of Return is 27.30% which is more than ~~standard~~ ...
both criteria.

Illustration 4.7

A company is evaluating the following Project :

Cost	₹ 10,000
Cash inflows : Year 1	₹ 1,000
2	1,000
3	2,000
4	10,000

Compute the Internal Rate of Return and comment on the project if the opportunity cost is 14%.

Illustration 4.8

A firm whose cost of capital is 10% is considering two mutually exclusive projects X and Y, the details of which are :

	Year	Project X	Project Y
Cost	0	₹ 1,00,000	₹ 1,00,000
Cash inflows	1	10,000	50,000
	2	20,000	40,000
	3	30,000	20,000
	4	45,000	10,000
	5	60,000	10,000

Compute the Net Present Value at 10%, Profitability Index, and Internal Rate of Return for the two projects.

Illustration 4.9

Jolly company has an investment opportunity costing ₹ 1,00,000 with the following expected cash inflow.

Year	Inflows	PVF$_{(10\%, n)}$	Year	Inflows	PVF$_{(10\%, n)}$
1	₹ 17,000	0.909	6	₹ 18,000	₹ 0.564
2	17,000	0.826	7	10,000	0.513
3	17,000	0.751	8	15,000	0.467
4	17,000	0.683	9	10,000	0.424
5	17,000	0.621	10	14,000	0.386

Using 10% as the cost of capital (rate of discount) determine (*i*) Net Present Value; and (*ii*) Profitability Index.

Solution:

Calculation of Net Present Value :

Year	Inflow (₹)	PVF$_{(10\%, n)}$	PV (₹)
1	17,000	0.909	15,453
2	17,000	0.826	14,042
3	17,000	0.751	12,767
4	17,000	0.683	11,611
5	17,000	0.621	10,557
6	18,000	0.564	10,152
7	10,000	0.513	5,130
8	15,000	0.467	7,005
9	10,000	0.424	4,240
10	14,000	0.386	5,404
		Total Present value of Inflows	96,361

NPV = ₹ 96,361 – ₹ 1,00,000 = – ₹ 3,639

Illustration 4.10

A company requires an initial investment of ₹ 40,000. The estimated net cash flows are as follows : *(Figures in ₹)*

Year	1	2	3	4	5	6	7	8	9	10
Net cash flow	7,000	7,000	7,000	7,000	7,000	8,000	10,000	15,000	10,000	4,000

Using 10% as the cost of capital (rate of discount), determine the following :
(i) Pay-back period (ii) Net Present Value and (iii) Internal Rate of Return.

Solution:

(i) Payback Period :

Initial outlay	= ₹ 40,000
Cashflows for 5 years	= ₹ 7,000 + 7,000 + 7,000 + 7,000 + 7,000
	= ₹ 35,000
Balance outlay	= ₹ 40,000 − 35,000 = ₹ 5,000
Cash flow for year 6	= ₹ 8,000
Therefore, Payback period	= 5 years + $\dfrac{5,000}{8,000}$
	= 5.62 years.

(ii) Net Present Value (at 10% cost of capital)

Year	Cash Flow	PVF$_{(10\%, n)}$	PV
1	₹ 7,000	.909	₹ 6,363
2	7,000	.826	5,782
3	7,000	.751	5,257
4	7,000	.683	4,781
5	7,000	.621	4,347
6	8,000	.564	4,512
7	10,000	.513	5,130
8	15,000	.467	7,005
9	10,000	.424	4,240
10	4,000	.386	1,544
			48,961
Total PV of inflows			48,961
Less Initial outlay			40,000
Net Present Value			8,961

Illustration 4.18

Bright Metals Ltd. is considering two different investment proposals, A and B. The details are as under :

		Proposal A	Proposal B
Investment Cost		₹ 9,500	₹ 20,000
Estimated Income :			
	Year 1	4,000	8,000
	Year 2	4,000	8,000
	Year 3	4,500	12,000

Suggest the more attractive proposal on the basis of the NPV method considering that the future incomes are discounted at 12%. Also find out the IRR of the two proposals.

Solution:

Evaluation of Investment Proposal (Net Present Value Method) :

Year	Cash inflows (₹)		$PVF_{(12\%, n)}$	Present Value (₹)	
	A	B		A	B
0	− 9,500	− 20,000	1·000	− 9,500	− 20,000
1	4,000	8,000	0·893	3,572	7,144
2	4,000	8,000	0·797	3,188	6,376
3	4,500	12,000	0·712	3,204	8,544
Net Present Value (NPV)				464	2,064

Proposal B has higher NPV, and therefore, it should be accepted.

Calculation of Internal Rate of Return :

In case of Proposal A, the discount factor should be raised from 12% and tested at, say, 14% and 15%. Similarly, for B the same should be tried at, say, 17% and 18%. The purpose is to find out at what point the present value of inflows are equal to ₹ 9,500 and ₹ 20,000.

Project A	Project B
NPV @ 12% ₹ 464	NPV @ 12% ₹ 2064
NPV @ 14% ₹ 122	NPV @ 17% ₹ 176
NPV @ 15% ₹ − 35	NPV @ 18% ₹ − 172

Interpolation between 14% and 15%

$$IRR = 14\% + \frac{122}{122 - (-35)} \times 1 = 14·78\%$$

Interpolation between 17% and 18%

$$IRR = 17\% + \frac{176}{176 - (-172)} \times 1 = 17·51\%$$

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Illustration 4.19

The cash flows from two mutually exclusive Projects A and B are as under :

Years	Project A	Project B
0	₹ – 22,000	₹ – 27,000
1 – 7 (Annual)	6,000	7,000
Project Life	7 Years	7 Years

(i) Calculate NPV of the proposals at discount rates of 15%, 16%, 17%, 18%, 19% and 20%.

(ii) Advise on the project on the basis of IRR method.

Solution:

Computation of Present Value of Cash Inflows of Different Projects

Dis. Rate	Cash Flows (₹) Proj. A	Cash Flows (₹) Proj. B	PVAF$_{(r\%,\,7y)}$	P.V. of Cash Flows (₹) Proj. A	P.V. of Cash Flows (₹) Proj. B
15%	6,000	7,000	4·160	24,960	29,120
16%	6,000	7,000	4·040	24,240	28,280
17%	6,000	7,000	3·922	23,532	27,454
18%	6,000	7,000	3·812	22,872	26,684
19%	6,000	7,000	3·706	22,235	25,942
20%	6,000	7,000	3·605	21,630	25,235

Calculation of NPV :

Dis. Rate	PV of Inflows (A)	NPV (A)	PV of Inflows (B)	NPV (B)
15%	₹ 24,960	₹ 2,960	₹ 29,120	₹ 2,120
16%	24,240	2,240	28,280	1,280
17%	23,532	1,532	27,454	454
18%	22,872	872	26,784	– 216
19%	22,235	235	25,942	– 1,058
20%	21,630	– 370	25,235	– 1,765

Calculation of IRR :

Project A : Since outflow of ₹ 22,000 is falling between ₹ 22,235 and ₹ 21,630, the IRR must be between 19% to 20%. So, interpolating the difference of ₹ 605 between 19% and 20%, the IRR comes to 19·39% :

$$\text{IRR} = 19\% + \frac{235}{235 - (-370)} \times (20 - 19) = 19\cdot39\%$$

Project B : Since outflow of ₹ 27,000 is falling between ₹ 27,454 and ₹ 26,684, the IRR must be between 17% to 18%. So, interpolating the difference of ₹ 770 between 17% and 18%, the IRR comes to 17·59% :

$$\text{IRR} = 17\% + \frac{454}{454 - (-216)} \times (18 - 17) = 17\cdot59\%$$