-:- APV approach :-

- Similar to MM model on Capital Structure with taxes.
- Also, revisited in Business Valuation - new topic - valuation of distress firms.

Eg: 2 firms in the same risk class & EBIT of 400000
t = 30% (Business risk & σ_{EBIT} are same)

Unlevered firm : Value (Vu) = 2500000, $k_c^* = ?$

Levered firm : Debt = 1000000 @ 10%

$V_L = ?$

Equity value = ?

k_c & k_e = ?

Soln :-

1) $V_u = \frac{EBIT(1-t)}{k_c^*}$

$k_c^* = \frac{400000(1-0.3)}{2500000} \times 100 = 11.2\%$

2) $V_L = V_u + D \times t = 2500000 + (1000000 \times 0.3) = 2800000$

3) Value of Equity (S) = 2800000 - 1000000 = 1800000

4) $k_c = \frac{NOPAT}{V_L} = \frac{400000 \times 0.7}{2800000} \times 100 = 10\%$

5) $k_e = \frac{PAT}{S} = \frac{(400000 - 100000) \times 0.7}{1800000} = 11.67\%$

Adjusted Present Value (APV) Approach.

Lets segregate investment aspect & financing aspect

of the project.

Step 1 : Base Case APV.

= NPV of project as if there is no debt & there are no capital market imperfections like floatation cost.

= PV of unlevered CF disc. @ unlevered ke.

(• unlevered ke = opportunity cost of capital. cost of equity kya hota agar debt aur floatation cost nahi hote....)

Unlevered CF & unlevered ke shall be given.

Step 2 : Floatation cost → common sense. ☺

Step 3 : Tax advantage of Debt (TAD)

= PV of Interest Tax Shield disc. @ 'r'

Assume debt is perpetual

$\therefore TAD = \frac{r \times t \times D}{r} \quad \frac{A}{i}$

$= t \times D$

Repayment pattern & tenure of debt given

↓

Apply common sense ☺

Q.1

1) Step 1 : Base Case NPV

= 28.5 × PVAF (15%, 7) − 120

= −1.428 lakhs

[Self note : Iska mtlb project unviable h agar purely equity financed h....)

∴ Base Case NPV = −1.428 lakhs

2) Step 2 : Adjusted NPV

→ Floatation cost = $\frac{60}{0.95} \times 0.05 = 3.16$ lakhs.

→ Tax Advantage of Debt disc. @ 12%.

6% 6 months ka hai toh saal ka effective int. = $(1.06)^2 - 1 = 12.36$

Yrs	Amount o/s	Interest @ 12%	Total Interest	Interest Tax Shield	P.V. @ 12.36%
1 : 1st 1/2	60	3.6	7.2	2.16 (7.2 × 0.3)	1.92
2nd 1/2	60	3.6			
2 : 1st 1/2	60	3.6	6.9	2.07 (6.9 × 0.3)	1.64
2nd 1/2	55	3.3			
3 : 1st 1/2	50	3.0	5.7	1.71 (5.7 × 0.3)	1.21
2nd 1/2	45	2.7			
4 : 1st 1/2	40	2.4	4.5	1.35 (5.7 × 0.3)	0.85
2nd 1/2	35	2.1			
5 : 1st 1/2	30	1.8	3.3	0.99 (3.3 × 0.3)	0.55
2nd 1/2	25	1.5			
6 : 1st 1/2	20	1.2	2.1	0.63 (2.1 × 0.3)	0.31
2nd 1/2	15	0.9			
7 : 1st 1/2	10	0.6	0.9	0.27 (0.9 × 0.3)	0.12
2nd 1/2	5	0.3			
			Tax Advantage of Debt = 6.60		

APV = Base Case NPV - Issue Cost + Tax advantage of debt

= -1.428 - 3.16 + 6.6

∴ APV = 2.012 lakhs

we have calculated ITS assuming we will get it at the end of each year & calculated its PV accordingly

Conclusion : So the project which was not viable with 100% equity financing is now viable given the tax advantage of debt.

Note : We have not considered tax shield on the issue cost. Alternatively, post tax issue cost = 3.16 × 0.7 = 2.21

∴ APV = -1.428 - 2.21 + 6.6 = 2.962

Q.2

Step 1 : Base Case NPV

$$= \frac{A}{i} - I = \frac{42}{0.14} = 300 - 270 = 30 \text{ lakhs}$$

Step 2 : Issue Cost = 10 lakhs .... (given)

Step 3 : Tax Advantage of Debt

Debt = 270 + 10 = 280 @ 10% & tax rate = 30%.

∴ Tax advantage of debt = $t \times D$

$= 0.3 \times 280$

$= 84$ lakhs

APV = Base Case NPV - Issue cost + Tax advantage of debt

$= 30 - 10 + 84$

∴ APV = 104 lakhs

Q.3

W.N.] Cash Flow

Revenue	1200000
(-) Op. Exp.	400000
EBDIT	800000
(-) Deprⁿ	500000
EBIT	300000
NOPAT @ 70%	210000
(+) Deprⁿ	500000
CFAT	710000

∴ Cash Flow for firm = 710000

$k_c^* = R_f + (R_m - R_f) B_u = 5 + 6 \times 1.5 = 14\%$ (unlevered ke)

* k_c^* : Unlevered ke.

$R_e = R_f + (R_m - R_f)\beta$ → CAPM

where, β = systematic risk.

↓

Market Risk.

If market Δ by 1%, Stk Δ by β%

β → β_u : only business risk.

β → β_L : Business + Financial risk.

k_c^* = Unlevered ke

$= R_f + (R_m - R_f)\beta_u$

↑

(unlevered β)

1) Base case NPV = 710000 × PVAF (14%, 5) − 2500000
= −62512.5

2) Issue cost of NPV = $\frac{40\% \text{ of } 2500000}{98\%} \times 2\% \cong 20408$

3) Tax Advantage of Debt −
Debt = 60% of 2500000 = 1500000
Interest rate = 8%
tax rate = 30%
Assuming that debt is repayable one-shot i.e. lumpsum at the end of 5 years.
Annual ITS = 30% of 8% of 1500000 =
= 36000 p.a. for 5 years.
Tax advantage of Debt = PV of ITS @ 8%
= 36000 × PVAF (8%, 5)
= 143738

If question states, interest tax shield is certain, then we should use Rf = 5% as discount rate for tax advantage of debt.

4) APV = Base case NPV − Floatat^n cost + tax advantage of debt
= −62512.5 − 20408 + 143738
= 60817.5 ∴ Project is viable

If a company has losses → no tax shield. To get Tax shield, Co. got to have profits.

Note :-
1) Alternatively, after tax floatation cost
= 20408 × 0.7
= 14286
This gives APV = −62512.5 − 14286 + 143738 = 66939

2) Problem remaining silent, we have assumed that loan is repayable lumpsum on maturity.

3) If the firm is definitely going to make positive profits in future, ITS becomes certain & disc. rate for TAD should be Rf = 5%

i.e. TAD = 36000 × PVAF (5%, 5) = 155861.16