

CAPITAL BUDGETING

Key Topics to Know

- Understand the concept of the time value of money, i.e., present value of \$1 and present value of an annuity of \$1.
- Determine the typical cash inflows and cash outflows that are associated with an investment project.
- Discounted cash Flow model:
 - Net Present Value (NPV) Method
 - Internal Rate of Return (IRR) Method
 - Rank project using the Profitability or Present Value Index.
- Payback:
 - Investment required/Net annual cash inflow = Payback period OR
 - Summation of each year's net cash inflow or outflow until investment is recouped
- Simple or Average or Accounting Rate of Return:
 - Rate of Return = Net Income/Initial Investment
 - Net Income = Incremental revenues – Incremental expenses including depreciation

Problems

Problem #1

The following data concern an investment project:

Investment in equipment	\$10,000
Net annual cash inflows	\$ 2,400
Working capital required	\$ 5,000
Salvage value of the equipment	\$ 1,000
Life of the project	8 years
Required rate of return	10%

The working capital will be released for use elsewhere at the conclusion of the project.

Required: Compute the project's net present value.

Problem #2

T Company is considering a project that would have a ten-year life and would require a \$1,500,000 investment in equipment. At the end of ten years, the equipment would have no salvage value. The project would provide net income each year as follows:

Sales	\$2,000,000
Less: Variable Expenses	<u>1,100,000</u>
Contribution Margin	900,000
Less: Fixed Expenses:	
Other fixed expenses	\$500,000
Depreciation	<u>150,000</u> <u>650,000</u>
Net Income	\$ 250,000

All of the above items, except depreciation, represent cash flows. The company's required rate of return is 12%.

Required:

- a) Compute the project's net present value and present value index.
- b) Compute the project's payback period.
- c) Compute the project's average rate of return.
- d) Compute the project's internal rate of return to the nearest whole percent.

Problem #3

V Company has been offered a 5-year contract to supply a part for the military. After careful study, the company has developed the following estimated data relating to the contract:

Cost of equipment	\$300,000
Working capital needed	50,000
Net annual cash receipts	70,000
Salvage value at end of contract	5,000

It is not expected that the contract would be extended beyond the initial contract period. The company's discount rate is 10%.

Required: Use the net present value method to determine if the contract should be accepted.

Problem #4

G Company is considering a project with estimated annual cash flows of \$500,000 and an expected life of 9 years. The project is expected to cost \$2,000,000. G Company's minimum rate of return is 10%.

Required: Use the present value index to determine if the contract should be accepted.

Multiple Choice Questions

The next 3 questions refer to the following information.

U Company has an old bus in poor mechanical condition. The bus can be either overhauled now or replaced with a new shuttle bus. The following data have been gathered concerning these two alternatives:

	Present Bus	New Bus
Purchase cost new	\$32,000	\$40,000
Remaining net book value	21,000	
Major repair needed now	9,000	
Annual cash operating costs	12,000	8,000
Salvage value now	10,000	
Trade-in value in seven years	2,000	5,000

U Company could continue to use the present bus for the next seven years. Whether the present bus is used or a new bus is purchased, the bus would be traded in for another bus at the end of seven years. U Company uses a discount rate of 12%.

1. If the new bus is purchased, the net present value of this alternative is:
 - a) \$(74,252)
 - b) \$(64,252)
 - c) \$(66,512)
 - d) \$(76,512)

2. If the present bus is repaired, the net present value of this alternative is:
 - a) \$(53,864)
 - b) \$(54,768)
 - c) \$(63,768)
 - d) \$(62,864)

3. What is the net disadvantage of buying the new bus?
 - a) \$3,640 disadvantage
 - b) \$10,484 disadvantage
 - c) \$12,744 disadvantage
 - d) \$1,388 disadvantage

4. H Company is studying a project that would have an eight-year life and would require a \$300,000 investment in equipment which has no salvage value. The project would provide net income each year as follows for the life of the project:

Sales		\$500,000
Less: cash variable expenses		<u>200,000</u>
Contribution margin		300,000
Less:	Fixed Expenses:	
Fixed cash expenses		\$150,000
Depreciation expense		<u>37,500</u>
Net Income		<u>\$112,500</u>

The company's required rate of return is 10%. What is the payback period for this project?

- a) 3 years
 b) 2 years
 c) 2.5 years
 d) 2.67 years
5. P Company is considering the purchase of a \$200,000 machine that is expected to reduce operating cash expenses by \$65,000 per year. This machine, which has no salvage value, has an estimated useful life of 5 years and will be depreciated on a straight-line basis. For this machine, the average rate of return would be:
- a) 10.0%
 b) 12.5%
 c) 20.0%
 d) 32.5%
6. The net present value method assumes that a project's cash flows are reinvested at the:
- a) Internal rate of return.
 b) rate of return.
 c) Discount rate used in the present value calculations.
 d) Accounting rate of return.

7. C Company has several investment opportunities to evaluate, but does not have the funds to invest in all of them. Which calculation would be best for Cresol to use to determine which project(s) to choose?
- Payback period.
 - rate of return.
 - Net present value.
 - Present value index.
8. The payback method measures:
- How quickly investment dollars are recovered.
 - The cash flow from an investment.
 - The economic life of an investment.
 - The project present value of an investment.
9. W Company is considering a project that would require an investment of \$203,000 and would last for 6 years. The annual net operating income from the project would be \$103,000, which includes depreciation of \$30,000. The scrap value of the project's assets at the end of the project would be \$23,000. The cash inflows occur evenly throughout the year. The payback period of the project is:
- 1.5 years
 - 2.0 years
 - 1.4 years
 - 1.7 years
10. Z Company is considering a capital budgeting project that would require an initial investment of \$440,000 and working capital of \$32,000. The working capital would be released for use elsewhere at the end of the project in 4 years. The investment would generate annual cash inflows of \$147,000 for the life of the project. At the end of the project, equipment that had been used in the project could be sold for \$11,000. The company's discount rate is 7%. The net present value of the project is:
- \$66,282
 - \$34,282
 - \$159,000
 - \$58,698

11. V Company is considering a project that would require an investment of \$48,000. No other cash outflows would be involved. The present value of the cash inflows would be \$52,800. The present value index of the project is:
- .90
 - .10
 - 1.10
 - .09
12. Q Company is contemplating purchasing equipment that would increase sales revenues by \$478,000 per year and cash operating expenses by \$249,000 per year. The equipment would cost \$738,000 and have a 9 year life with no salvage value. The annual depreciation would be \$82,000. The average rate of return on the investment is:
- 19.9%
 - 30.8%
 - 31.0%
 - 11.1%
13. X Company is considering the acquisition of a new machine that costs \$420,000 and has a useful life of 5 years with no salvage value. The incremental net operating income and incremental net cash flows that would be produced by the machine are:

	<u>Incremental Net Operating Income</u>	<u>Incremental Net Cash Flows</u>
Year 1	\$61,000	\$145,000
Year 2	\$67,000	\$151,000
Year 3	\$78,000	\$162,000
Year 4	\$41,000	\$125,000
Year 5	\$83,000	\$167,000

Assume cash flows occur uniformly throughout a year except for the initial investment. The payback period of this investment is closest to:

- 5.0 years
- 3.2 years
- 1.9 years
- 2.8 years

14. M Company has some equipment that needs to be rebuilt or replaced. The following information has been gathered relative to this decision:

	<u>Present</u> <u>Equipment</u>	<u>New</u> <u>Equipment</u>
Purchase cost new	\$50,000	\$48,000
Remaining book value	\$30,000	-
Cost to rebuild now	\$25,000	-
Maintenance at the end of 3 years	\$8,000	\$5,000
Annual cash operating costs	\$10,000	\$8,000
Salvage value at the end of 5 years	\$3,000	\$7,000
Salvage value now	\$9,000	-

M Company uses a discount rate of 12%. At the end of five years M Company will have no future use for any of the equipment. If the new equipment is purchased, the present value of the cash flows that occur now is:

- a) (\$48,000)
 - b) (\$39,000)
 - c) (\$41,000)
 - d) (\$37,000)
15. K Company Corporation is considering three investment projects-B, C, and D. Project B would require an investment of \$15,000, Project C of \$50,000, and Project D of \$89,000. The present value of the cash inflows would be \$16,350 for Project B, \$56,500 for Project C, and \$96,120 for Project D. The present value index of investment project C is closest to:
- a) .13
 - b) .87
 - c) .12
 - d) 1.13

Solutions to Problems

Problem #1

	Amount	Time	10% Factor	Present Value
Investment required	\$10,000	Now	1.00	(\$10,000)
Net cash Inflows	2,400	1-8	5.335	12,804
Working capital required	5,000	Now	1.00	(5,000)
Working capital released	5,000	8	.467	2,335
Salvage value	1,000	8	.467	467
Net Present Value				\$ 606

Problem #2

	Amount	Time	12% Factor	Present value
Investment required	\$1,500,000	Now	1.00	(\$1,500,000)
Cash Inflows*	400,000	1-10	5.65	2,260,000
Net Present Value				760,000

- a) Present value Index: $760,000 / 1,500,000 = .51$
- b) Payback Period: $\$1,500,000 / \$400,000 = 3.75$ years
- c) Rate of Return: $\$250,000 / \$1,500,000 = 16.67\%$
- d) Factor of the IRR = Investment required ÷ Annual net cash inflow
 $= \$1,500,000 \div \$400,000 = 3.75$

The factor is closest to the present value of an annuity over 10 years at 23%.

Problem #3

	<u>Years 1 - 5</u>
Annual cash flow	\$70,000
Discount factor @ 12%	3.791
Present value	\$265,370
	<u>Year 5</u>
Working capital	\$50,000
Salvage value	<u>5,000</u>
	55,000
Discount factor @ 12%	.621
Present value	\$34,155
Present value years 1 - 5	\$265,370
Present value year 5	34,155
Less: Initial investment	<u>350,000</u>
Net present value	(\$50,475)

No, the contract should not be accepted because the net present value is negative.

Problem #4

	<u>Years 1 – 9</u>
Annual cash flow	\$500,000
Discount factor @ 10%	5.759
Present value	\$2,879,500
Investment	2,000,000
Present Value Index	1.439

Solutions to Multiple Choice Questions

- 1. B
- 2. D
- 3. D
- 4. B
- 5. B
- 6. C
- 7. D
- 8. A
- 9. A
- 10. D
- 11. B
- 12. A
- 13. D
- 14. B
- 15. A