Unit-II

★ What are the factors affecting working capital?

★ What is capital budgeting? What is importance of capital budgeting?

~~Cash inflow~~ (CF) [Cash-flow] = CIF/COF.
CFOF → Cash outflow.

Initial Cash outlay.

Nature of Capital Budgeting.

★ Importance of capital budgeting decisions.
★ Steps involved in capital budgeting decision.

In capital budgeting, costs and benefits are measured in terms of cash flows and not accounting profits.

★ Calculation of cash outflow.

Cash outflow = Cost of project/asset + Addition
Net working capital + Transportation/
Installation charges.

★ Calculation of cash inflows after taxes.

Sales Revenue
Less: Cash expenses.
PBDT or EBDT
Less: Depreciation.
PBT or EBT
Less: Taxes.
PAT or NoPAT or EAT.
Add: Depreciation
CFAT or Annual operating cash inflows

★ Depreciation = $\frac{\text{Initial Investment} - \text{Scrap value}}{\text{Economic useful life of asset.}}$

Techniques
- Non-discounted (traditional) → Payback period
  - Acc. rate of return
- Discounted.
  - Net present value.
  - PROFITABILITY INDEX (PI)
  - Internal rate of return (Profitability)
  - Discounted payback period.

* Payback period = Initial investment / CFAT.

* Cumulative cash flow method.

Payback period = Based year + Amount to be recaubed / Next year Cash inflow.

Problems.

* JP.1. Initial investment = 50,00,000

CFAT = 12,00,000.

Payback period = 50,00,000 / 12,00,000 = 4.1667 years.

* JP.2. Initial investment = 2,60,000.

Cash inflows, CFAT = 2,90,000. in total.

⇒ 4 years.

Payback period = 4 + 10,000 / 40,000

Payback period = 4.25.

Accounting rate of return. (ARR)

$$ARR = \frac{\text{Average Annual profit after tax}}{\text{Average investment}} \times 100 \text{ or UR}$$

Average profit after tax = $\frac{\text{Total annual profit after tax}}{\text{No. of years}}$

Average Investment = $\text{Initial investment} - \left\{\frac{\text{scrap value}}{2} + \text{Additional NWC} + \text{Scrap val}\right.$

ARR > Minimum rate $\Rightarrow$ Accept

ARR < Minimum rate $\Leftrightarrow$ Reject

Problems.

★ JD.3. (II) Cost = 2,75,000 Salvage value = 30,000.

Payback period = 5 years.

1. Calculation of depreciation.

tax rate = 35%.

working capital requirement = 25,000.

rate of return = 20%.

	1	2	3	4	5
PBDT	1,04,000	1,02,000	99,000	1,03,000	1,07,0

Depreciation = (II - Salvage value)/Payback

= 2,75,000 - 30,000/5

= 2,45,000/5 = 49,000

PAT =

	1	2	3	4	5
PBT	55,000	53,000	50,000	54,000	58,000
PAT	35,150	34,450	32,500	35,100	37,700

Average PAT = 35,100.

Average Investment = $\frac{275,000 + 30,000}{2}$

$+ 25,000 + 30,000$

$= 305,000 \mid 177500$

ARR = 19.7746 %.

Rejected.

	1	2	3	4	5
★J.P. 4 CFAT	84750.	83,450.	81500	84100	141700

Initial investment = 2,75,000

Payback period = ~~8150~~3 + $\frac{25,300}{84,100}$

= ~~3~~ + 0.3008

= 3.3008 years ★

~~Net Present value.~~

★ J.P.5. Calculate ARR.

	Machine A	Machine B
Cost	56,125	56,125
after depreciation & income tax.		
1.	3375	11375
2	5375	9375
3	7375	7375
4	9375	5375
5	11375	3375
Estimated life in years.	5	5

Estimated Salvage Value	3000	3000
Average income tax rate	55%	55%
AWC	5,000	6,000

Machine A:

Average PAT = 1375

Average investment = $\frac{56125 - 3000}{2}$ + 6000 + 3000

= 34562.5

~~ARR~~ $\frac{34562.5 \times 100}{1375}$

ARR = $\frac{1375 \times 100}{34562.5}$

ARR = 21.3381% for machine A

Machine B:

Average PAT = 1375

Average investment = $\frac{56125 - 3000}{2}$ + 5k + 3k

= 35562.5

ARR = 20.7381% for machine B

Modern / Discounted cash flow techniques.

→ Net present value.

$$NPV = PV_{inflows} - \text{Initial Investment}$$

Difference between project's present value of cash inflow & project's initial cash outflow.

$$NPV = \left[\frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \ldots + \frac{CF_n}{(1+k)^n} \right] - ICO$$

CFAT X PV ⇒ $PV_{inflows}$.

NPV > 0 ⇒ Accept

NPV < 0 ⇒ Reject.

→ Profitability index.

$$PI = \frac{\text{PV cash flows after CI}}{II}$$

Ratio of project's present value of cash inflows to the project's initial cash outflow.

$$PI = 1 + \left[\frac{NPV}{ICO} \right].$$

PI > 1 ⇒ Accept

PI < 1 ⇒ Reject.

* JP.6 II = 10,00,000 Scrap value = 50,000

Cost of capital = 10%.

Year	CFAT	PV factor	PVCFAT
1	4,00,000	0.909	3,63,600
2	4,00,000	0.826	3,30,400
3	3,00,000	0.751	2,25,300
4	3,00,000	0.683	2,04,900
5	2,50,000	0.621	1,55,250
			31050
5	50,000	0.621	~~12,29,450~~
			~~50,000~~
			1,310,500

~~NPV = 12,29,450 - 10,00,000~~

~~NPV = 229,450~~

NPV = 1310500 - 10,00,000

NPV = 310500.

* JP.7.

Year	Project A	Project B
0	44,000	54,000
1-7	12,000	12,500
life	7 yrs	7 yrs

rate = 15%

Profitability index

For project

Year	CFAT	PV factor	PVCFAT
1	12,000	0.8696	10435.2
2	12,000	0.7561	9073.2
3	12,000	0.6575	7890
4	12,000	0.5718	6861.6
5	12,000	0.4972	5966.4
6	12,000	0.4323	5187.6
7.	12,000	0.3759	4510.8
			49,924.8

$$PV\ factor = \frac{1}{(1+i)^n}$$

$$PI = \frac{49,924.8}{44,000}$$

$$PI = 1.1346$$

$$PVCFAT = 4.160 \times 14,500$$

$$PVCFAT = 60,320$$

$$PI = \frac{60,320}{54,000}$$

$$PI = 1.117$$

Project A is better than B

Internal Rate of Return

Discount rate that equates the project's present value of cash inflows with the project's Initial cash outflow.

IRR is the discount rate at which the project's NPV is 'zero'

$$ICO = \frac{CF_1}{(1+IRR)^1} + \frac{CF_2}{(1+IRR)^2} + \ldots + \frac{CF_n}{(1+IRR)^n}.$$

$$IRR = \text{Lower discount rate} + \left(\frac{\text{PVCF at lower rate} - \text{Cash outflow}}{\text{PVCF at lower rate} - \text{PVCF at higher rate}} \right) (\text{Higher rate} - \text{Lower rate})$$

Steps in calculating IRR

Step 1: Calculate the average annual cash inflows

Step 2: Compute the take payback period by dividing the initial Investment with the average annual cash inflows.

Step 3: Refer to the 'Present value of an annuity interest factor table' i.e [PVIFA]

Step 4: Find out the two discount rates

(Say "X" and "Y") between which the false payback period lies in the line of the life of the project 'n' years.

IRR > k ⇒ Accept

IRR < k ⇒ Reject

* JRS Initial Investment = 10,00,000

Period	1	2	3	4	5
CF	2,00,000	3,00,000	4,50,000	2,50,000	2,00

Cost of capital = 10%

Average annual cash flows = $\frac{14,00,000}{5}$ = 2,80,000

Payback period = $\frac{10,00,000}{2,80,000}$ = ~~0.7143~~ 3.5714.

Calculation of NPV @ 12%

yr	CFAT	PVF@12%	PVCF
1	2,00,000	0.893	1,78,600
2	3,00,000	0.797	2,39,100
3	4,50,000	0.712	3,20,400
4	2,50,000	0.636	1,59,000
5	2,00,000	0.569	1,13,400
			1010500

NPV = 1010500 − 10,00,000

NPV = 10,500

Calculation of NPV @ 13%

yr ~~NPV~~	CFAT	PVF@13%	PVCF
1	2,00,000	0.885	1,77,000
2	3,00,000	0.783	2,34,900
3	4,50,000	0.693	3,11,850
4	2,50,000	0.613	1,53,250
5	2,00,000	0.543	1,08,600
			985600

NPV = 985600 − 10,00,000

NP = −14,400

$$IRR = 12\% + \frac{10,10,500 - 10,00,000}{10,10,500 - 985,600} \times (13-12)$$

IRR = 12.42%. Project is accepted.

IP.9. 10% cost. *To calculate IRR.

Project A (Initial investment) = 3,60,000.

yrs	CFAT	PV@13%	PVCF	PV@14%	PVCF
1	60,000	0.885	53,100	0.877	52,620
2	1,20,000	0.783	93,960	0.769	92,280
3	1,80,000	0.693	1,24,740	0.675	1,21,500
4	1,00,000	0.613	61,300	0.592	59,200
5	60,000	0.543	32,580	0.519	31,140
			3,65,680		3,56,740

Average annual cash flows = $\frac{5,20,000}{5} = 104000$

Payback period = $\frac{3,60,000}{1,04,000} = 3.4615$

Calculation of NPV @ 13%

NPV = 365,680 − 3,60,000

NPV = 5680

Calculation of NPV @ 14%.

NPV = 356,740 - 360000

NPV = -3260

$$IRR = 13\% + \frac{365,680 - 360,000}{365,680 - 356,740} \times (14 - 13)$$

IR = 13 + 0.653 = 13.653% Project A is accepted.

Project B (Initial investment) = 5,00,000.

yrs	CFAT	PV@11%	PVCF	PV@12%	PVCF
1	90,000	0.901	81,090	0.893	80,370
2	1,70,000	0.812	1,38,040	0.797	1,35,490
3	2,20,000	0.731	1,60,820	0.712	1,56,640
4	1,20,000	0.659	79,080	0.636	76,320
5	80,000	0.593	47,440	0.567	45,360
			506,470		4,94,180

Average annual cash flows = $\frac{6,80,000}{5}$ = 1,36,000

Payback Period = $\frac{5,00,000}{1,36,000}$ = 3.6765

Calculation of NPV @ 11%

NPV = 506,470 - 5,00,000

NPV = 6,470

Calculation of NPV @ 12%

NPV = 4,94,180 - 5,00,000

NPV = -5820.

IRR = 11% + $\frac{506470 - 500000}{506470 - 494180}$ × (12 - 11)

IRR = 11% + 0.5264 = 11.5264% Project B is accepted.

* → To calculate NPV.

Project A (Initial investment) = 3,60,000

yrs	CFAT	PVF @10%	PVCF
1	60,000	0.909	54,540
2	1,20,000	0.826	99,120
3	1,80,000	0.751	1,35,180
4	1,00,000	0.683	68,300
5	60,000.	0.621	37,260
			3,94,400.

NPV = 3,94,400 - 3,60,000

NPV = 34,400

Project A is accepted

Project B (Initial investment) = 5,00,000

yrs	CFAT	PVF@10%	PVCF
1	90,000	0.909	81,810
2	1,70,000	0.826	1,40,420
3	2,20,000	0.751	1,65,220
4	1,20,000	0.683	81,960
5	80,000	0.621	49,680
			5,19,090

NPV = 519090 - 500,000

= 19090

Project B is accepted.

6. Discounted Payback period.

NPV is the most superior investment criterion

★ JP.10. Initial investment = 3,00,000

yrs	CFAT	PV@10%	PVCF
1	90,000	0.909	81,810
2	1,08,000	0.826	89,208
3	90,000	0.751	67,590
4	79,200	0.683	54,093.6
5	72,000	0.621	44,712

Discounting rate = 10%.

Discounted payback period = $4 + \frac{7298.4}{44,712}$

$= 4 + 0.1632$

$= 4.1632$

12. Initial Investment = 50,000

Tax rate = 35%

yr	PBDT	PBT	PAT	CFAT
1	10,000	0	~~10,000~~ 0	10,000
2	10,692	692	449.8	10,449.8
3	12,769	2,769	1799.85	11799.85
4	13,462	3,462	2250.3	12250.3
5	20,385	10,385	6750.25	16750.25

Depreciation = $\frac{\text{Initial Investment - Salvage value}}{\text{~~Payback period~~ Economic useful life of asset}}$

Depreciation = $\frac{50,000}{5} = 10,000$

a) Payback period = $4 + \frac{5,500.05}{16750.25}$

$= 4 + 0.328$

$= 4.328$

b) ARR = $\frac{\text{Average PAT}}{\text{Average investment}} \times 100$

Average PAT = $\frac{11250.2}{5} = 2250.04$

Average investment = $\frac{50,000}{2} = 25,000$

$ARR = \frac{2250.04}{25000} \times 100$

ARR = 9%

c) IRR.

Average annual cash flows = $\frac{61250.2}{5} = 12250.04$

Fake payback period = $\frac{50,000}{12,250.04} = 4.08$

~~Calculation of NPV @~~

Calculation of NPV @ 7% and @ 8%

Yr	CFAT	PV@7%	PVCF	PV@8%	PVCF
1	10,000	0.934	9345.79	0.926	9260
2	10,449.8	0.873	9122.67	0.857	8955.48
3	11799.85	0.816	9628.68	0.794	9369.08
4	12250.3	0.763	9346.98	0.735	9003.97
5	16750.25	0.713	11942.93	0.681	11406.92
			49387.05		47995.45

Calculation of NPV @ 6%

	1	2	3	4	5
PV@6%	0.943	0.89	0.839	0.792	0.747
	9430	9300.32	9900.01	9702.2	12512.44

PVCF total at 6% = 50845.03.

NPV @ 6% NPV = 50845.03 - 50000 = 845.03

NPV @ 7%. NPV = 49387.05 - 50000 = -612.95

$$IRR = 6\% + \left(\frac{845.03}{50845.03 - 49387.05}\right) \times (7-6)$$

IRR = 6 + 0.579 = 6.579% Rejected.

d) NPV @ 10%.

yr	CFAT	PV@10%	PVCF
1	10,000	0.909	9090
2	10,4~~4~~1.8	0.826	8631.53
3	11799.85	0.751	8861.69
4	12250.3	0.683	8366.95
5	16750.25	0.621	10,401.90
			45352.07

NPV = 45352.07 - 50,000.

NPV = -4647.92 Rejected

e) PI @ 10%.

$$PI = \frac{45352.07}{50,000}$$

PI = 0.907 Rejected

Q11 II = 8,00,000 Depreciation = 20%
taxation = 50%.

yr	PBT	PAT	CFAT
1	4,00,000	2,00,000	3,60,000
2	4,00,000	2,00,000	3,60,000
3	3,20,000	1,60,000	3,20,000
4	3,20,000	1,60,000	3,20,000
5	1,60,000	80,000	2,40,000
		8,00,000	

$$\text{Depreciation} = \frac{8,00,000}{5} = 1,60,000.$$

a) Payback period $= 2 + \frac{80,000}{3,20,000} = 2 + 0.25 = 2.25$.

b) $ARR = \frac{\text{Average PAT}}{\text{Average investment}} \times 100$.

$$\text{Average PAT} = \frac{800000}{5} = 160000$$

$$\text{Average investment} = \frac{800000}{2} = 400000$$

$$ARR = \frac{1,60,000}{4,00,000} \times 100 = 40\%$$

NPV @ 10%

c)

yr	CFAT	PV@ 10%	PVCF
1	3,60,000	0.909	3,27,240
2	3,60,000	0.826	2,97,360
3	3,20,000	0.751	2,40,320
4	3,20,000	0.683	2,18,560
5	2,40,000	0.621	1,49,040
			12,32,520

NPV = 12,32,520 - 8,00,000

NPV = 4,32,520. Accepted

d) PI @ 10%.

$$PI = \frac{12,32,520}{8,00,000} = 1.5406$$ Accepted

e) IRR.

Average annual cash flows = $\frac{16,00,000}{5}$ =

3,20,000

Fake payback period = $\frac{8,00,000}{3,20,000}$ = 2.5

Calculation of NPV @ 25% and 30%.

yr	CFAT	PV@25%	PVCF	PV@30%	PVCF
1	3,60,000	0.800	2,88,000	0.769	2,76,840
2	3,60,000	0.640	2,30,400	0.592	2,13,120
3	3,20,000	0.512	1,63,840	0.455	1,45,600
4	3,20,000	0.410	1,31,200	0.35	1,12,000
5	2,40,000	0.328	78,720	0.269	64,560
			8,92,160		8,12,120

PV@40%	PVCF
0.714	2,57,040
0.510	1,83,600
0.364	1,16,480
0.260	83,200
0.186	44,640
	6,84,960

Calculation of NPV @ 30%.

NPV = 8,12,120 - 8,00,000

NPV = 12120

Calculation of NPV @ 40%.

NPV = 6,84,960 - 8,00,000

NPV = -1,15,040

$$IRR = 30 + \left(\frac{12120}{8,12,120 - 6,84,960}\right) \times (40-30)$$

$$IRR = 30 + \frac{12120}{} \; 0.095 \times 10$$

$$IRR = 30 + 0.95$$

$$IRR = 30.95\ \%$$

Project is accepted