Basic Investment Appraisal Techniques:

Payback Period,
Discounted Payback Period,
NPV and IRR

CAPITAL BUDGETING : PROBLEM 1

Hick Limited is considering investing in a new project, for which the following information is available:

	£ 000
Initial investment	450
Life of project	4 years
Estimated annual free cash flows:	
Year 1	150
Year 2	300
Year 3	100
Year 4	100

- Residual value 30
- Cost of capital or discount rate is 10%

PROBLEM 1 (CONTINUED)

Required:

Evaluate the financial viability of the above project using the following techniques:

I. Payback Period
II. Discounted Payback Period
III. Net Present Value
IV. Internal Rate of Return

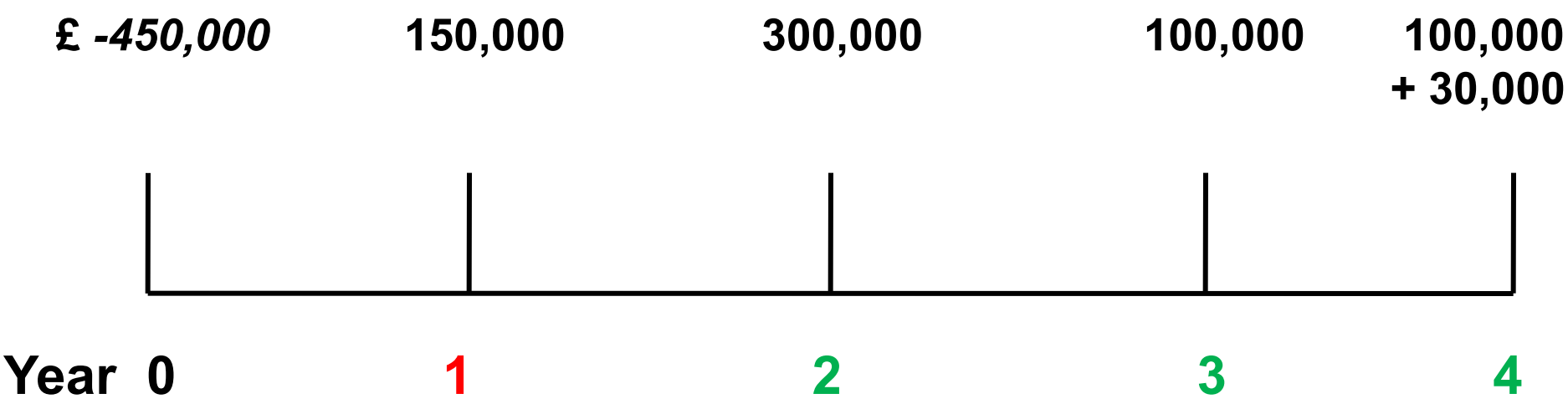
Clearly state the assumptions made.

SOLUTION 1

(i) Payback Period (PP)

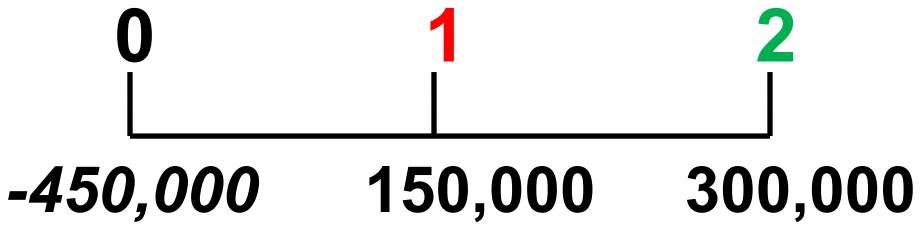
Payback Period is the number of years needed to recover initial cost (cash outflows) of a project from its future cash inflows. It does not consider time value of money concept.

Cash Flow Timeline



Payback Period

(i) Payback Period



Cumulative Inflows → 150 K | 450k

	Cash flow	Cumulative
Investment=	(450,000)	(450,000)
Year 1 =	150,000	150,000
Year 2 =	300,000	450,000

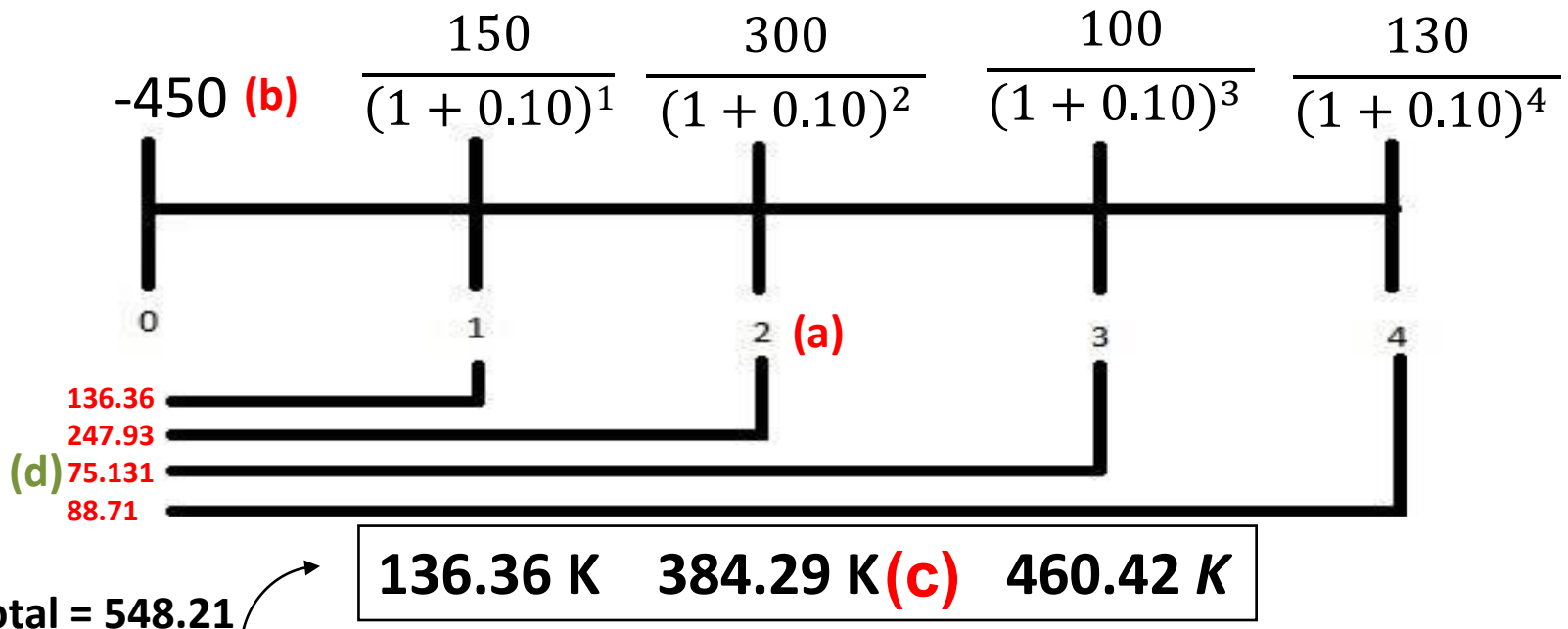
Therefore payback period equals **2 years**

(ii) Discounted Payback Period (DPP)

DPP is the number of years needed to recover initial cost (cash outflows) of a project from its future cash inflows. To calculate it, we need consequentially add the discounted value of each future cash inflow as long as the initial cost is recovered.

(ii) Discounted Payback Period (DPBP)

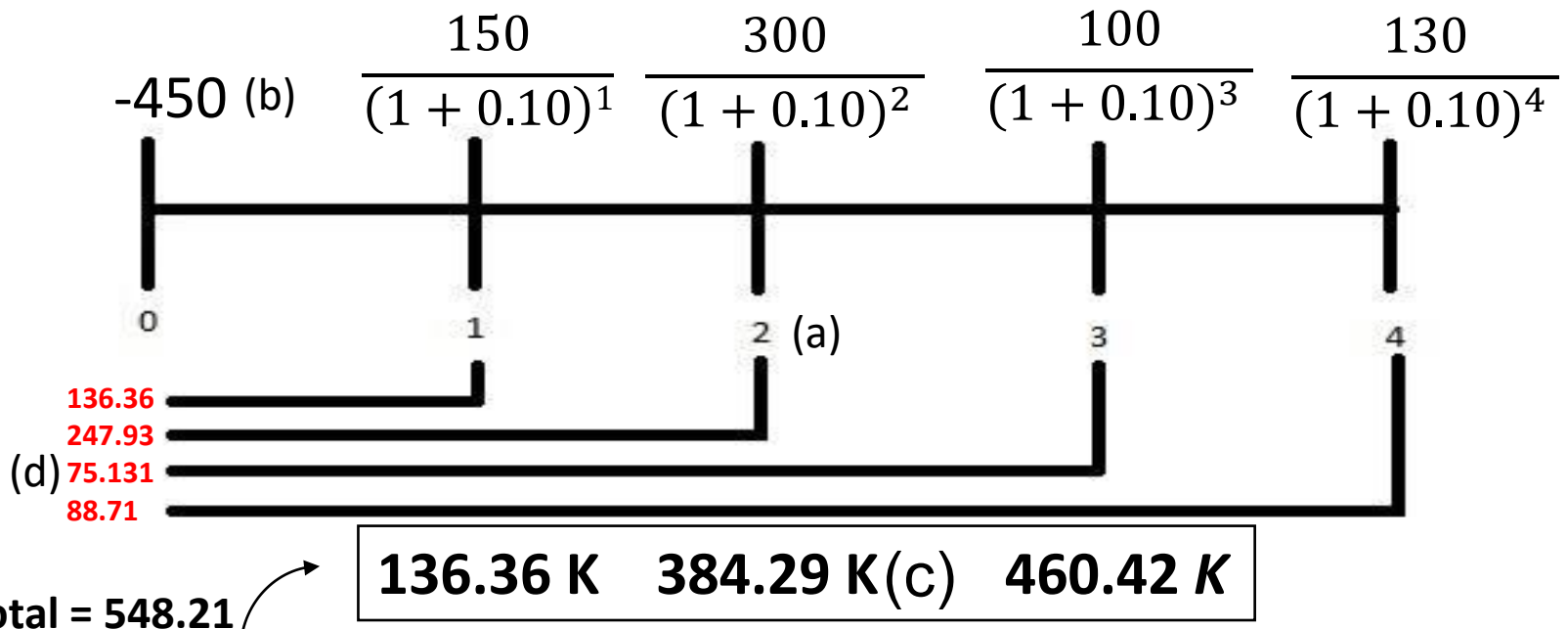
Here, Cost of Capital = 10%



- 450-385.29 = 64.71
- 460.42-385.29 = 75.31

(ii) Discounted Payback Period (DPBP)

Here, Cost of Capital = 10%



Total = 548.21

Cumulative Inflows

DPBP = a + (b - c) / d

= 2 + (450 – 384.29) / 75.131

= 2 + (65.71) / 75.131

= 2+ 0.87 = 2.87 Years

Significance of Discounted Payback Period

- The discounted payback period (DPP) is the amount of time that it takes (in years) for the initial cost of a project to equal to discounted value of expected cash inflows, or the time it takes to reach to the break even point from an investment.
- While simple payback period ignores the time value of money concept, **discounted payback period takes the time value of money into account by discounting each cash flow by the cost of capital (or, WACC).**
- Other things being equal, the shorter the payback period, the earlier the initial investment will be recovered, and the greater the liquidity of the project.
- If Project X has a discounted payback period of 5 years, that means after 5 years, the discounted cash inflow will be enough to recover the amount of discounted cash outflow.

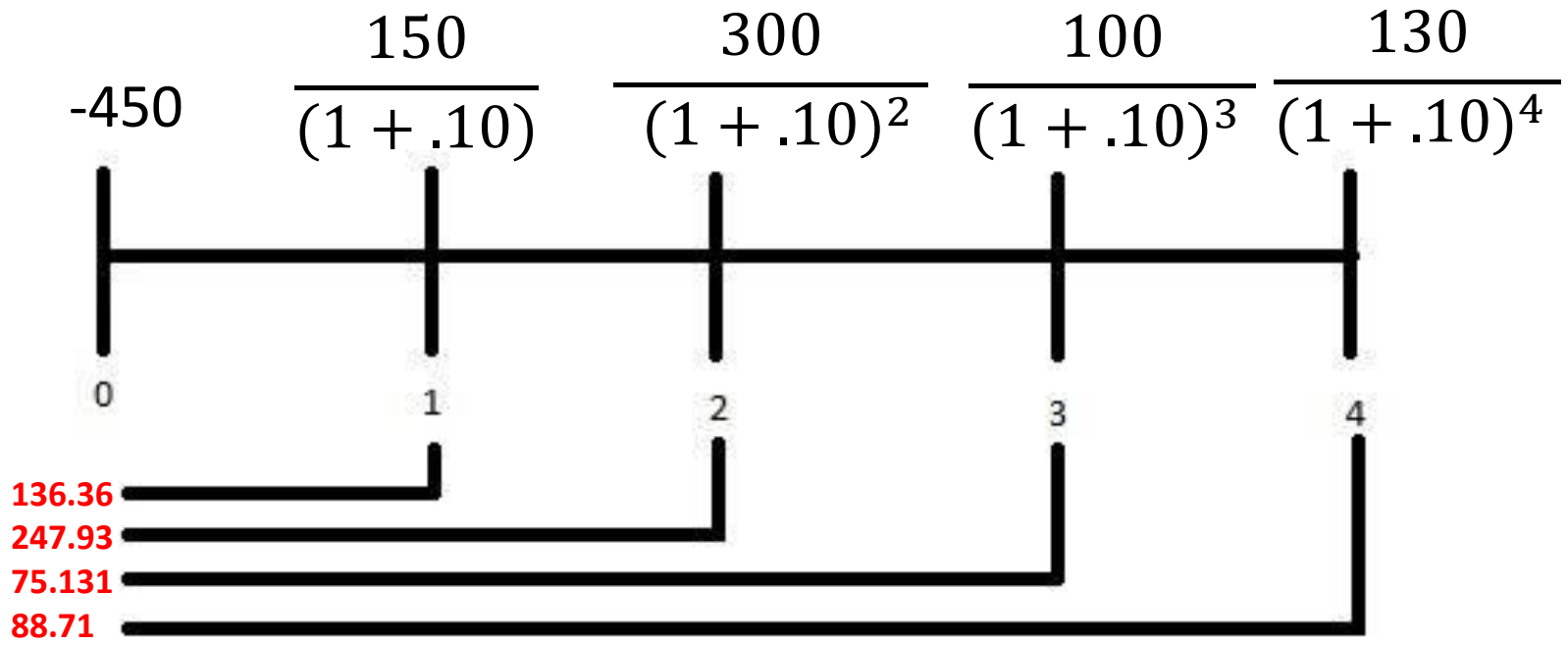
(iii) Net Present Value (NPV)

NPV is the present value of an investment project's net cash inflows minus the project's cash outflows.

SOLUTION 1 (CONTINUED)

(iii) Net Present Value (NPV)

Here, Cost of Capital = 10%



Total = 548.221

NPV = Total Discounted Cash Inflows – Investment = 548,221 - 450,000 = 98,221

NPV = 98,221

Significance of NPV

- NPV discounts each inflow and outflow to the present, and then sums them to see how the value of the inflows compares to the outflows.

- NPV > 0: The PV of the inflows is greater than the PV of the outflows.
- NPV = 0: The PV of the inflows is equal to the PV of the outflows.
- NPV < 0: The PV of the inflows is less than the PV of the outflows.

Significance of NPV (continued)

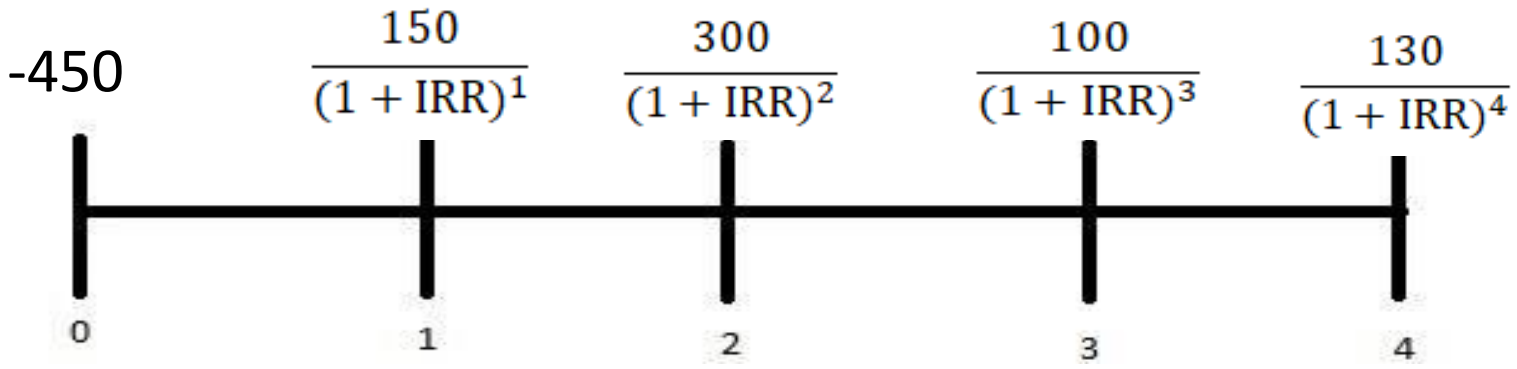
- **Time value**. It recognizes the time value of money concept i.e. a $ received today is worth more than a $ received tomorrow.
- **Measure of true profitability**. It uses all cash flows occurring over the entire life of the project. Hence, it is a measure of the project's holistic profitability.
- **Shareholder value**. The net present value (NPV) method is always consistent with the objective of the shareholder value maximization. This is the greatest virtue of the method.

SOLUTION 1 (CONTINUED)

(IV) **IRR Calculation**

IRR is the discount rate that equates the present value of the future net cash flows from an investment project with the project's initial cash outflow.

SOLUTION 1 (CONTINUED)



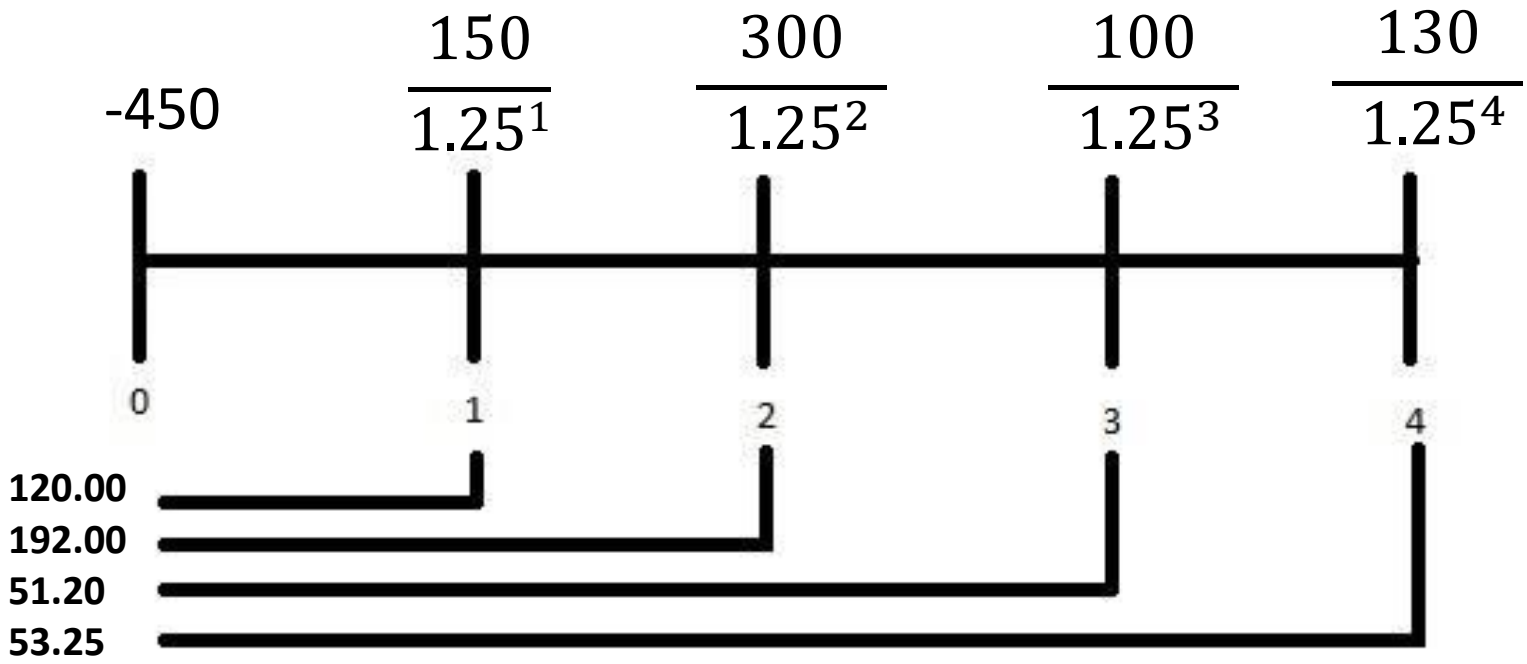
NPV = Total Discounted Cash Inflows – Investment

=450,000 - 450,000

=0

SOLUTION 1 (CONTINUED)

Now, at a discount rate of 25%



Total = 416.418

NPV = Total Discounted Cash Inflows – Investment = 416,418 - 450,000 = -33,582

NPV = -33,582

Solution 1 (Continued)

(IV) **IRR Calculation**

Using linear interpolation IRR can be estimated:

$$\frac{98{,}221-(-33{,}582)}{0.25-0.10} = \frac{98{,}221-0}{IRR-0.1} \quad \text{(At IRR, NPV=0)}$$

Rearranging gives,

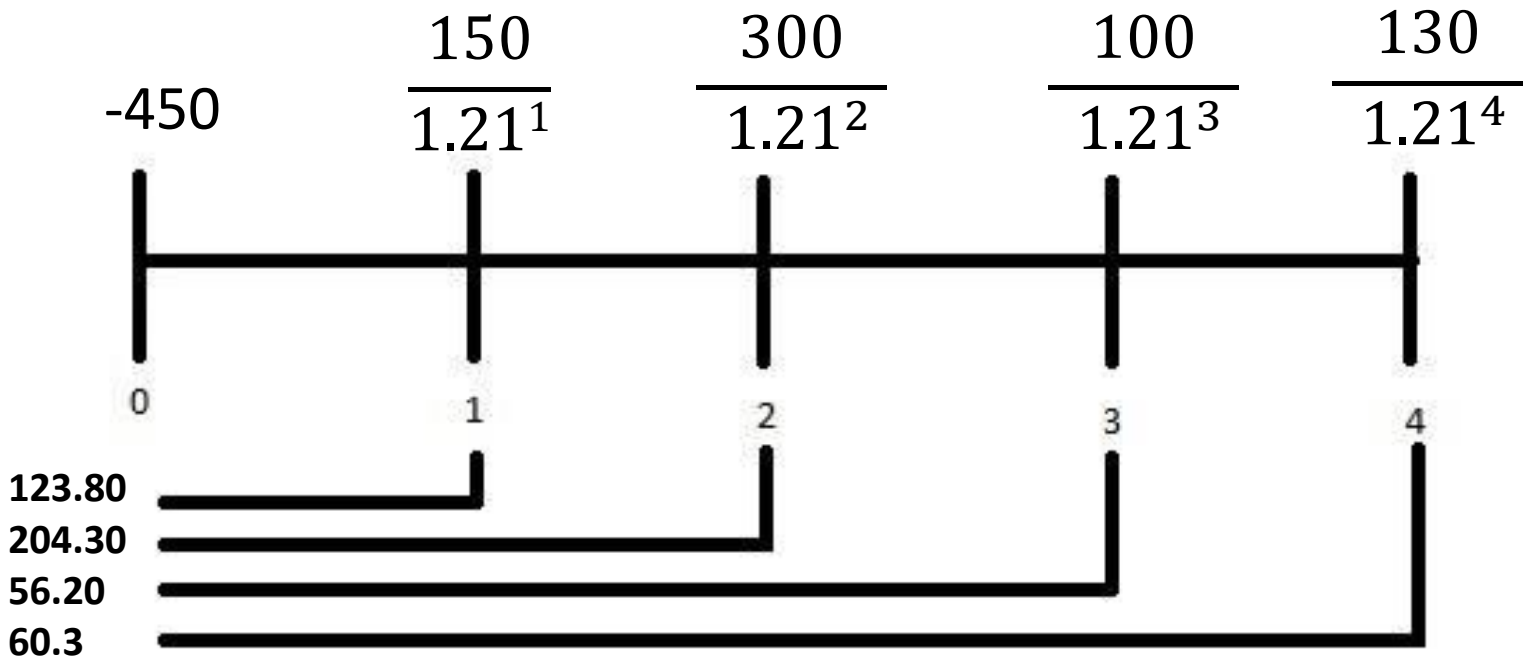
$$\text{IRR-0.1} = \frac{98{,}221\times 0.15}{98{,}221+33{,}552}$$

Therefore, IRR = 0.11181+0.1 = 21.181%

IRR = 21%

SOLUTION 1 (CONTINUED)

Now, at a discount rate of 21%



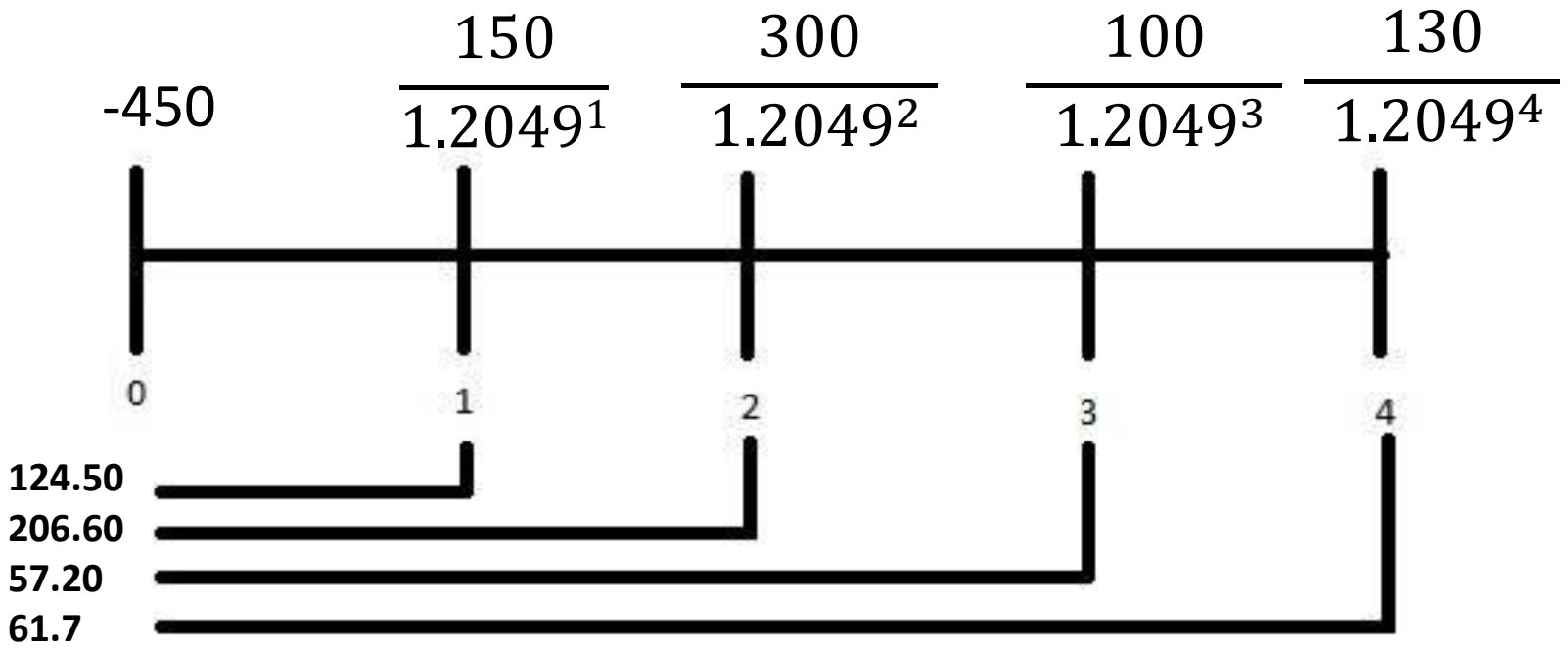
Total = 444.56

NPV = Total Discounted Cash Inflows – Investment = 444,560 - 450,000 = -5,44

This will be 0 when more accurate interpolation is taken. So, at IRR, NPV=0

SOLUTION 1 (CONTINUED)

At accurate IRR = 20.49%



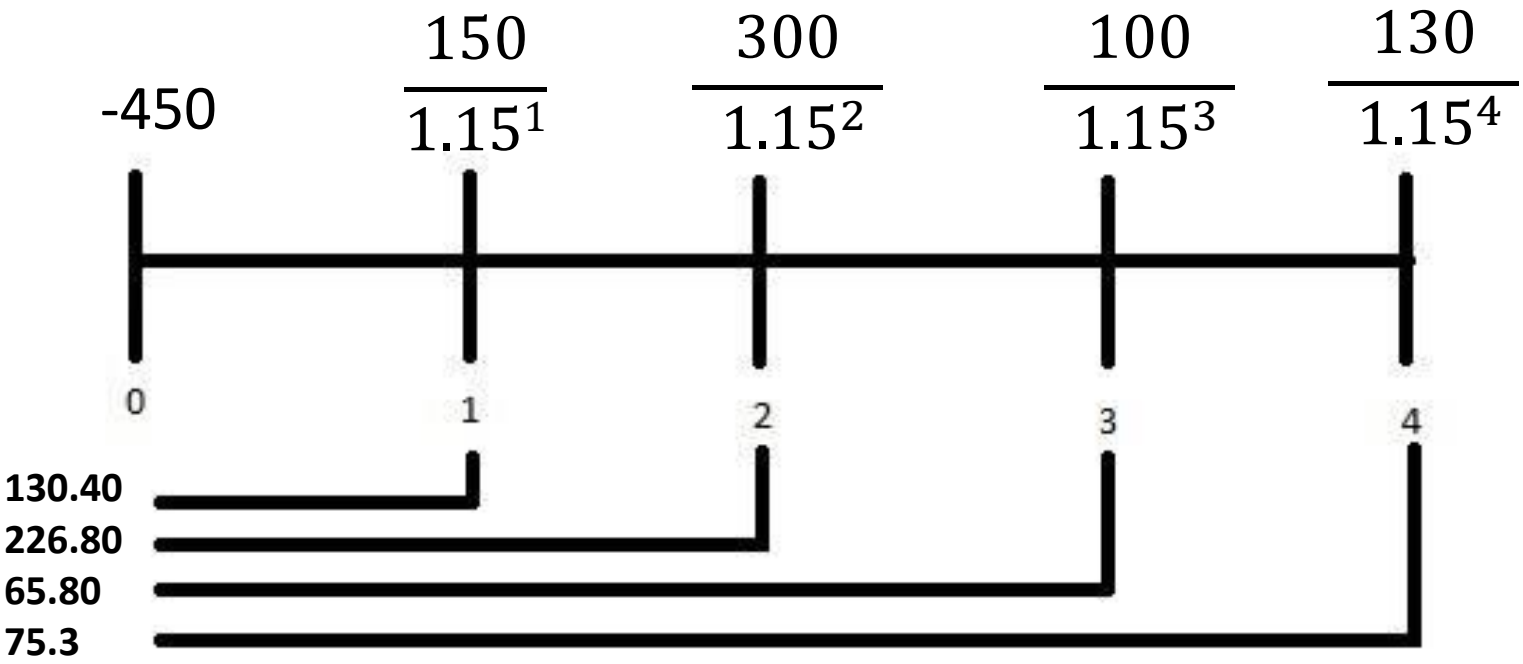
Total = 450

NPV = Total Discounted Cash Inflows – Investment = 450,000 - 450,000 = 0

So, at IRR, NPV=0

SOLUTION 1 (CONTINUED)

At a discount rate = 15% (discount<IRR)



Total = 497.4

NPV = Total Discounted Cash Inflows – Investment = 497,400 - 450,000 = 47,400

So, at IRR, NPV=47,400

Solution 1 (Continued)

When discount rate/cost of capital > IRR, NPV<0

When discount rate/cost of capital = IRR, NPV=0

When discount rate/cost of capital < IRR, NPV>0

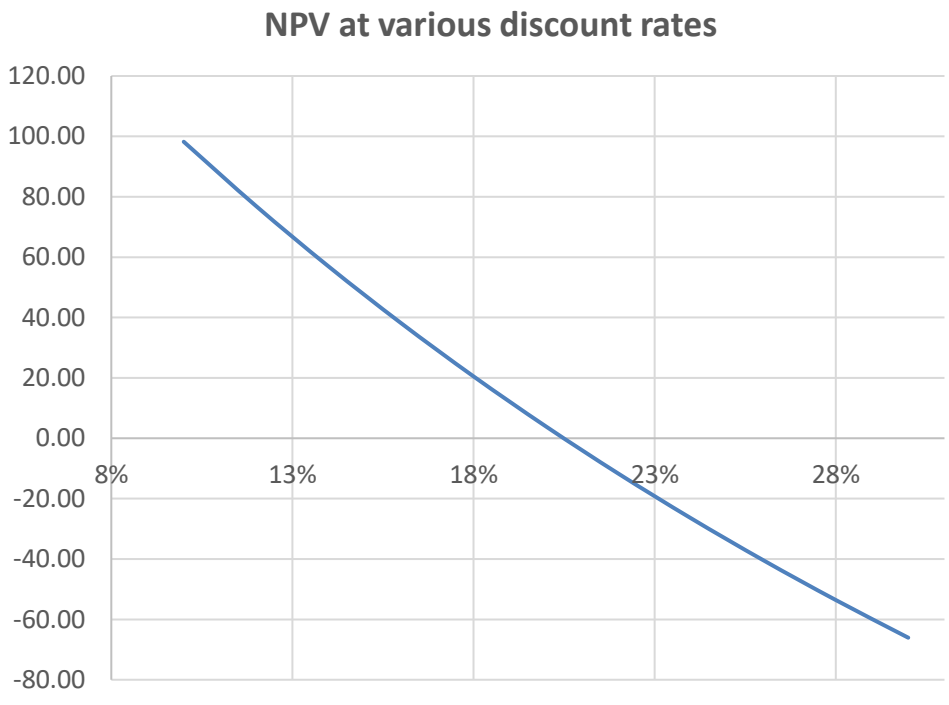
Solution 1 (Continued)

When discount rate/cost of capital > IRR, NPV<0

When discount rate/cost of capital = IRR, NPV=0

When discount rate/cost of capital < IRR, NPV>0

Discount Rate	NPV
10%	98.22
12%	76.88
14%	56.89
16%	38.12
18%	20.49
20%	3.90
22%	-11.74
24%	-26.49
26%	-40.42
28%	-53.59
30%	-66.07



Significance of IRR

- IRR is the rate at which cash flows are discounted and such discounted cash flows are equal to investment amount. This ensures that the project would at least cover the amount of investment at a particular rate i.e. IRR.
- Mathematically, internal rate of return is a discount rate that makes the net present value (NPV) of all cash flows from a particular project equal to zero. IRR calculations rely on the same formula as NPV does.
- The higher a project's internal rate of return, the more desirable it is to undertake. In theory, any project with an IRR greater than its cost of capital is a profitable one, and thus it is in a company's interest to undertake such projects.
- Assuming the costs of investment are equal among the various projects, the project with the highest IRR would probably be considered the best and be undertaken first.
- Usually IRR and NPV calculation result in the same acceptance or rejection decision. Any project with positive NPV would have IRR higher than its cost of capital.
- **If a firm's cost of capital is 10%, Project X has IRR of 12%, and Project Y has IRR of 15%, the company should choose Project Y, if these projects are mutually exclusive.** If not, both of the projects should be chosen, as both would be profitable for the company from financial perspective.

CAPITAL BUDGETING : PROBLEM 2

A project requires an initial investment of £120,000 and is expected to produce the following net cash inflows:

Year 1	£50,000
Year 2	£25,000
Year 3	£25,000
Year 4	£25,000
Year 5	£30,000

The discount rate is 8%

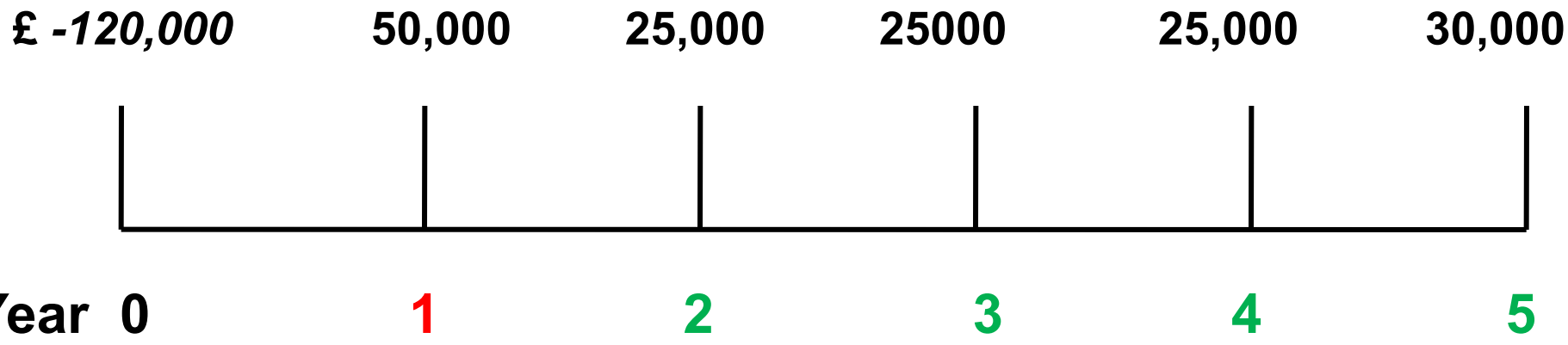
PROBLEM 2 (CONTINUED)

Required:

Evaluate the financial viability of this project using the following methods:

I. Payback
II. Discounted Payback Period
III. Net Present Value
IV. Internal Rate of Return

Cash Flow Timeline



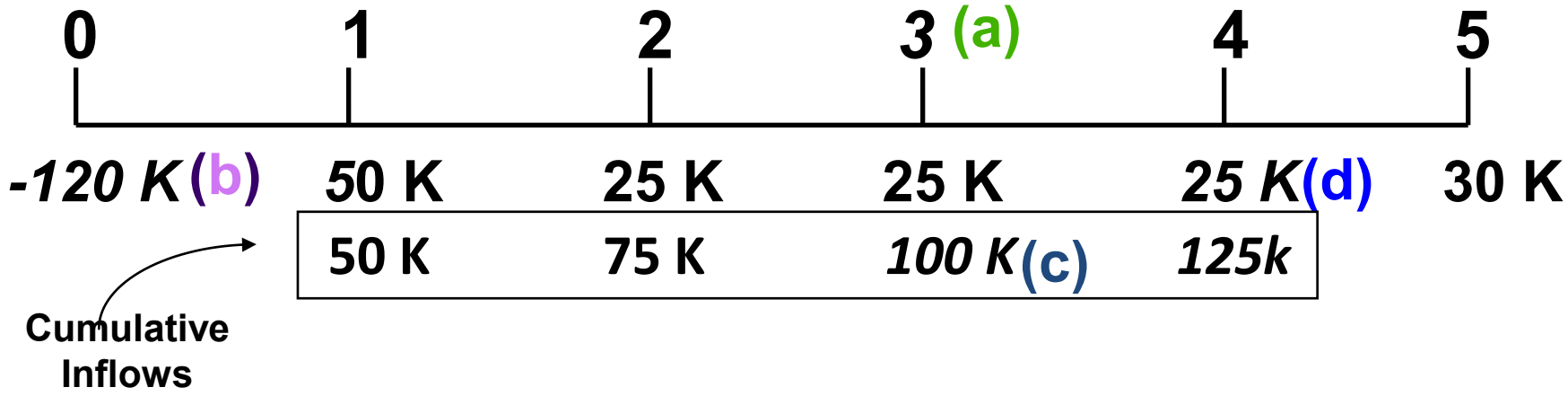
Discount Rate = 8%

Evaluate the financial viability of this project using the following methods:

I. Payback
II. Discounted Payback Period
III. Net Present Value
IV. Internal Rate of Return

SOLUTION 2

(i) Payback Period (PP)



$$PP = a + (b - c) / d$$

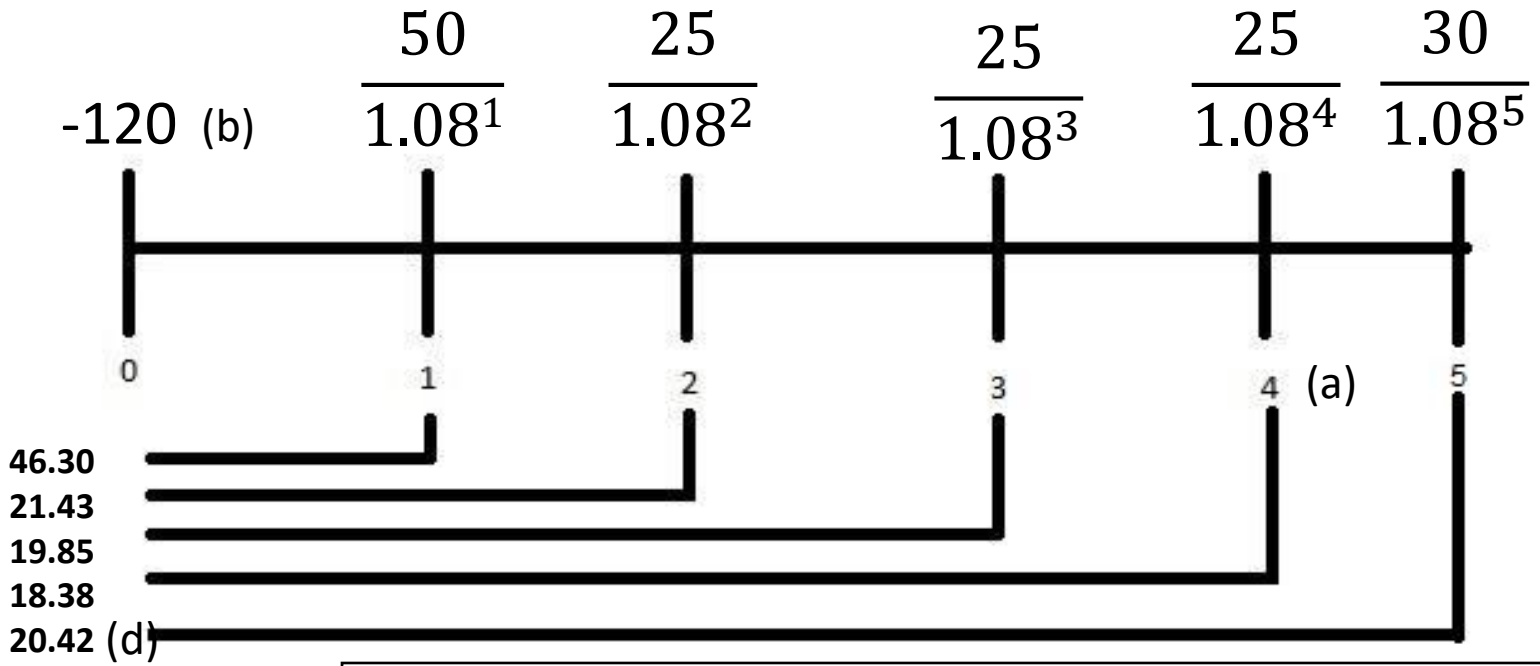
$$= (3 + (120{,}000 - 100{,}000) / 25{,}000)$$

$$= 3.8 \text{ years}$$

SOLUTION 2 (CONTINUED)

(ii) Discounted Payback Period (DPBP)

Here, Cost of Capital = 8%



46.3 K	67.73 K	*87.58K*	*105.96K*(c)	*126.38K*

Cumulative Inflows

(Amounts are in thousands)

$$DPBP = a + (b - c) / d$$

$$= 4 + (120 - 105.96) / 20.42$$

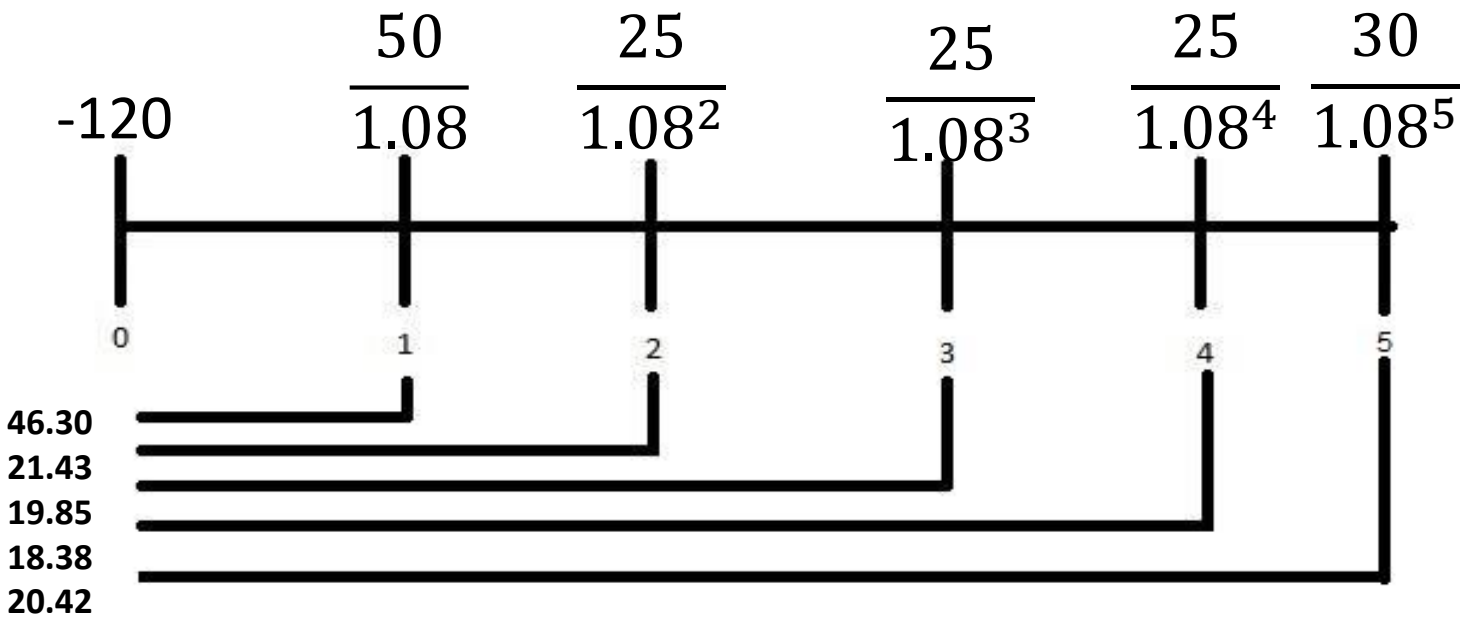
$$= 4 + (14.04) / 20.42$$

$$= 4 + 0.69 \text{ years}$$

SOLUTION 2 (CONTINUED)

(iii) **NPV Calculation**

Here, Cost of Capital = 8%

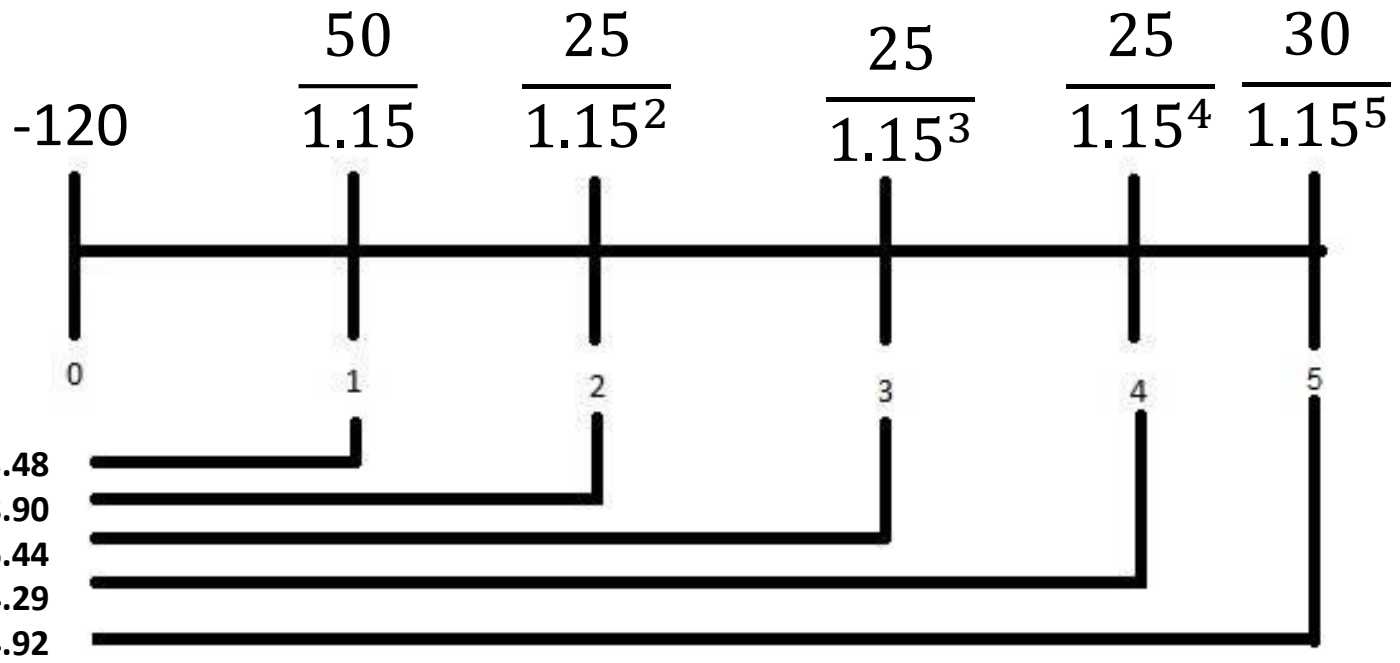


Total = **126.38**

NPV = 126,380 – 120,000 = **6,380**

SOLUTION 2 (CONTINUED)

(iii) **NPV Calculation** (At a 15% discount rate)

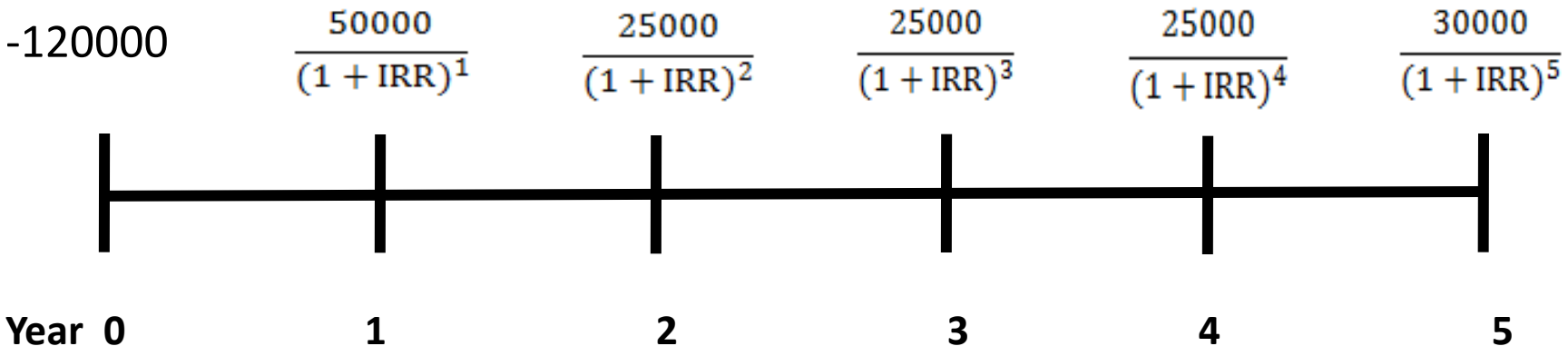


Total = **107.93**

NPV = 107,930 – 120,000 = **-12,070**

SOLUTION 2 (CONTINUED)

IRR:



NPV = Total Discounted Cash Inflows –Investment

=120,000 - 120,000

=0

SOLUTION 2 (CONTINUED)

(IV) **IRR Calculation**

Using linear interpolation (or graphical method) IRR cam be estimated:

$$\frac{6{,}380-(-12{,}070)}{0.15-0.08} = \frac{6{,}380-0}{\text{IRR}-0.08}$$ (At IRR, NPV=0)

Rearranging gives,

$$\text{IRR-0.08} = \frac{6{,}380\times 0.07}{6{,}380+12{,}070}$$

Therefore, IRR = 0.024+0.08

IRR = 10.4%

SOLUTION 2 (CONTINUED)

NPV @ IRR

-120000 $\frac{50000}{(1+\text{IRR})^1}$ $\frac{25000}{(1+\text{IRR})^2}$ $\frac{25000}{(1+\text{IRR})^3}$ $\frac{25000}{(1+\text{IRR})^4}$ $\frac{30000}{(1+\text{IRR})^5}$

$\frac{50000}{(1+0.104)\text{^}1}$ $\frac{25000}{(1+0.104)\text{^}2}$ $\frac{25000}{(1+0.104)\text{^}3}$ $\frac{25000}{(1+0.104)\text{^}4}$ $\frac{30000}{(1+0.104)\text{^}5}$

45,372 20,586 18,681 16,952 18,459

Year 0 1 2 3 4 5

NPV = Total Discounted Cash Inflows –Investment

=120,050 - 120,000

=50 (***almost 0; will be zero with more accurate IRR***)

PROBLEM 3

Diamond Ltd

Diamond Ltd has £1m to invest and have identified the following four projects:

Project	Investment	Net Present Value
A	£400,000	+£100,000
B	£600,000	+£125,000
C	£300,000	+£90,000
D	£250,000	+£40,000

Required

Assuming each project is **divisible** and the projects are not **mutually exclusive**, in which projects should Diamond Ltd invest?

SOLUTION 3

Diamond Ltd

Rank projects on basis of NPV per £ of investment required

Project	Net Present Value (NPV)	Investment	NPV per £	Ranking
A	+£100,000	£400,000	£0.25	2
B	+£125,000	£600,000	£0.208	3
C	+£90,000	£300,000	£0.3	1
D	+£40,000	£250,000	£0.16	4

SOLUTION 3 (CONTINUED)

Allocate available funds accordingly

Project	**Funds used**	**NPV**
C	£300,000	£90,000
A	£400,000	£100,000
B	£300,000 (balance)	£62,500 (=½× 125,000)
	£1,000,000	**£252,500**

Estimating Free Cash Flow for Investment Appraisal :

CAPITAL BUDGETING : PROBLEM 3

Project Chittagong: Problem

Huawei has been actively working with Bangladesh Government and providing technological support to the local companies in the ICT sector. The company also manufactures microchips and has factory in Gazipur and Cumilla. Management of Huawei has identified an opportunity to invest in a new microchip plant in Chittagong, details of which are provided below:

- Initial investment required BDT 40b (to be depreciated over 20 years)
- Sales expected in Year 1 BDT 100b
- Sales growth rate 5% per annum for the first 5 years/zero growth thereafter
- Operating profit margin 10% for the first 3 years and 12% thereafter (excluding depreciation)
- Tax rate 30%
- Working capital investment 10% of the following year's Sales (required at the start of each year)
- After-tax or tax-adjusted WACC 8.5%

Problem (Continued)

- The amount of sustaining capital expenditure required is estimated to be equal to the amount of depreciation charged per annum.

- The Chittagong plant will initially impact on the business of the company's plant in nearby Cumilla. It is estimated that the lost sales to Chittagong will result in lost contribution (before tax) to the Cumilla plant of BDT 8b in year 1, BDT 8b in year 2 and BDT 3b in year 3.

- The investment will partly be financed by a 10-year bank loan of BDT 30b at an interest rate of 5% before tax. Tax rate 30%. After tax WACC is 8.5%. Ke = ? Before Tax Kd = 5%, After tax Kd= 5% (1-.3), We = 20/50, Wd= 30/50, Tax rate =30 %

Requirement:

- Calculate the net present value of this investment. (You may assume that the new **Chittagong plant will have an infinite life**, even though it will be depreciated over 20 years for accounting and tax purposes).

- STEP 1: NOPAT
- STEP 2: FREE CASH FLOW
- STEP 3: NPV

Breakdown of Risk

Project may do better or worse than expected	Competition may be stronger or weaker than anticipated	Entire sector may be affected by action	Exchange rate and political risk	Interest rate, inflation and news about economy

Firm-specific — Market

Assumptions & Issues to Consider

- Sales revenue is calculated by multiplying Quantity Sold (Q) with Price per Unit (P).
- GDP growth rate or per capita could affect purchasing power of buyers, which in turn could affect quantity demanded and sold.
- Profit margin could vary over the project's lifetime, depending on cost of goods sold, operating expenditures, magnitude of fixed costs etc.
- Different depreciation rates could be used to allocate the long term assets' costs over the project's lifetime.

Assumptions & Issues to Consider (continued)

- Many projects might require investments at different stages of the projects lifetime, not only the initial investment the beginning of the project.
- The cost of capital is assumed to be fixed over the projects life time. But it depends on investors required rate of return, market conditions, etc. These could change over the time.

Sustaining Capital Expenditure

- Sustaining capital expenditures refers to expenditures in respect of physical assets such as property, industrial buildings, or equipment replacements or improvements required to maintain business operations at current production levels.
- An important issue to consider is the determination of an appropriate level of sustaining capital reinvestment required to maintain a company's current operations and profitability. This determination is usually based on analysis of historical levels of capital expenditure.

The drivers of sustaining expenditures include:

- Environmental compliance and improvements
- Safety compliance and improvements
- Social requirements

Depreciation

- Depreciation is a non-cash expense, which is used to allocate the cost of fixed asset over the operational life of that asset.
- As this is a non-cash expense, it does not have any direct impact on cash flow. The cost of the asset is considered in the initial investment figure.
- But deprecation is an expense, so it should be deducted from the cash flow before calculating tax amount. After calculating tax, it is added back to the cash flow, as no cash expense has actually incurred.
- Thus this depreciation amount gives a tax advantage (depreciation tax shield) by reducing tax to an extent, but does not reduce actual cash flow.

Why NOPAT is used in Investment decisions:

- Net operating profit after tax (NOPAT) is the actual after-tax operating profit of the company or in simple terms, it is the earning of the company after interest and tax.
- A company's NOPAT is a measure of profit that excludes the cost and tax benefits of debt financing.
- NOPAT *captures Operating Expenditure and partial Capital Expenditure.*
- *WACC captures Financing Expenditure.*

Growth Rate

- When cash flows are supposed to grow at a constant rate, present value of cash flows are calculated using the formula: $CF(1+g)/(K_s - g)$
- When cash flow remains the same (no growth rate), it works as a perpetuity. So the present value is calculated as: CF/K_s
- Here, CF= Cash flow; g= Growth Rate; K_s = Cost of Capital

Solution

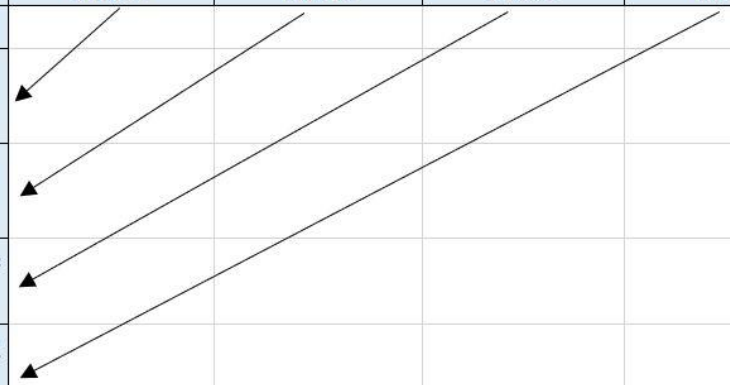
(All amounts in billions in BDT)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Net Sales (5% yearly growth till Y5, 0% growth from Y6 to infinity)		100	100*1.05 = 105	105*1.05 = 110	110*1.05 = 116	116*1.05 = 122	(0% growth) 122
Operating Profit Margin (before dep.) [10% margin of Net Sales till Y3, 12% margin of Net Sales from Y4 to infinity]		100*10% = 10	105*10% = 10.5	110*10% = 11	116*12% = 13.9	122*12% = 14.6	122*12% = 14.6
Lost Contribution		- 8.0	- 8.0	- 3.0	-	-	-
- Depreciation (40 bil./20 Years)		- 2.0	- 2.0	- 2.0	- 2.0	- 2.0	- 2.0
Operating Profit before Tax		0.0	0.5	6.03	11.89	12.59	12.59
Tax (30%)		0.0	- 0.15	- 1.81	- 3.57	- 3.78	- 3.78
NOPAT		0.0	0.35	4.22	8.32	8.81	8.81

Solution

(All amounts in billions in BDT)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
NOPAT		0.0	0.35	4.22	8.32	8.81	8.81
Initial Investment	- 40						
+ Depreciation		2.0	2.0	2.0	2.0	2.0	2.0
Sustaining CAPEX		- 2.0	- 2.0	- 2.0	- 2.0	- 2.0	- 2.0
Change in Working Capital (Working 1)	- 10	- 0.5	- 0.5	- 0.6	- 0.6	0.0	0.0
Free Cash Flow	- 50	- 0.50	- 0.15	3.62	7.72	8.81	8.81

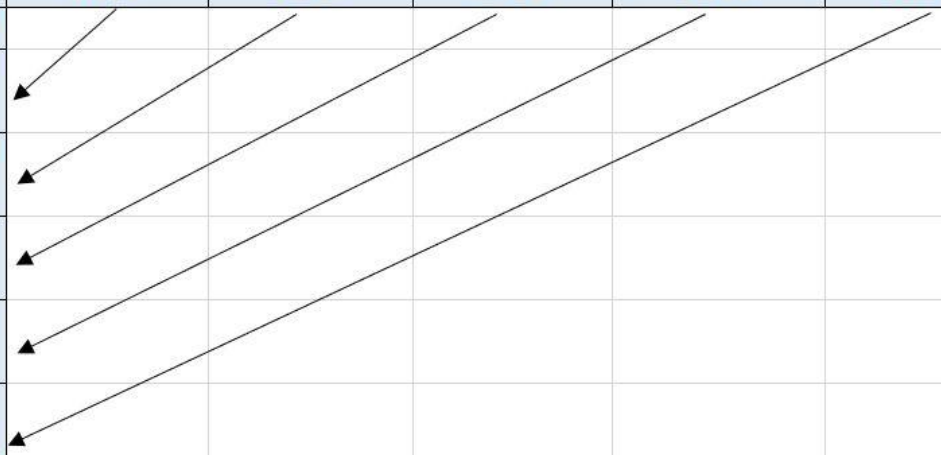
Solution

(All amounts in billions in BDT)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Free Cash Flow	- 50	- 0.50	- 0.15	3.62	7.72	8.81	8.81
Terminal Value (Y5 FCF/WACC)					8.81/0.085 = 103.65		
Total amount to discount	- 50	- 0.50	- 0.15	3.62	111.37		
Discount Factor [1/(1+WACC)^year]	1/(1+.085)^0= 1	1/(1+.085)^1= 0.922	1/(1+.085)^2= 0.849	1/(1+.085)^3= 0.783	1/(1+.085)^4= 0.722		
Present Values at Year 0 (Amount to Disc. x Disc Fact.)	- 50 x 1 = - 50						
	- 0.50 x 0.922 = - 0.46						
	- 0.15 x 0.849 = - 0.13						
	3.62 x 0.783 = 2.83						
	111.37x 0.722 = 80.36						
Sum of Present Values (Y1 to Y4)	-0.46 + -0.13 + 2.83 + 80.36 = 82.61						
Net Present Value	- 50 + 82.61 = 32.61						



Solution

(All amounts in billions in BDT)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Free Cash Flow	- 50	- 0.50	- 0.15	3.62	7.72	8.81	8.81
Terminal Value (Y6 FCF/WACC)						8.81/0.085 = 103.65	
Total lamount to discount	- 50	- 0.50	- 0.15	3.62	7.72	112.46	
Discount Factor [1/(1+WACC)^year]	1/(1+.085)^0= 1	1/(1+.085)^1= 0.922	1/(1+.085)^2= 0.849	1/(1+.085)^3= 0.783	1/(1+.085)^4= 0.722	1/(1+.085)^5= 0.665	
Present Values at Year 0 (Amount to Disc. x Disc Fact.)	- 50 x 1 = - 50						
	- 0.50 x 0.922 = - 0.46						
	- 0.15 x 0.849 = - 0.13						
	3.62 x 0.783 = 2.83						
	7.72 x 0.722 = 5.57						
	112.46 x 0.665 = 74.49						
Sum of Present Values (Y1 to Y5)	-0.46 + -0.13 + 2.83 + 5.57 + 74.49 = 82.3						
Net Present Value	- 50 + 82.3 = 32.3						



Working 1 - Change in Working Capital (WC) Calculation								
(All amounts in billions in BDT)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Net Sales (5% yearly growth till Y5, 0% growth from Y6 to infinity)		100	100*1.05 = 105	105*1.05 = 110	110*1.05 = 116	116*1.05 = 122	122	122
Required WC (10% x Net Sales of following year)	100*10% = 10	105*10% = 10.5	110*10% = 11	116*10% = 11.6	122*10% = 12.2	122*10% = 12.2	122*10% = 12.2	-
Change in WC	10-0 = 10	10.5-10 = 0.5	11-10.5 = 0.5	11.6-11 = 0.6	12.2-11.6 = 0.6	12.2-12.2 = 0.0	12.2-12.2 = 0.0	-

Workings 2
(All amounts in BDT'000)

2. Terminal value

$$\text{Terminal value} = \frac{\text{stabilized cash flow x (1 + growth rate)}}{\text{(discount rate} - \text{growth rate)}}$$

Here, the growth rate is zero after year 5. So it would work as a perpetuity with stabilized cash flow for infinity.

$$\text{So, terminal value} = \frac{\text{stabilized cash flow}}{\text{discount rate}} = \frac{8.81 \text{ bil}}{0.085} = 103.65 \text{ bil.}$$

Assumptions

3 different assumptions in 3 different scenarios

1) 8.5% cost of capital, but zero growth of cash flow after year 5
2) 12% cost of capital, but zero growth of cash flow after year 5
3) 8.5% cost of capital, but 3% growth of cash flow after year 5

Limitations

- Depreciation may change after 20 years, but that is ignored in the calculation
- Principal repayment of the current debt is not considered
- After first 10 years of the project, there may be a new loan or the capital structure of the project may change in some way – which is ignored in the calculation
- Sales is assumed to have 0% growth after year 5 – which may not be the case. Sales may grow further or even decline

Multinational Capital Budgeting : Problem 4

Spartan, Inc., is considering the development of a subsidiary in Bangladesh that would manufacture and sell integrated circuits locally. Spartan's management has asked various departments to supply relevant information for a capital budgeting analysis. In addition, some Spartan executives have met with government officials in Bangladesh to discuss the proposed subsidiary. The project would end in 4 years. All relevant information follows.

Initial investment. An estimated BDT 20 million, which includes funds to support capital expenditures as well as working capital, would be needed for the project. Given the existing spot rate of $0.50 per BDT, the U.S. dollar amount of the parent's initial investment is $10 million.

Price and demand. The estimated price and demand schedules during each of the next 4 years are shown here:

	Year 1	Year 2	Year 3	Year 4
Price per circuit	BDT 350	BDT 350	BDT 360	BDT 380
Demand in Bangladesh	60,000 units	60,000 units	100,000 units	100,000 units

Problem (continued)

Costs. The variable costs (for materials, labor, etc.) per unit have been estimated and consolidated as shown here:

	Year 1	Year 2	Year 3	Year 4
Variable costs per circuit	BDT 200	BDT 200	BDT 250	BDT 260

The rental expense of office space is BDT 1 million per year. Other annual overhead expenses are expected to be BDT 1 million per year.

Depreciation. The Bangladesh government will allow Spartan's subsidiary to depreciate the cost of the plant and equipment at a maximum rate of BDT 2 million per year, which is the rate the subsidiary will use.

Problem (continued)

Taxes. The Bangladesh government will impose a 20 percent tax rate on income. The U.S. government will allow a tax credit on taxes paid in Bangladesh; therefore, earning remitted to the U.S. parent will not be taxed by the U.S. government.

Salvage value. The Bangladesh government will pay the parent BDT 15 million to assume ownership of the subsidiary at the end of 4 years. Assume that capital gains tax on the sale of the subsidiary is 10%.

Remitted funds. The Spartan subsidiary plans to send all net cash flows received back to the parent firm at the end of each year. The Bangladesh government promises no restrictions on the cash flows to be sent back to the parent firm but does impose a 10 percent withholding tax on any funds sent to the parent, as mentioned earlier.

Problem (continued)

Exchange rates. The spot exchange rate of the Bangladeshi Taka is $0.50. The forecasted exchange rate for all future periods is $0.45.

Required rate of return. Spartan, Inc., requires a 15% return on this project.

Requirement

Calculate the net present value of this investment.

Solution

		Year 0	Year 1	Year 2	Year 3	Year 4
1.	Demand (Units)		60,000	60,000	100,000	100,000
2.	Price Per Unit		BDT 350	BDT 350	BDT 360	BDT 380
3.	Total Revenue=(1)*(2)		BDT 21,000,000	BDT 21,000,000	BDT 36,000,000	BDT 38,000,000
4.	Variable Cost Per Unit		BDT 200	BDT 200	BDT 250	BDT 260
5.	Total Variable Cost=(1)*(4)		BDT 12,000,000	BDT 12,000,000	BDT 25,000,000	BDT 26,000,000

Solution (continued)

		Year 0	Year 1	Year 2	Year 3	Year 4
5.	Total Variable Cost=(1)*(4)		BDT 12,000,000	BDT 12,000,000	BDT 25,000,000	BDT 26,000,000
6.	Annual Rental Expense		BDT 1,000,000	BDT 1,000,000	BDT 1,000,000	BDT 1,000,000
7.	Other Fixed Annual Expenses		BDT 1,000,000	BDT 1,000,000	BDT 1,000,000	BDT 1,000,000
8.	Noncash Expense (Depreciation)		BDT 2,000,000	BDT 2,000,000	BDT 2,000,000	BDT 2,000,000
9.	Total Expenses =(5)+(6)+(7)+(8)		BDT 16,000,000	BDT 16,000,000	BDT 29,000,000	BDT 30,000,000

Solution (continued)

		Year 0	Year 1	Year 2	Year 3	Year 4
3.	Total revenue=(1)*(2)		BDT 21,000,000	BDT 21,000,000	BDT 36,000,000	BDT 38,000,000
8.	Noncash expense (Depreciation)		BDT 2,000,000	BDT 2,000,000	BDT 2,000,000	BDT 2,000,000
9.	Total expenses =(5)+(6)+(7)+(8)		BDT 16,000,000	BDT 16,000,000	BDT 29,000,000	BDT 30,000,000
10.	Before-tax earnings of subsidiary =(3)-(9)		BDT 5,000,000	BDT 5,000,000	BDT 7,000,000	BDT 8,000,000
11.	Host government tax (20%)		BDT 1,000,000	BDT 1,000,000	BDT 1,400,000	BDT 1,600,000
12.	After-tax earnings of subsidiary= (10)-(11)		BDT 4,000,000	BDT 4,000,000	BDT 5,600,000	BDT 6,400,000
13.	Net cash flow to subsidiary=(12)+(8)		BDT 6,000,000	BDT 6,000,000	BDT 7,600,000	BDT 8,400,000

Solution (continued)

		Year 0	Year 1	Year 2	Year 3	Year 4
13.	Net Cash Flow to subsidiary=(12)+(8)		BDT 6,000,000	BDT 6,000,000	BDT 7,600,000	BDT 8,400,000
14.	Salvage Value after Capital Gain Tax [*Note]					BDT 14,550,000
15.	BDT Remitted by subsidiary (100% of net cash flow+ after tax salvage value)		BDT 6,000,000	BDT 6,000,000	BDT 7,600,000	BDT 22,950,000
16.	Withholding Tax on remitted funds (10%)		BDT 600,000	BDT 600,000	BDT 760,000	BDT 2,295,000
17.	**BDT Remitted after Withholding Taxes**		**BDT 5,400,000**	**BDT 5,400,000**	**BDT 6,840,000**	**BDT 20,655,000**

Solution (continued)

		Year 0	Year 1	Year 2	Year 3	Year 4
17	**BDT Remitted after Withholding Taxes**		**BDT 5,400,000**	**BDT 5,400,000**	**BDT 6,840,000**	**BDT 20,655,000**
18	Exchange Rate of BDT		$0.45	$0.45	$0.45	$0.45
19	Cash Flows to Parent		$2,430,000	$2,430,000	$3,078,000	$9,294,750
20	Discount factor at 15%		0.8696	0.7561	0.6575	0.5718
21	**PV of parent cash flows**		**$2,113,043**	**$1,837,429**	**$2,023,835**	**$5,314,303**
22	Initial Investment by parent	-$10,000,000				
23	PV of Total Cash Inflows	$11,288,611				
24	**NPV (discounted cash out flow- discounted cash inflow)**	**$1,288,611**				

Solution (continued)

Note: After tax salvage value calculation

Value of the Project	BDT 20,000,000
Accumulated Depreciation (4 × BDT 2,000,000)	BDT 8,000,000
Net Book Value	**BDT 12,000,000**

Book value of subsidiary	BDT 12,000,000.00
Selling price	BDT 15,000,000.00
Capital Gain	BDT 3,000,000.00
Tax on capital gains @ 15%	BDT 450,000.00
After tax proceed (Selling price -Tax on capital gains)	**BDT 14,550,000.00**

Thanks a lot

for your time and patience.