 38.5 = 26.2295%.

Jan 12 → Dec 12

38.5 → 45 : 16.883 11%

Jan 13 → Dec 13:

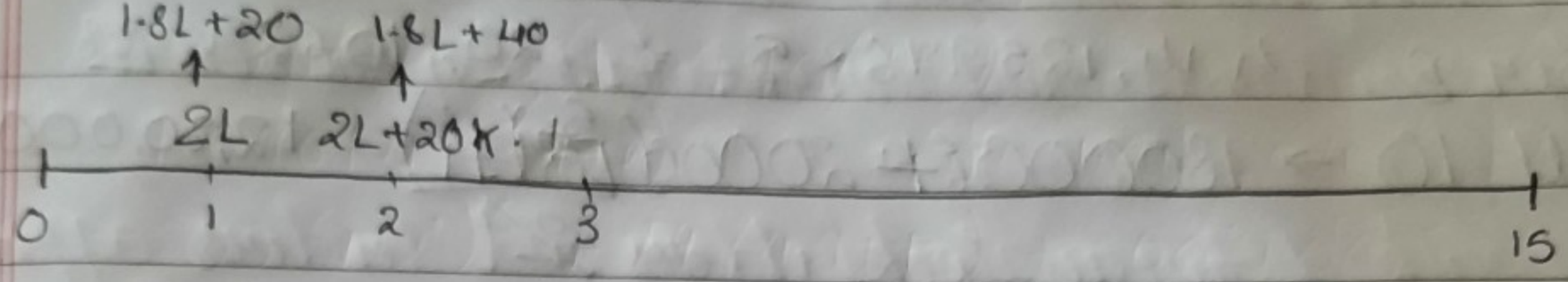
45 → 47 : 4.444%.

$\therefore$ LWRR: $(1.262295)(1.1688311)(1.0444) = (1+i)^3$

$1+i = 1.155044$ $\therefore \boxed{i = 15.5044\%}$

iii) MWRR takes amount & time of cashflow into consideration which is not in control of fund manager. While TWRR is free of these, hence a better measure.

Q.10



loan = $180K\,[a_{\overline{15}|}\ @12\%] + 20K\,[Ia_{\overline{15}|}\ @12\%]$

$= 180\,[6.8109] + 20\,[40.431] = 1225.962 + 814.62$

$\therefore$ loan $= 2040.582\ K =$ ₹ 20,40,582 = loan.

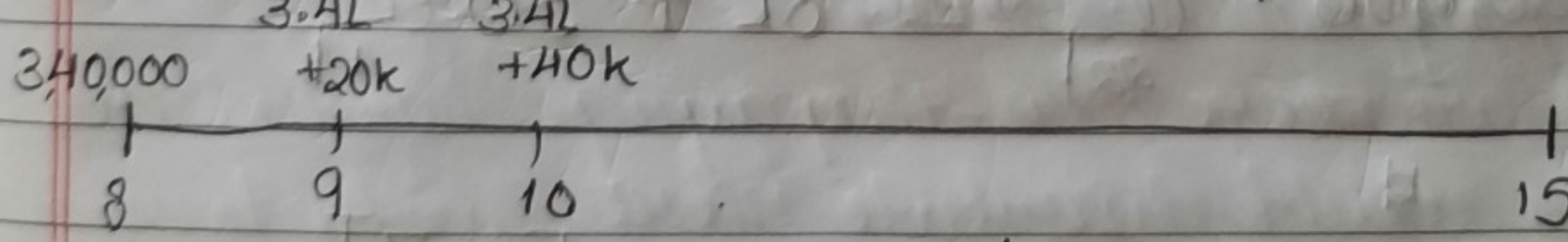
Total Cost = Loan + Self.

= 80% of TC + 20% of TC.

$\therefore \frac{80}{100} \times TC = 20,40,582$

∴ Total Cost = ₹ 25,50,727.50

→ loan O/S after t=8, PV = $a_{\overline{7}|}$ @ for 7 yrs



→ $PV = 340000 \times a_{\overline{7}|}\ @12\% + 20000 \times Ia_{\overline{7}|}\ @12\%$

PV = 1551692 + 324160 = ₹ 18,75,852 → New loan O/S

Term.	loan At Start	Repaid	Int	CapRepaid	loan left.
9.	18,75,852	3,60,000	2,25,102·24	1,34,897·76	1740954.24
10.	17,40,954.24	3,80,000	2.08.914.5088	1,71,085.4912	15,69,868.75

Loan of New Bank = 15,69,868.75

Charging fee = 1% = ₹ 15,698.6875

∴ 15,69,868.75 = Y × $a_{\overline{5}|}$ @10% = Y × 3.7908

∴ Y = ₹ 4,14,125.976

Total Amount Repaid in plan A

= 180000 + 200000 $\left[\frac{15 \times 16}{2}\right]$ = 25,80,000 → Repaid.

Amt as per B: 4,14,125.976 × 5 = 20,70,629.88

Paid till 10 → 180000 + 200000 $\left(\frac{5}{2}(1+i)\right)$ = 12,80,000

Total Repaid in B: ₹ 33,50,629.88 + 15698.68 = ₹ 3366328.56

→ He shouldnt switch Banks.

~~8.12~~ 8.11

	CF	FV.
Jan 15		460
Mar 31		500
1/4/15	+40	(500+40)
31/12	-50	
1/1/16		550
1/7		600
31/12	X	

i.)

$$TWRR = \frac{500}{460} \times \frac{600}{\cancel{540}\ \cancel{60}} \times \frac{X}{550}$$

$$= \cancel{(1.20}\ (1+i)^2$$

$$\frac{5}{2277} \times (X) = (1.2)^2 = 1.44$$

$$\boxed{X = 655.776}$$

ii.)

ii.) $460(1+i)^2 + 40(1+i)^{6/12} - 50(1+i)^{12/12} = 655.776$

$i \approx 0.20\%$ ← $i = 0.1999$

iii) Annual Rate of 2015:

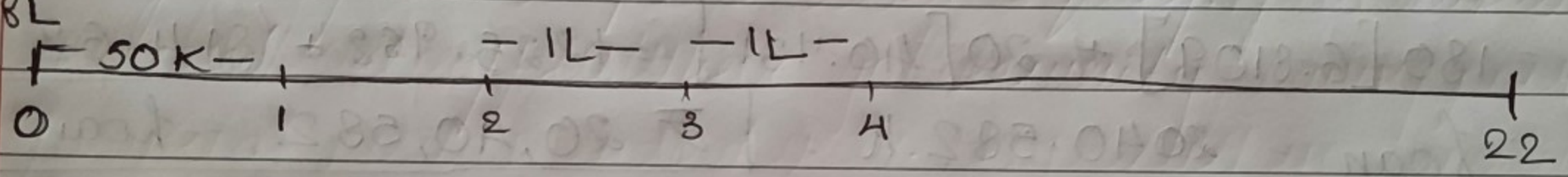
460 ⟶ ~~600~~ 550 = $\frac{90}{460} \times 100 = 19.565\%$

2016 → 550 → 655.776 : 19.282%

iv.) ~~TWR~~ TWRR is same to TWRR if terminals (t_{n-1}, t_n) are same in each. If subinterval are sufficiently short it is very close.

v.) TWRR is better measure as ~~of~~ MWR it is independent of Amt and timing of cashflows thus which is not under control of fund manager. Thus more effective result obtained.

Q.12



i.) For investment project, it is count of years when the forecasted cumulative cashflows ~~exceed~~ equals the initial investment. taking interest rate into consideration for all cashflows is DPP.

ii.) 6.

$$1,00,000 \times \bar{a}_{\overline{22}|} \geq 8L + 50\,\bar{a}_{\overline{1}|}$$

$$1,00,000 \times \bar{a}_{\overline{T}|} \geq 8,00,000 + 50\,\bar{a}_{\overline{T}|}$$

$$100000 \left\{ \frac{1-(1+i)^{-T}}{\ln(1.07)} \right\} \geq 800000(1.07)^{-T} + 50\bar{a}_{\overline{T}|}$$

$$0 \leq 100000 \left\{ \frac{1-(1.07)^{-T}}{\ln(1.07)} \right\} - 800000(1.07)^{-T} + 50\left\{ \frac{1-(1.07)^{-T}}{\ln(1.07)} \right\}$$

ii) a) b.) $-8L(1+i)^{T} - 50(1+i)^{T-1} + 1L\,\bar{s}_{\overline{t-2}|} \geq 0$ @ 7%.

$-8L(1.07)^{T} - 50(1.07)^{T-1} + 1L\,\bar{s}_{\overline{t-2}|} = 0$

~~1L 3~~ $\downarrow$

$1L \times \left\{ \frac{(1+i)^{T-2} - 1}{in(1.07)} \right\}$

At $t=17$, NPV = -75

At $t=18$, NPV = 28.85 , By Interpolating, $t = 17.76$ yrs.

b.) ∴ Ace Profit: AV of ~~per~~ inflow after DPP ∴ $t = 42.33$ yrs.

$AV = 100,000 \times \bar{s}_{\overline{42.33}|}$ @ 6% = $1,00,000 \times 4.800743066$

Profit: ₹ 480074.307

iii) Income Rent = $100 \times \bar{s}_{\overline{11}|}$ @ 6% = $100 \times 1.0297 = \underline{102.97}$

↳ yearly income.

$-800(1+i)^{T} - 50(1+i)^{T-1} + 102.97 \cdot \bar{s}_{\overline{T-2}|}$ @ 7% = 0

By using calculator, ~~T=18~~ $t = 18$

∴ NPV of cashflows/amount after 18 years = $\underline{9.7462}$

Ace Profit = $9.7462(1.06)^{4} + 100\bar{s}_{\overline{4}|}$ @ 6%.

~~AP = ₹ AC~~ AP = 462.79

Ace Profit after 22 yrs is ₹ 4,62,790

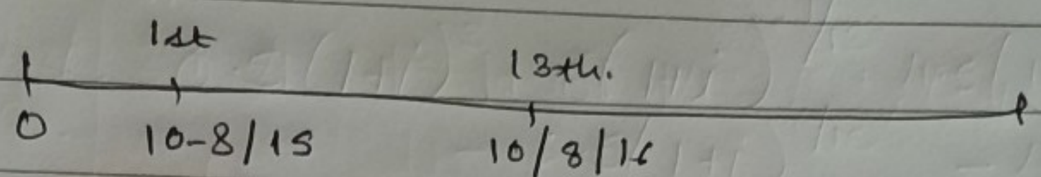
Q.B Loan: 988000 $i = 7\%$ $i^{(12)} = 0.067850$

$\therefore \frac{i^{(12)}}{12} = 0.005654166$

$\therefore 988000 = X \times a_{\overline{300}|} @ i^{(12)}/12 = X \times \left\{ \frac{1 - \left(\frac{1}{1.005654}\right)^{300}}{0.005654166} \right\}$

$X = ₹ 6,848.057$

→ Loan O/S after:



→ $N = (14 \times 12) - 4 = \underline{164 \text{ payments}}$

→ PV of 132 pays: $6848.057 \times a_{\overline{136}|} @ i^{(12)}/12$

$= 6848.057 \times \frac{1 - \left(\frac{1}{1.00565416}\right)^{136}}{0.0056541}$

Loan O/S = ₹ 648576.12

iii) Loan O/S after 10/10/26

→ $PV = 6848.057 \times a_{\overline{134}|} @ i^{(12)}/12 = 6848.057 \times \left\{ \frac{1 - \left(\frac{1}{1.00565416}\right)^{134}}{0.00565416} \right\}$

∴ Loan O/S = 6,42,196.3361

Int: 3631.084 = loan × int rate

→ Cap Repaid: ₹ 3,216.972

iv) Loan O/S at Apr 10, 33 → 87

$PV = 6848.057 \times a_{\overline{87}|} @ i^{(12)}/12 = 6848.057 \times \left\{ \frac{1 - \left(\frac{1}{1.00565416}\right)^{87}}{0.00565416} \right\}$

→ Loan O/S = 469559.4026

Loan O/S at Mar 10, 34 → 76

$PV = 6848.057 \times \frac{1}{1.00} \times a_{\overline{76}|} @ i^{(12)}/12$

Loan O/S = 4,22,109.0764.

Total Amt Repaid = ₹ 47,450.3216 → Cap Repaid.

Int: 6848.057 (12) × 12 − 47,450.326

Interest = 34,726.356