

ADVANCED CAPITAL BUDGETING DECISIONS

CLASS 13

MCQ based Questions

Scenario Analysis

S Ltd finds an opportunity to invest in a 2 year project and will cost ₹1 lakh. The estimated cash flows for the first year is given in the following table:

- Year 1 ₹ 40,000 with probability of 30% (Scenario 1)
- Year 1 ₹ 60,000 with probability of 40% (Scenario 2)
- Year 1 ₹ 80,000 with probability of 30% (Scenario 3)

The second year cash flows with conditional probability are

- Scenario 1 - ₹ 20,000 with probability of 20%
- Scenario 1 - ₹ 50,000 with probability of 60%
- Scenario 1 - ₹ 80,000 with probability of 20%
- Scenario 2 - ₹ 70,000 with probability of 30%
- Scenario 2 - ₹ 80,000 with probability of 40%
- Scenario 2 - ₹ 90,000 with probability of 30%
- Scenario 3 - ₹ 80,000 with probability of 10%
- Scenario 3 - ₹ 1,00,000 with probability of 80%
- Scenario 3 - ₹ 1,20,000 with probability of 10%

If the relevant cost of capital to evaluate is 8% (risk free rate), Cost of Capital 14%,

1. Which of the following options represent the total number of different paths for the cash flows in the given scenarios?
 - A. 9 paths
 - B. 6 paths
 - C. 3 paths
2. In the context of cash flows, which of the following options correctly describes the relationship between the cash flows?
 - A. Moderately Correlated
 - B. Uncorrelated
 - C. Perfectly Correlated
3. What is the expected cash flow in Year 1?
 - A. Rs. 50,000
 - B. Rs. 60,000
 - C. Rs. 80,000

4. If the cash flow scenario is Scenario 1, what is the expected cash flow for Year 2?

- A. Rs. 1,00,000
- B. Rs. 80,000
- C. Rs.50,000

5. What is the Best Case Net Present Value (NPV) and its associated probability for the given scenarios?

	Best Case Net Present Value (NPV)	Probability
A.	56,038	0.03
B.	76,955	0.03
C.	59,808	0.24

6. What is the Worst Case Net Present Value (NPV) and its associated probability for the given scenarios?

	Worst Case Net Present Value (NPV)	Probability
A.	-51,202	0.06
B.	-42,661	0.03
C.	-45,816	0.06

7. Calculate the Mean, Standard Deviation, and Coefficient of Variation (CV) of Net Present Value (NPV) for the given cash flow scenarios.

	Mean	Standard Deviation	Coefficient of Variation (CV)
A.	21570.68	32814.21	152.12%
B.	7531.47	18623.39	247.27%
C.	21570.68	27017.425	125.25%

8. The firm uses the Risk-Adjusted Discount Rate (RADR) guidelines based on the Coefficient of Variation (CV) for its projects. According to the given guidelines, which of the following actions would be taken for this project with a CV?

- A. If CV of the project <150%, deduct 50% of Normal Risk Premium from Kc.
- B. If CV of the project >150%, add 50% of Normal Risk Premium to Kc.
- C. If CV of the project falls between 140-150%, use Kc.

9. Calculate the Risk Adjusted NPV of the project and state whether the project should be accepted or rejected.

	Risk Adjusted NPV	Acceptance/Rejection
A.	7531.47	Accepted
B.	21570.68	Accepted
C.	-8785.86	Rejected

ANSWER:

1. A
2. A
3. B
4. C
5. B
6. C
7. A
8. B
9. A

Explanation:

	Year 1	P	Year 2	P	Path	Joint prob	NPV(X)	NPV*Joint Prob	(X-Xbar)^2*P
Sc.1	40000	0.3	20000	0.2	1	0.06	-45816	-2748.96	272457878.5
			50000	0.6	2	0.18	-20096	-3617.28	312500200
			80000	0.2	3	0.06	5624	337.44	15257796.18
									0
Sc.2	60000	0.4	70000	0.3	4	0.12	15569	1868.28	4322419.539
			80000	0.4	5	0.16	24143	3862.88	1058692.829
			90000	0.3	6	0.12	32716	3925.92	14906178.95
									0
Sc.3	80000	0.3	80000	0.1	7	0.03	42661	1279.83	13344047.93
			100000	0.8	8	0.24	59808	14353.92	350902233.8
			120000	0.1	9	0.03	76955	2308.65	92022687.06
						1	Expected NPV(Xbar)	21570.68	1076772135
									32814.20629
						Summary			
						Expected NPV		21570.68	
						S.d of NPV		32814.20629	
						Coefficient of Variation		152.1241161	

	Year 1	P	RADR	17%	Year 2	P	Path	Joint prob	NPV(X)	NPV*Joint Prob
Sc.1	40000	0.3	20000	0.2	1	0.06			-51202	-3072.12
			50000	0.6	2	0.18			-29286	-5271.48
			80000	0.2	3	0.06			-7371	-442.26
Sc.2	60000	0.4	70000	0.3	4	0.12			2418	290.16
			80000	0.4	5	0.16			9723	1555.68
			90000	0.3	6	0.12			17028	2043.36
Sc.3	80000	0.3	80000	0.1	7	0.03			26817	804.51
			100000	0.8	8	0.24			41427	9942.48

			120000	0.1	9	0.03	56038	1681.14
						1	Expected NPV(Xbar)	7531.47
								Project accepted

	Year 1	P	Rf	8%	Path	Conditional Expected CF2
	Year 1	P	Year 2	P	Path	Conditional Expected CF2
Sc.1	40000	0.3	20000	0.2	1	50000
			50000	0.6	2	
			80000	0.2	3	
Sc.2	60000	0.4	70000	0.3	4	80000
			80000	0.4	5	
			90000	0.3	6	
Sc.3	80000	0.3	80000	0.1	7	100000
			100000	0.8	8	
			120000	0.1	9	
		expected cash flow in year 1	60000			

Topic Replacement Project

Question 1:

Company Y is operating an elderly machine that is expected to produce a net cash inflow of ₹ 40,000 in the coming year and ₹ 40,000 next year. Current salvage value is ₹ 80,000 and next year's value is ₹ 70,000. The machine can be replaced now with a new machine, which costs ₹ 1,50,000, but is much more efficient and will provide a cash inflow of ₹ 80,000 a year for 3 years. Company Y wants to know whether it should replace the equipment now or wait a year with the clear understanding that the new machine is the best of the available alternatives and that it in turn be replaced at the optimal point. Ignore tax. Take opportunity cost of capital as 10 per cent. Advise with reasons.

(Source: ICAI)

ANSWER:

Statement showing present value of cash inflow of new machine when it replaces elderly machine now

NPV of New Machine

PV of Cash Inflow (80000×2.486)	₹ 1,98,880
Less: Purchase Cost of New Machine	<u>₹ 1,50,000</u>
	<u>₹ 48,880</u>

Since NPV of New Machine is positive, it should be purchased.

Timing Decision

Replace Now

Current Realizable Value	₹ 80,000
NPV of New Machine	<u>₹ 48,880</u>
Total NPV	<u>₹ 1,28,880</u>

Replace after 1 Year

Cash Inflow for Year 1	₹ 40,000
Realisable Value of Old Machine	₹ 70,000
NPV of New Machine	<u>₹ 48,880</u>
Total NPV after 1 Year	<u>₹ 1,58,880</u>
PV of Total NPV ($158880/1.1$)	₹ 1,44,436

Advise: Since Total NPV is higher in case of Replacement after one year Machine should be replaced after 1 year.

Question 2:

Trouble Free Solutions (TFS) is an authorized service center of a reputed domestic air conditioner manufacturing company. All complaints/service related matters of Air conditioner are attended by this service center. The service center employs a large number of mechanics, each of whom is provided with a motor bike to attend the complaints. Each mechanic travels approximately 40000 kms per annum. TFS decides to continue its present policy of always buying a new bike for its mechanics but wonders whether the present policy of replacing the bike every three year is optimal or not. It is of believe that as new models are entering into market on yearly basis, it wishes to consider whether a replacement of either one year or two years would be better option than present three year period. The fleet of bike is due for replacement shortly in near future.

The purchase price of latest model bike is ₹ 55,000. Resale value of used bike at current prices in market is as follows:

Period	₹
1 Year old	35,000
2 Year old	21,000
3 Year old	9,000

Running and Maintenance expenses (excluding depreciation) are as follows:

Year	Road Taxes Insurance etc. (₹)	Petrol Repair Maintenance etc. (₹)
1	3,000	30,000
2	3,000	35,000
3	3,000	43,000

Using opportunity cost of capital as 10% you are required to determine optimal replacement period of bike.

Source: ICAI)

ANSWER:

In this question the effect of increasing running cost and decreasing resale value have to be weighted upto against the purchase cost of bike. For this purpose, we shall compute Equivalent Annual Cost (EAC) of replacement in different years shall be computed and compared.

Year	Road Taxes (₹)	Petrol etc. (₹)	Total (₹)	PVF @10%	PV (₹)	Cumulative PV (₹)	PV of Resale Price (₹)	Net Outflow (₹)
1	3,000	30,000	33,000	0.909	29,997	29,997	31,815	(1,818)
2	3,000	35,000	38,000	0.826	31,388	61,385	17,346	44,039
3	3,000	43,000	46,000	0.751	34,546	95,931	6,759	89,172

Computation of EACs

Year*	Purchase Price of Bike (₹)	Net Outflow (₹)	Total Outflow (₹)	PVAF @ 10%	EAC* (₹)
1	55,000	(1,818)	53,182	0.909	58,506
2	55,000	44,039	99,039	1.735	57,083
3	55,000	89,172	1,44,172	2.486	57,993

Thus, from above table it is clear that EAC is least in case of 2 years, hence bike should be replaced every two years.