A company is considering an investment proposal to instal new milling controls. The project will cost ₹ 50,000. The facility has a life expectancy of 5 years and no salvage value. The company tax rate is 35%. The firm uses straight line depreciation. The estimated profit before depreciation from the proposed investment proposal are as follows :

Year	Profit
1	₹ 10,000
2	₹ 11,000
3	₹ 14,000
4	₹ 15,000
5	₹ 25,000

Compute the following :

(*a*) Pay back period.

(*b*) Average rate of return.

(*c*) Internal rate of return.

(*d*) Net present value at 10% discount rate.

(*e*) Profitability index at 10% discount rate.

[*Answer :* Pay back period 4.18 years; Average rate of return on average investment 13%; NPV ₹ –1,375; IRR of the project is 9.06% and the PI is .973.]

2 Machine A costs ₹ 1,00,000, payable immediately. Machine B costs ₹ 1,20,000, half payable immediately and half payable in one year's time. The cash receipts expected are as follows :

(Figures in ₹)

Year (at the end)	A	B
1	₹ 20,000	—
2	60,000	₹ 60,000
3	40,000	60,000
4	30,000	80,000
5	20,000	—

With 7% cost of capital, which machine should be selected?

[*Answer :* B is having higher NPV and hence acceptable.]

A machine costing ₹ 110 lacs has a life of 10 years, at the end of which its scrap value is likely to be ₹ 10 lacs. The firm's cut-off rate is 12%. The machine is expected to yield an annual profit after tax of ₹ 10 lacs, depreciation being reckoned on straight line basis. Ascertain the net present value of the project.

[*Answer :* The NPV of the project is ₹ 6,22,000.]

XYZ Co. is considering the purchase of one of the following machines., whose relevant data are as given below :

(Figures in ₹)

	Machine X	Machine Y
Estimated life	3 years	3 years
Capital cost	90,000	90,000
Earnings (after tax) : Year 1	40,000	20,000
Year 2	50,000	70,000
Year 3	40,000	50,000

The company follows the straight-line method of depreciation; the estimated salvage value of both the types of machines is zero. Show the most profitable investment based on (*i*) Pay back period, (*ii*) Accounting rate of return, and (*iii*) Net present value assuming a 10% cost of capital.

[*Answer :* The PB are 1.25 and 1.4 years; ARR are 96.3% and 103.7% and NPV are ₹ 92,280 and ₹ 98,130.]

P4.5 XYZ Ltd. is considering the purchase of new machine. Two alternative machines (A & B) have been suggested, each having initial cost of ₹ 10,00,000 and requiring ₹ 50,000 as additional working capital at the end of 1st year. Net cash flows are expected to be as follows :

Year	Machine A	Machine B
1	₹ 1,00,000	₹ 3,00,000
2	₹ 3,00,000	₹ 4,00,000
3	₹ 4,00,000	₹ 5,00,000
4	₹ 6,00,000	₹ 3,00,000
5	₹ 4,00,000	₹ 2,00,000

The company has target return on capital of 10% and on this basis you are required to compare the profitability of the machines and state which alternative you consider to be financially preferable.

[B.Com. (H.), D.U., 2013]

[*Answer :* NPV : ₹ 2,82,900 and ₹ 2,93,300. So, Machine B is better.]

P4.6 A company has to make a choice between two projects (A & B). The initial outlay of two projects are ₹ 2,70,000 and ₹ 4,80,000 respectively for A and B. The scrap values after 5 years are ₹ 10,000 and ₹ 30,000 respectively. The opportunity cost of capital of the company is 16%. The annual cash flows are as under :

Year	Project A	Project B
1	—	₹ 1,20,000
2	₹ 60,000	1,68,000
3	2,64,000	1,92,000
4	1,68,000	2,04,000
5	1,78,000	2,10,000

You are required to calculate :

(*i*) Payback Period

(*ii*) Profitability Index. *[B.Com. (H.), D.U. 2013]*

[*Answer :* Payback periods are 2.80 years and 3 years. PI are 1.467 and 1.205].

P4.7 Pioneer Steels Ltd., is considering two mutually exclusive projects. Both require an initial cash outlay of ₹ 10,000 each and have a life of five years. The company's required rate of return is 10% and pays tax at a 50% rate. The projects will be depreciated on a straight line basis. The profit before depreciation expected to be generated by the projects are as follows :

(Figures in ₹)

Year	1	2	3	4	5
Project 1	4,000	4,000	4,000	4,000	4,000
Project 2	6,000	3,000	2,000	5,000	5,000

You are required to calculate :

(*a*) The Payback of each project.

(*b*) The Average Rate of Return for each project.

(*c*) The Net Present Value and Profitability Index for each project.

(*d*) The Internal Rate of Returns for each project.

Which project should be accepted and why?

[*Answer:* For the two projects, the Pay back period are 3-1/3 years and 3-3/7 years; ARR are 20% and 22%; NPV are ₹ 1,373 and ₹ 1,767; IRR are 15.24% and 16.83% and the PI are 1.137 and 177 respectively. Project B seems to be better as per all the discounted cash flow techniques.]

P 4.8 A company is manufacturing a consumer product, the demand for which at current price is in excess of its ability to produce. The capacity of a particular machine, now due for replacement, is the limiting factor on production. The possibilities exist either of acquiring a similar machine (Project X) or of purchasing a more expensive machine with greater capacity (Project Y). The cash flows under each alternative have been estimated and given below. The company's opportunity cost of capital is 10%, after tax. In deciding between the two alternatives, the Managing Director favours the '*pay back method*'. The Chief Accountant, however, thinks that a more specific method should be used and he has calculated for each project:

(*i*) The Net Present Value.

(*ii*) The Profitability Index.

Having made these calculations, however, he finds himself still uncertain about which project to be recommended. You are required to make these calculations and to discuss their relevance to the decision to be taken.

The relevant cashflows from two projects are as follows:

	Cashflows	
	Project X	Project Y
Years 0	(₹ 27,000)	(₹ 40,000)
1	—	10,000
2	5,000	14,000
3	22,000	16,000
4	14,000	17,000
5	14,000	15,000

[*Answer:* NPV of the projects are ₹ 11,908 and ₹ 13,596; PI are 1.44 and 1.34 respectively.]

P 4.9 A firm has the following two proposals before it.

	Proposal I	Proposal II
Cost.	₹ 11,000	₹ 10,000
Cash Inflows:		
Years 1	₹ 6,000	₹ 1,000
2	2,000	1,000
3	1,000	2,000
4	5,000	10,000

Find out IRR of both the proposals, which proposal is acceptable if the required rate of return of the firm is (*i*) 11% or (*ii*) 10%.

[*Answer:* IRR of Proposal I is 11.26% and Proposal II is 10.22%. If the required rate of return is 11%, only Proposal I is acceptable. However, if the required rate of return is 10%, then both proposals are acceptable.]

P 4.10 ABC Ltd. is considering to replace one of its existing machines at a cost of ₹ 4,00,000. The existing machine can be sold at its book value *i.e.*, ₹ 90,000. However, it has a remaining useful life of 5 years with salvage value nil. It is being depreciated @ 20% WDV.

The new machine can be sold for ₹ 2,50,000 after 5 years when it will be no longer required. It will be depreciated by the firm @ 30% WDV. The new machine is expected to bring savings of ₹ 1,00,000 p.a. Should the machine be replaced given that (*i*) the tax rate applicable to firm is 50% and the required rate of return is 10% (Tax on gain/loss on sale of asset is to be ignored).

[*Answer :* The NPV of the replacement decision is ₹ 1,45,174. So, the firm may replace the machine].