

SECTION B

1. Useful life = 6 years

Total cost = 5000

Cash inflow yearly = 1500

Residual value of the bumper = 800

$$AAR = (800/2900) \times 100 = 27.59$$

= average annual / average investment profit

$$= (\text{Average cash inflow} - \text{depreciation per year})$$

$$\text{Depreciation per year} = (\text{Cost} - \text{salvage value}) / (\text{estimated useful life})$$

$$= (5000 - 800) / 6 = 700$$

$$\text{Average annual profit} = 1500 - 700 = 800$$

$$\text{Average investment} = \frac{(5000 + 800)}{2} = 2900$$

$$\therefore AAR = (800/2900) \times 100 = \underline{\underline{27.59\%}}$$

$$\text{b) Payback period} = \text{Cost of investment} / \text{Cash inflow} \\ = 5000 / 1500 = 3.3 \text{ years i.e. } \underline{\underline{3 \text{ years } 4 \text{ months}}}$$

(2) Cost \$ 180000

Life 5 years

Residual value = 10000

Payback period =

Year	Total flow	Cumulative flow
0	180000	180000
1	45000	135000
2	65000	70000
3	90000	20000
4	90000	110000
5	90000	200000

Cumulative flow is positive in 3rd year

$$\text{Payback period} = 2 + (80000/90000) = 2.78 \text{ years i.e. } \underline{\underline{2 \text{ years } 10 \text{ months}}}$$

$$\begin{aligned} AAR &= \frac{\text{Av. annual profit}}{\text{Av. investment}} = \frac{(\text{Cash inflow} - \text{Net depreciation}) / 5}{\frac{(80000 + 10000)}{2}} \times 100 \\ &= \frac{[(45000 + 65000 + 90000 + 90000 + 90000) - 180000] / 5}{(80000 + 10000) / 2} \times 100 \\ &= \frac{40000}{95000} \times 100 = \underline{\underline{42.11\%}} \end{aligned}$$

② Investment = 200 000
 returns rate 4% after one year

$$\text{returns} = \frac{4}{100} \times 200000 = 8000$$

$$\text{Bank's interest} = 2\% \times 200000 = 1000$$

$$\text{Net return} = 8000 - 1000 = \underline{\underline{\$7000}}$$

$$\text{ROI} = \frac{7000}{200000} \times 100\% = 3.5\%$$

④ Purchase price = 600 000

Particulars	Amount
Down payment	180000
Mortgage	420000
Interest on mortgage	12600
<u>Monthly expense</u>	
strata fee	360
Repair & Maintenance	140
Insurance	100
Property tax	1700
Total expense (a)	614 900
Income from rent	
2500 pm (b)	30000

$$\text{Return on Investment } C = \frac{b}{a} = \frac{30000}{614900} \times 100\% = 4.88\%$$

⑤ NPV = Present value of Cash Inflow - initial investment
 present value of cash inflow = $(30000 \times 5.53492) + (100000 \times 0.46651)$
 $= \$164 713$

$$\text{NPV} = 164713 - 140000 = \$24 713$$

⑥ $P = 120000$
 $x = 3.6$
 $t = 10$
 $m = 12$

$$A = P \left(1 + \frac{x}{m} \right)^{mt} = 120000 \left(1 + \frac{3.6}{1200} \right)^{12 \times 10} = \$171906.86 = \text{repayable amount}$$

In amortization

$$Pv = P \left[\frac{1 - (1 + \frac{x}{m})^{-mt}}{\frac{x}{m}} \right]$$

$$\frac{171906.86}{100.65} = P \left[\frac{1 - \left(1 + \frac{3.6}{1200} \right)^{-120}}{0.003} \right] = \frac{100.65}{100.65} P$$

$$P = \$1707.98$$

$$(b) \text{ Total payment} = \text{Amount } A = \$171986.98$$

$$(c) \text{ Interest on loan} = A - P$$

$$= 171986.98 - 120000$$

$$= \$51986.98$$

$$(d) \text{ Amount after 4 years} = P(1 + r_m)^{mt}$$

$$= 120000 \left(1 + \frac{3.6}{120}\right)^{4(12)}$$

$$= 138556.22$$

Money paid up to that time

$$PV = P \left(\frac{1 - (1 + r_m)^{-mt}}{r_m} \right)$$

$$138556.22 = P \left(\frac{1 - (1 + 0.03)^{-48}}{0.003} \right)$$

$$138556.22 = 44.64 P \Rightarrow P = 3103.72$$

$$\text{Amount paid by 4 years} = (3103.72)48 = 81983.04$$

$$\text{Balance} = 138556.22 - 81983.04 = \$56573.18$$

$$\oplus \text{ Tania can borrow} = 12000 \times PVA (i=3\%, n=20)$$

$$(a) = 12000 \times 14.8742$$

$$= \$178529.64$$

$$\textcircled{8} \text{ Depreciation} = (\text{cost} - \text{salvage value}) / \text{no. of years}$$

$$(300000 - 30000) / 4 = 67500 \text{ per year}$$

$$\text{present value of cash outflow} = \$300000$$

$$NPV = \text{Present value of cash inflow} - \text{Initial investment}$$

$$(100000 + 90000 + 80000 + 80000) - 300000 = \$50000$$

(c)	Yrs	Buy cost	Rental cost	NPV at 12%	NPV buy cost	NPV rental cost
	1	10500	12500	0.893	9644.4	11430.4
	2	10500	12500	0.797	8607.6	10201.6
	3	10500	12500	0.712	7629.6	9113.6
	4	10500	12500	0.636	6562.8	8140.3
	5	10500	12500	0.567	5123.6	7257.6
	6	10500	12500	0.502	5475.6	6436.6
				Present value	\$44409.6	52630.6

As NPV at buying the car is low, therefore it is profitable to buy as it will reduce the cost by \$ 8224

particulars	Option 1 Buy	Option 2 Lease
Depreciation $\frac{[30000 - 6000]}{6}$	\$ 4000	-
Maintenance cost	\$ 2000	-
Insurance	\$ 1500	\$ 1500
Gas	\$ 3000	\$ 3000
Rental expense	-	\$ 5000
Annual cost	\$ 10500	12500

Year	New HVAC			Rebuild HVAC		
	Cash flow	Disc. Factor	Disc. Cash flow	Cash flow	Discounting factor	Discounted cash flow
0	500000	1.0000	500000	200000	1.000	200000
1	8000	0.87719	7017.34	11000	0.87719	9649.12
2	8000	0.76944	6155.74	11000	0.76944	8454.14
3	8000	0.67497	5399.77	11000	0.67497	7424.69
4	8000	0.59208	4736.64	11000	0.59208	6512.86
5	8000	0.51937	4154.95	11000	0.51937	5713.86
6	8000	0.45559	3644.69	11000	0.45559	5011.45
7	8000	0.39964	3197.10	11000	0.39964	4396.01
8	8000	0.35056	2804.49	11000	0.35056	3856.15
8	50000	0.35056	17527.91	10000		
			519582.94			251027.50

Cash outflow is minimum in rebuilding HVAC, so rebuilding should be accepted.

① Investment of \$ 180000

$$\text{Net cash inflow} = 45000 + 65000 + 90000 + 90000 + 90000 =$$

Year	Total flow	Cumulative flow
0	180000	180000
1	45000	135000
2	65000	70000
3	90000	20000
4	90000	110000
5	90000	200000

Cumulative flow is positive in 3rd year.

$$\text{Payback period} = 2 + \frac{70000}{90000} = 2.78 \text{ years i.e. } 2 \text{ years } 10 \text{ months}$$

$$\begin{aligned} \text{AAR} &= \frac{\text{av. Annual Profit}}{\text{av. Investment}} = \frac{(\text{Cash inflow} - \text{Net depreciation})/5}{\text{av. Investment}} \times 100 \\ &= \frac{(380000 - 180000)/5}{95000} \times 100 = 42.1\% \end{aligned}$$

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Year	Cash flow	PV factor at 8%	Present value
0	-150 000	1	-150 000
1	25 000	0.926	23 150
2	25 000	0.857	21 425
3	25 000	0.794	19 850
4	25 000	0.735	18 375
5	25 000	0.681	17 025
6	25 000	0.630	15 750
7	25 000	0.583	14 575
8	25 000	0.540	13 500
8	11 000	0.540	5 940
NPV:			- 410

	A	B	C	D
1	Year	Cash Flows	PV factor @ 8%	Present Value
2	0	\$ -1,50,000	1	\$ -1,50,000
3	1	\$ 25,000	0.926	\$ 23,150
4	2	\$ 25,000	0.857	\$ 21,425
5	3	\$ 25,000	0.794	\$ 19,850
6	4	\$ 25,000	0.735	\$ 18,375
7	5	\$ 25,000	0.681	\$ 17,025
8	6	\$ 25,000	0.630	\$ 15,750
9	7	\$ 25,000	0.583	\$ 14,575
10	8	\$ 25,000	0.540	\$ 13,500
11	8	\$ 11,000	0.540	\$ 5,940
12	NPV			\$ -410
13	Note: PV factor has been rounded off to 3 decimal places since nothing is mentioned, for any different requirements please mention in comment section or change the round formula accordingly.			
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Calculations:

	A	B	C	D
1	Year	Cash Flows	PV factor @ 8%	Present Value
2	0	-150000	=PV(8%,A2,0,-1.0)	=((ROUND(C2,3))*B2)
3	1	25000	=PV(8%,A3,0,-1.0)	=((ROUND(C3,3))*B3)
4	2	25000	=PV(8%,A4,0,-1.0)	=((ROUND(C4,3))*B4)
5	3	25000	=PV(8%,A5,0,-1.0)	=((ROUND(C5,3))*B5)
6	4	25000	=PV(8%,A6,0,-1.0)	=((ROUND(C6,3))*B6)
7	5	25000	=PV(8%,A7,0,-1.0)	=((ROUND(C7,3))*B7)
8	6	25000	=PV(8%,A8,0,-1.0)	=((ROUND(C8,3))*B8)
9	7	25000	=PV(8%,A9,0,-1.0)	=((ROUND(C9,3))*B9)
10	8	25000	=PV(8%,A10,0,-1.0)	=((ROUND(C10,3))*B10)
11	8	11000	=PV(8%,A11,0,-1.0)	=((ROUND(C11,3))*B11)
12	NPV			=SUM(D2:D11)
13	Note: PV factor has been rounded off to 3 decimal places since nothing is mentioned, for any different requirements please mention in comment section or change the round formula accordingly.			
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(13)

$$P = 240000$$

$$r = 3.6\% \text{ p.a.}$$

$$A = P(1 + r/m)^{mt} = 240000 \left(1 + \frac{3.6}{1200}\right)^{12(20)} = 492532.81$$

$$PV = P \left(\frac{1 - (1 + r/m)^{-mt}}{r/m} \right)$$

$$492532.81 = P \left(\frac{1 - (1 + 0.003)^{-240}}{0.003} \right)$$

$$492532.81 = 170.91 P \Rightarrow P = \underline{\underline{\$2881.86 \text{ per month}}}$$

(b) Total payment in 10 years

$$(2881.86 \times 10 \times 12) = \underline{\underline{\$345823.90}}$$

$$(c) \text{ Interest} = \text{repaid amt} - \text{principal} = 345823.90 - 240000 = \underline{\underline{\$105823.90}}$$

(14) NPV for purchase

$$\text{Initial cash flow} = -32000$$

$$\text{annual cash flow} = -\$6800 \text{ for next 6 years}$$

$$\text{present value} = -6800 \times \text{PVA of } \$1 (12\%, 6)$$

$$= -6800 \times 4.1141$$

$$= -\$27975.59$$

$$\text{Terminal cash flow} = 6000 \text{ after 6 years}$$

$$\text{Present value} = 6000 \times \text{PV of } \$1 (12\%, 6)$$

$$= 6000 \times 0.56667$$

$$= 3039.78$$

$$NPV = -32000 - 27975.59 + 3039.78 = -56917.81 \$$$