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F.M. ASSIGNMENT

Ans-13

i) $X \, a^{(12)}_{\overline{25}|}$ @ 7% = 9880

X = 821.26

Montly Repayment → $\frac{X}{12}$ = 68.438 = 6843.8

ii) Loan ~~os~~ outstanding after 10/3/2029 = $X \, a^{(12)}_{\overline{\frac{34}{3}}|}$ @ 7% = 648600

iii) Loan outstanding after 10/09/2026 = $X \, a^{(12)}_{\overline{13.83}|}$ @ 7%

Loan outstanding after 10/10/2026 = $X \, a^{(12)}_{\overline{13.75}|}$ @ 7%

∴ Capital repaid on 10/10/2026 = $X\left(\frac{v^{13.75} - v^{13.83}}{i^{2}}\right)$ @ 7%

= 26.86

iv) Capital repay continue in 12 installments is

$X\left(a^{(12)}_{\overline{22/3}|} - a^{(12)}_{\overline{19/3}|}\right)$ @ 7% = ~~516.2~~ 516.20

Total interest = X − 516.20

= 821.26 − 516.20

= 305.0600000

Ans-12 i) In many practical problems, the net cash flow changes sign only once, this change being from negative to positive. In these circumstances the balance in the investor's account will change from negative to positive ~~iii)~~ ~~at~~ at a unique time t_1 or it will always be negative, in which case the project is not viable.

This time t_1 is referred as Discounted Payback Period (DPP).

ii) a) DPP = $-800(1+i)^t - S\cdot(1+i)^{t-1} + 10\cdot(\bar{s}_{\overline{t-2}|}\ @\ 7\%) = 0$

$t = 17.8$ years

b) $A.V. = 100\left(\bar{s}_{\overline{4.23}|}\ @\ 6\%\right) = 480$

$A.V. = 480000$

iii) $i = 6\%$

$100\,\bar{s}_{\overline{1}|} = 102.97$

$\therefore$ DPP = $-800(1+i)^t - S\cdot(1+i)^{t-1} + 102.97\left(s_{\overline{t-2}|}\ @\ 7\%\right) = 0$

$\therefore\ t = 18$ years

$\therefore\ -800(1+i)^{18} - S\cdot(1+i)^{17} + 102.97\left(s_{\overline{16}|}\ @\ 7\%\right) = 9.7714$

$\therefore\ AV = 9.7714(1+i)^4 + 100\ \bar{s}_{\overline{4}|}\ @\ 6\% = 462.79$

$AV = 462790$

Ans-2 i) a) The cashflow changes sign only once, this change being from negative to positive. In these circumstance the balance in the investor's account will change from negative to positive at a unique time t, or it will always be negative, in which the project is not viable.
If this time t, exists, it is refered as DPP

b) Payback period 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 preferable to a project with longer discounted payback-period as it ~~with~~ 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 interest rate should be considered due to time of value of money
Hence, DPP is more effective.

iii) Project A:

	-20K	-10K	
0	1	2	3
-1.7L	+20K	+20K	+2L

$$NPV = -170k - 20k(v^1) + 20k(v^1) - 10k(v^2) + 20k(v^2) + 200(v^3)$$
$$= -170k + 10k(v^2) + 200v^3$$
$$= -170 + \cancel{10}\ 8.899 + 167.92385$$
$$= 6.82285\ k = ₹\ 6822.85$$

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

$IRR = 7.423\%$

Project B :

0	1	2	6
$-200k$	$+14k$	$+14k$	$+14k$ $+200k$

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

$= -200 + 14(4.9173) + 200(1.06)^{-6}$

$= -59.0078 + 68.422$

$= 9.4142k$

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

$= 7\%$

Project A $= -170[1+i]^3 + 10v^2 + 200v^3$ $\boxed{PV = 0}$

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

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

$(1+i)^3 = 1.04014$

$i = 1.3204\%$

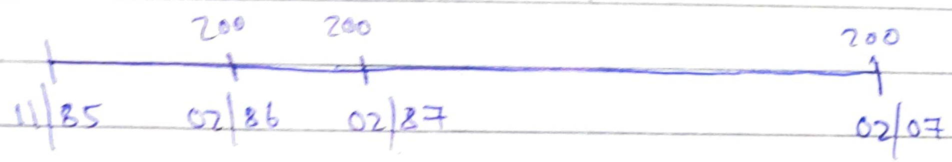
Project B $= -200(1+i)^6 + 14(4.9173) + 200(1.06)^{-6}$

$200(1+i)^6 = 209.4141$

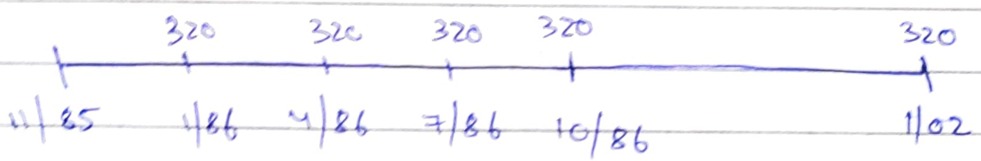
$(1+i)^6 = 1.04707054$

$i = 0.769551\%$

Ans 3



Annuity 1 $= 200\,(v)^{1/4}\left(\ddot{a}_{\overline{22}|} \text{ @ } 8\%\right) = 2161.363$



Annuity 2 $= 320\,(1+i)^{1/12}\left(a^{(4)}_{\overline{16.25}|} \text{ @ } 8\%\right)$

$= 2957.872$

Annuity 3 $= 180\left(a^{(12)}_{\overline{18.75}|} \text{ @ } 8\%\right)$

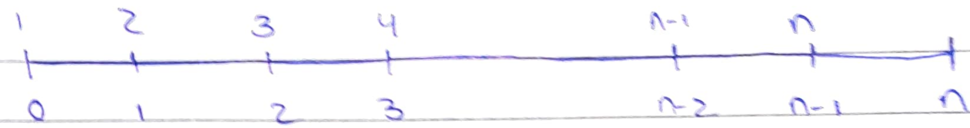
$= 1780.665$

Total Annuity $(1+2+3) = 6899.90$

$\therefore\ 6899.90 = A\,(1+i)^{1/4}\, a^{(2)}_{\overline{21.5}|}$

$A = 656.56$

Ans-4 $I\ddot{a}_{\overline{n|}} \rightarrow$



$$PV = 1 + 2v + 3v^2 + 4v^3 + \dots n \cdot v^{n-1} = (1+i) Ia_{\overline{n|}}$$

$$= (1+i) \times \left[\frac{\ddot{a}_{\overline{n|}} - nv^n}{i} \right] \qquad \therefore I\ddot{a}_{\overline{n|}} = \left[\frac{\ddot{a}_{\overline{n|}} - nv^n}{d} \right]$$

Ans-5 i) $160000 = X a_{\overline{10|}}$ @ 8%

$X = 23844.65$

ii) Loan outstanding after 4th Pay:- $23844.65 (a_{\overline{6|}}$ @ 8%$)$

$= 110231.44$

$\therefore Y a_{\overline{6|}} = 110231.44$

$Y = 25309.72$

iii) Loan outstanding after 7th Pay:- $25309.72 (a_{\overline{3|}}$ @ 10%$)$

$= 62942.72$

$\therefore Z a_{\overline{3|}}$ @ 9% $= 62942.74$

$Z = 24865.77$

$\therefore$ Total Repayment $= (4 \times X) + (3 \times Y) + (3 \times Z)$

$= 245905.070$

$$160000(1+i)^{10} = 245905.07$$

$$\therefore (1+i)^{10} = 1.536906688$$

$$1+i = 1.043914067$$

$$i = 0.043914067$$

$$i = 4.3914067\%$$