S. S. Jain Subodh Management Institute

MBA IVth Semester, (Model Paper & Suggested Answers)

Subject: Project Management

Paper Code: M-402

Time: 1 Hour **Max Marks: 10**

Note: Attempt both the questions. All questions carry equal marks.

Q1. What is technical feasibility study? What important aspects are considered in a technical analysis of a project? The following table gives data on normal time and cost and crash time and cost for a project:

Activity	Normal		Crash	
	Time	Cost	Time	Cost
1-2	6	60	4	100
1-3	4	60	2	200
2-4	5	50	3	150
2-5	3	45	1	65
3-4	6	90	4	200
4-6	8	80	4	300
5-6	4	40	2	100
6-7	3	45	2	80

The indirect cost id Rs. 10/day:

(i) Draw the network for the project. (1)

(ii) Find the critical path of the project. (1)

(iii) Find the minimum total time for project completion and corresponding costs.

(1.5+1.5)

Q2. A Ltd. Company considering investing in a project. The expected original investment in the project will be Rs. 2,00,000; the life of project will be 5 year with no salvage value. The expected net cash inflows after depreciation but before tax during the life of the project will be as follows:

Year	1	2	3	4	5
Rs.	85,000	1,00,000	80,000	80,000	40,000

The project will be depreciated at the rate of 20% on original cost. the company is subjected to 30% tax rate.

Required:

(i) Calculate payback period and average rate of return (ARR). (1+1)

(ii) Calculate net present value index, if cost of capital is 10%. (1)

(iii) Calculate internal rate of return. (2)

Note: the P.V. factors are:

Year	PV at 10%	PV at 37%	PV at 38%	PV at 40%

1	0.909	0.730	0.725	0.714
2	0.826	0.533	0.525	0.510
3	0.751	0.389	0.381	0.364
4	0.683	0.284	0.276	0.260
5	0.621	0.207	0.200	0.186

Suggested Answers

Answer 1

Solution :

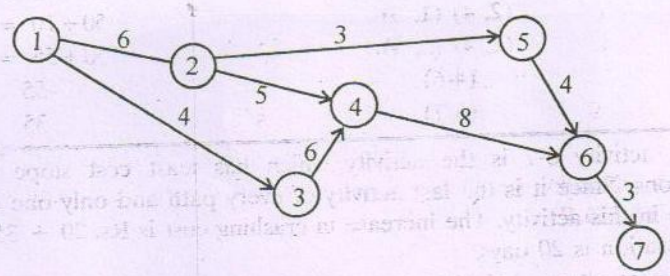

Fig. 2.56.

The different paths are :

S.No.	Paths	Duration
(i)	1-2-5-6-7	16
(ii)	1-2-4-6-7	22
(iii)	1-3-4-6-7	21

The critical path is : 1-2-4-6-7 with a duration of 22 days.

The slope of activities of the above network are :

Activity	Normal time	Crash time	Cost slope
1-2	6	4	$(100-60) \div 2 = 20$
1-3	4	2	$(200-60) \div 2 = 70$
2-4	5	3	$(150-50) \div 2 = 50$
2-5	3	1	$(65-45) \div 2 = 10$
3-4	6	4	$(200-90) \div 2 = 55$
4-6	8	4	$(300-80) \div 4 = 55$
5-6	4	2	$(100-40) \div 2 = 30$
6-7	3	2	$(80-45) \div 1 = 35$

The activity 1-2 is the activity with minimum cost slope on critical path. This activity can be reduced by one day and with this reduction both paths (ii) and (iii) become the critical path. The new paths are as given below :

(i) 1-2-5-6-7 15 days
(ii) 1-2-4-6-7 21 days
(iii) 1-3-4-6-7 21 days

Increase in crashing cost = Rs. 20.

The different combinations of activities required to reduce the two critical paths and corresponding crashing costs are :

S.No.	Combination	Cost of per day reduction
1.	(1-2) (1, 3)	$20+70 = 90$
2.	(1, 2) (3, 4)	$20+55 = 75$
3.	(2, 4) (1, 3)	$50+70 = 120$
4.	(2, 4) (3, 4)	$50+55 = 105$
5.	(4-6)	55
6.	(6-7)	35

The activity 6-7 is the activity which has least cost slope among all the combinations. Since it is the last activity of every path and only one day's reduction is possible in this activity. The increase in crashing cost is Rs. 20 + 35 = Rs. 55 and project duration is 20 days.

The next alternative with minimum crashing cost is activity 4-6. The length of path (1) is now 14 days and a 4 days reduction is possible in this activity. The new paths are now :

1-2-5-6-7	14 days
1-2-4-6-7	16 days
1-3-4-6-7	16 days

The crashing cost = 55 + 4 × 55 = Rs. 275.

As we see that the paths : 1-2-4-6-7 and 1-3-4-6-7 still remain critical paths. The cheapest alternative is (2) with a cost of Rs. 75/ day. This alternative can be used only by one day, because only one days reduction is now possible in activity 1-2.

The new paths are :

1-2-5-6-7	13 days
1-2-4-6-7	15 days
1-3-4-6-7	15 days

Corresponding crashing cost is Rs. 275 + 75 = Rs. 350. Now the alternative (4) with a cost slope of Rs. 105 is the cheapest alternative. As only one day's reduction is available in activity 3-4, this alternative can be used only for one day. The corresponding crashing cost = 350 + 150 = Rs. 455.

The new paths are :

1-2-5-6-7	13 days
1-2-4-6-7	14 days
1-3-4-6-7	14 days

The cheapest alternative is now (3). As only one day's reduction is now available in activity 2-4; this alternative will be used only for one day reduction.

The corresponding Crashing Cost = Rs. 455 + 120 = Rs. 575

The new paths are now

1-2-5-6-7	13 days
1-2-4-6-7	13 days
1-3-4-6-7	13 days

We see that no reduction is now possible in path 1-2-4-6-7. Hence minimum project duration is 13 days with corresponding cost = 575 + 13 × 10 = Rs. 705.

Total cost including overhead cost and normal cost

= Rs. (705 + 13×10 + 470) = Rs. 1305

Answer 2

Solution

Year	PBT	Tax @ 30%	PAT	Depreciation	Net Cash Inflow	Cumulative cash inflow
	Rs.		Rs.	Rs.	Rs.	Rs.
1	85,000	25,500	59,500	40,000	99,500	99,500
2	1,00,000	30,000	70,000	40,00	1,10,000	2,09,500
3	80,000	24,000	56,000	40,000	96,000	3,05,500
4	80,000	24,000	56,000	40,000	96,000	4,01,500
5	40,000	12,000	28,000	40,000	68,000	4,69,500
Total			2,69,500		4,69,500	
Average			53,900		93,900	

Payback Period :

= Rs. 99,500 in year 1st + Rs. 1,00,500 during 2nd year.
= Year 1 + 1,00,500 / 1,10,000 × 12 months in year 2nd
= 1 year 11 months (approx.)

(i) Calculation of ARR

Year	Investment at the beginning	Depreciation	Closing Investment	Average Investment
	Rs.	Rs.	Rs.	Rs.
1	2,00,000	40,000	1,60,000	1,80,000
2	1,60,000	40,000	1,20,000	1,40,000
3	1,20,000	40,000	80,000	1,00,000
4	80,000	40,000	40,000	60,000
5	40,000	40,000	—	20,000
Total				5,00,000
Average investment (5,00,000 / 5 year)				1,00,000

$$ARR = \frac{\text{Average profit after tax}}{\text{Average investment}} \times 100 = \frac{\text{Rs. } 53,900}{\text{Rs. } 1,00,000} \times 100 = 53.9\%$$

(ii) Calculation of Net Present Value

Year	Net Cash inflow	PVF @ 10%	Present Values
	Rs.		Rs.
0	(2,00,000)	1.000	(2,00,000)
1	99,500	0.909	90,445
2	1,10,000	0.826	90,860
3	96,000	0.751	72,096
4	96,000	0.683	65,568
5	68,000	0.621	42,228
NPV			1,61,197

(iii) Calculation of IRR

Present value factor = Initial investment / Average annual cash inflow
= Rs. 2,00,000 / Rs. 93,900 = 2.13

The value of 2.13 lies in between 38% and 40%.

Year	Net Cash Inflow	PVF @ 38%	PV Rs.	PVF @ 40%	PV Rs.
0	(2,00,000)	1.000	(2,00,000)	1.000	(2,00,000)
1	99,500	0.725	72,137	0.714	71,043
2	1,10,000	0.525	57,750	0.510	56,100
3	96,000	0.381	36,576	0.364	34,944
4	96,000	0.276	26,496	0.260	24,960
5	68,000	0.200	13,600	0.186	12,648
NPV			6,559		(–) 305

$$IRR = 38 + \frac{6,559}{6,559 + 305} \times 2 = 38 + 1.91 = 39.91\%$$