16-9-22

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TIME VALUE OF MONEY

Q2. $r = 16\%/4 = 4\%$ [Quaterly] ; $t = 4$ years

$$I = P\left[1 + \frac{r}{100}\right]^t$$

$$= P\left[1 + \frac{4}{100}\right]^4$$

$I = P \times 1.1699$

$A = I - P$

$= 1.1699P - P$

$= 0.1699P$

∴ Effective Rate Of Interest is 16.9%

Q3. $P = ₹5000$

$I = 14\%$

$n = 15$ years

$$FV = P\left[\frac{(1+i)^n - 1}{i}\right]$$

$$= 5000\left[\frac{(1+14\%)^{15} - 1}{14\%}\right]$$

$= 5000[43.8424]$

$= ₹219212.0707$

Q4. $6000 \times FVIFA = 44650$

$\therefore FVIFA = 7.442$

And,

$FVIFA_{20\%,5y} = 7.442$

$\therefore$ Interest is 20%

Q5 $PV = \frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} + \frac{C_4}{(1+r)^4} + \frac{C_5}{(1+r)^5}$

$= \frac{5000}{(1+14\%)^1} + \frac{5000}{(1+14\%)^2} + \frac{8000}{(1+14\%)^3} + \frac{9000}{(1+14\%)^4} + \frac{8000}{(1+14\%)^5}$

$= 4384.96 + 4616.80 + 5399.77 + 5328.22 + 4154.94$

$= 23886.19$

Q6. Total Value of Deposit $= P\left[1 + \frac{i}{n}\right]^{nt}$

$P = 10000$; $i = 16\%$; $n = 4$; $t = 5$ years

$= 10000\left[1 + \frac{16\%}{4}\right]^{5 \times 4}$

$= ₹21911.23$

Q7. FV = $10000

$i = 8\%$

$t = 10$ years

$PV = \frac{FV}{(1+i)^t}$

$= \frac{10000}{(1+8\%)^{10}}$

$= \$4631.93$

Q8. $PV = \$1000$

$i_1 = 12\%$

$i_2 = 6\%$

$i_3 = 8\%$

$FV = PV(1+i_1)(1+i_2)(1+i_3)$

$= 1000(1.12)(1.06)(1.08)$

$= \$1282$

Q9. $PV = \$10000$, $i_1 = 15\%$; $i_2 = 2\%$; $i_3 = 10\%$

$FV = PV(1+i_1)(1+i_2)(1+i_3)$

$= 10000(1+15)(1.02)(1.10)$

$= \$12903$

Q10. FV = $1000, $r = 10\%$, $n = 5$ years

$$PV = \frac{FV}{(1+r)^n}$$

$$= \frac{1000}{(1+10\%)^5}$$

$$= \$620.921$$

Q11. P = $50000, $r = 9.5\%$, $n = 5$ years,

$$\text{Amount} = P\left(1 + \frac{r}{12}\right)^{12 \times n}$$

$$A = P\left(1 + \frac{9.5\%}{12}\right)^{12 \times 5}$$

$$= \$80250.47346 \quad P = 31152$$

Q13 P = $50000, $r = 13.5\%$, $n = 10$ years

$$\text{Amount} = P\left(1 + \frac{r}{12}\right)^{12 \times n}$$

$$= 50000\left(1 + \frac{13.5\%}{12}\right)^{12 \times 10}$$

$$= 191423.0179$$

$$= 198826$$

$$= 191423.0179$$

Q12 For 1st year

$PV_1 = FV_1\left(1+\frac{r}{100}\right)^n$

$= 1000\left(1+\frac{10}{100}\right)^1$

$= 909.09$

For 2nd year

$PV_2 = FV_2\left(1+\frac{r}{100}\right)^n$

$= 2000\left(1+\frac{10}{100}\right)^2$

$= 1652.89$

For 3rd year

$PV_3 = FV_3\left(1+\frac{r}{100}\right)^n$

$= 3000\left(1+\frac{10}{100}\right)^3$

$= 2253.94$

$PV = PV_1 + PV_2 + PV_3$

$= 4815.92$

Q6. 69 Rule

$= 69/12 + 0.35 = 6.1$ years

72 Rule

$= 72/12 = 6$ years.

Q14 $T = 3$ years $\quad T = 4$ years

$A = 10000 \quad A = 13310$

$$13310 = P\left(1+\frac{R}{100}\right)^3\left(1+\frac{R}{100}\right)$$

$$13310 = 10000\left(1+\frac{R}{100}\right)$$

$$1+\frac{R}{100} = 1.331$$

$$\frac{R}{100} = 0.331$$

$$R = 33.1\%$$

Q14 $P = 10000$; $A = 13310$; $n = 3$; $R = ?$

$$A = P\left[1+\frac{R}{100}\right]^n$$

$$13310 = 10000\left[1+\frac{R}{100}\right]^4$$

$$1+\frac{R}{100} = \sqrt[4]{1.3310}$$

$$1+\frac{R}{100} = 1.074$$

$$\therefore R = 7.4\%$$

LEVERAGE

Q1.

	SITUATION 1		SITUATION 2	
	PLAN A	PLAN B	PLAN A	PLAN B
Sales	20000	20000	20000	20000
(-) VC	10000	10000	10000	10000
Contribution	10000	10000	10000	10000
(-) FC	4000	4000	5000	5000
EBIT	6000	6000	5000	5000
(-) Interest	1500	500	1500	500
EBT	4500	5500	3500	4500

$$DOL = \frac{\text{Contri}^n}{EBIT}$$

SITUATION 1		SITUATION 2	
PLAN A	PLAN B	PLAN A	PLAN B
10000	10000	10000	10000
6000	6000	5000	5000
1.67	1.67	2	2

$$DFL = \frac{EBIT}{EBT}$$

SITUATION 1		SITUATION 2	
PLAN A	PLAN B	PLAN A	PLAN B
6000	6000	5000	5000
4500	5500	3500	4500
1.33	1.09	1.428	1.1

DOL = DCL = $\frac{\text{Contribution}}{\text{EBT}}$

Situation 1		Situation 2	
Plan A	Plan B	Plan A	Plan B
10000	10000	10000	10000
4500	5500	3500	4500
2.22	1.18	2.85	2.22

Q2.

	A	B	C
Sales	4500	9600	24000
Variable Cost (-)	3000	7200	12000
Contribution	1500	2400	12000
Fixed Cost (-)	1200	2000	10000
EBIT	300	400	2000
Interest (-)	200	300	1000
EBT	100	100	1000
Tax (-)	35	35	350
EAT	65	65	650

Q3

	[in lakhs] A	[in lakhs] B
Sales	72	70
Variable Cost (-)	48	35
Contribution	24	35
Fixed Cost (-)	16	26.25
EBIT	8	8.75
Interest (-)	6	7
EBT	2	1.75
Tax (-)	0.60	0.70
EAT	1.40	1.05
No. of Share (÷)	1.00	0.70
EPS	1.40	1.50

RISK AND RETURN

Q1. $\text{Return} = \left[\frac{AI}{BP} + \frac{EP-BP}{BP}\right] \times 100$

$AI = 12,\ BP = 75,\ EP = 93$

$= \left[\frac{12}{75} + \frac{93-75}{75}\right] \times 100$

$= 40\%$

Q2

Q2. AI = 5; BP = 57; EP = 50

$$\text{Return} = \left[\frac{AI}{BP} + \frac{EP-BP}{BP}\right] \times 100$$

$$= \left[\frac{5}{57} + \frac{50-57}{57}\right] \times 100$$

=

Q2. AI = 17; BP = 95; EP = 106.50

$$\text{Return} = \left[\frac{AI}{BP} + \frac{EP-BP}{BP}\right] \times 100$$

$$= \left[\frac{17}{95} + \frac{106.50-95}{95}\right] \times 100$$

$$= 30\%$$

Q3 AI = 5; BP = 57; EP = 50

$$\text{Return} = \left[\frac{AI}{BP} + \frac{EP-BP}{BP}\right] \times 100$$

$$= \left[\frac{5}{57} + \frac{50-57}{57}\right] \times 100$$

$$= -3.50\%$$

∴ Risk,

Q4. EP = ₹225 ; BP = ₹190 ; Dividend = 7+9+12 = 28

$$HPR = \frac{\text{Dividend} + (EP - BP)}{BP} \times 100$$

$$= \frac{28 + (225 - 190)}{190} \times 100$$

$$= 33.157\%$$

$$AR = \frac{HPR}{3 \times 12} \times 12$$

$$= \frac{33.157}{3 \times 12} \times 12$$

$$= 11.052\%$$

Q5. EP = 2250 ; BP = 1770 ; Dividend = 70

$$HPR = \frac{\text{Dividend} + (EP - BP)}{BP} \times 100$$

$$= \frac{70 + (2250 - 1770)}{1770} \times 100$$

$$= 31.07\%$$

$$AR = \frac{HPR}{5 \times 12} \times 12$$

$$= \frac{31.07}{5 \times 12} \times 12$$

$$= 31.07\%$$

Q6. Dividend = 9+11+12 = 32; BP = 95; EP = 158

$$HPR = \frac{\text{Dividend} + (EP - BP)}{BP} \times 100$$

$$= \frac{32 + (158 - 95)}{95} \times 100$$

$$= 100\%$$

$$AR = \frac{HPR}{3 \times 12} \times 12$$

$$= 33.33\%$$

Q6. BP = 95, EP = 158, Dividend = 9+11+12 = 32

$$HPR = \frac{\text{Dividend} + (EP - BP)}{BP} \times 100$$

$$= \frac{32 + (158 - 95)}{95} \times 100$$

$$= 100\%$$

$$AR = \frac{HPR}{3 \times 12} \times 12$$

$$= 33.33\%$$

Q7. BP = 31.25; EP = 154; Dividend = 1.93 + 1.53 + 1.53 + 2.00 + 2.00 + 3.00 = 11.59

$$ROR = \frac{\text{Dividend} + (EP - BP)}{BP}$$

$$= \frac{11.59 + (154 - 31.25)}{31.25}$$

$$= 4.2188$$

Q8. Expected Return = 0.034 − 0.06 − 0.118 + 0.067 − 0.063 − 0.079 − 0.059 + 0.0268 + 0.268 + 0.268 + 0.178 + 0.191 − 0.071 − 0.055

$$= 0.233/12 = 1.9941\%$$

Q9.

Month	Returns	$(R_i - \bar{R})$	$(R_i - \bar{R})^2$
January	0.04	0.011	1.21×10^{-4}
February	0.09	0.061	37.21×10^{-4}
March	−0.06	−0.089	79.21×10^{-4}
April	0.075	0.046	21.16×10^{-4}
May	−0.05	−0.079	62.41×10^{-4}
June	0.08	0.051	26.01×10^{-4}

$\Sigma R_i = 0.175$

$\bar{R} = 0.029$

$\Sigma (R_i - \bar{R})^2 = 212.21 \times 10^{-4}$

$$\delta^2 = \frac{212.21 \times 10^{-4}}{5} = 42.4 \times 10^{-4}$$

$$\delta = \sqrt{42.4 \times 10^{-4}} = 6.51 \times 10^{-2}$$

Q10.

ES	R_i	P_i	R_iP_i	$R_i-E(R)$	$[R_i-E(R)]^2$	$P_i[R_i-E(R)]^2$
1	35	0.25	8.75	7.5	56.25	14.0625
2	30	0.50	15	2.5	6.25	3.125
3	15	0.25	3.75	-12.5	156.25	36.0625

$\Sigma R_iP_i = 27.5$ $\quad$ $\Sigma P_i[R_i-E(R)]^2 = 56.25$

$\delta^2 = \Sigma P_i[R_i-E(R)]^2$
$= 56.25$

Expected Return
$= \Sigma R_iP_i$
$= 27.5$

$\delta = 7.5$

Q11.

FP	ROR	P_i	R_iP_i	$R_i-E(R)$	$[R_i-E(R)]^2$	$P_i[R_i-E(R)]^2$
120	-0.2	0.1	0.02	-0.44	0.1936	0.01936
150	0	0.2	0	-0.24	0.0576	0.01152
180	0.2	0.4	0.08	0.41	0.1936	0.07744
220	0.4	0.2	0.08	0.16	0.0256	0.00512
240	0.6	0.1	0.06	0.36	0.1296	0.01296

$\Sigma R_iP_i = 0.24$ $\quad$ $\Sigma P_i[R_i-E(R)]^2 = 0.1264$

$\delta^2 = 0.1264 \times 100 = 12.64$

$\delta = \sqrt{0.1264} = 3.555$

Q12. $R_F = 10\%$; $R_M = 15\%$; $\beta = 1.5$; $g = 0.08$; $D_0 = 2$

$K_E = R_F + (R_M - R_F)\beta$

$= 10 + (15-10)1.5$

$= 17.5\%$

$D_1 = D_0(1+g) = 2(1+0.08) = 2.16$

$V_0 / P_0 = \frac{D_1}{K_E - g} = \frac{2.16}{0.175 - 0.08} = 22.74$

Q13. $R_F = 8\%$; $R_M = 12\%$; $E(R_i) = 15\%$

$E(R_i) = R_F + [E(R_M) - R_F]\beta$

$15 = 8 + [12 - 8]\beta$

$7 = 4\beta$

$\therefore \beta = 1.75$

Q14. $R_F = 9\%$; $E(R_i) = 15\%$; $\beta = 1.5$

$E(R_i) = R_F + [E(R_M) - R_F]\beta$

$15 = 9 + [E(R_M) - 9]1.5$

$6 = [E(R_M) - 9]1.5$

$4 = E(R_M) - 9$

$\therefore E(R_M) = 13$

Q16 Current Price = 50

1. ₹1000 Equity Stock of α

Economic Condition	R_α	P_α	Overall Return[R]	E(R)	R-E(R)	$[R-E(R)]^2$	$P_\alpha[R-E(R)]^2$
High Growth	55	0.3	20(55)=1100	330	-50	2500	750
Low Growth	50	0.3	20(50)=1000	300	-150	22500	6750
Stagnation	60	0.2	20(60)=1200	240	50	2500	500
Recession	70	0.2	20(70)=1400	280	250	62500	12500
				Σ=1150			Σ=20500

$\delta^2 = 20500$

$\therefore \delta = 143.17$

2. ₹1000 Equity Stock of β

Economic Condition	R_β	P_β	Overall Return(R)	E(R)	R-E(R)	$[R-E(R)]^2$	$P_\beta[R-E(R)]^2$
High Growth	75	0.3	20(75)=1500	450	200	40000	12000
Low Growth	65	0.3	20(65)=1300	390	100	10000	3000
Stagnation	50	0.2	20(50)=1000	200	-200	40000	8000
Recession	40	0.2	20(40)=800	160	-400	160000	32000
				Σ=1200			Σ=55000

$\delta^2 = 55000$

$\therefore \delta = 234.52$