Solutions to May -12 CA (Final) SFM Paper

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#1.

A. The yield of a Commercial paper is given by,

$$\text{Yield (\%)} = \frac{F-P}{P} \times \frac{12}{n} \times 100$$

$$\text{Yield (\%)} = \frac{100{,}000-98000}{98000} \times \frac{12}{4} \times 100$$

$$= 6.1224\%$$

Cost of Funds to the company

The cost of funds is much more than the effective interest to the company issuing Commercial Paper, because of the brokerage costs, Rating charges and Stamp duty.

Given,

Discount Cost = 100,000- 98000 = Rs. 2000

Brokerage = 0.10; Brokerage cost = 100,000× 0.10% = Rs. 100

Rating Charges = 0.60; Rating Cost = 100,000× 0.60% = Rs. 600

Stamp duty = 0.15% ; Duty Cost = 100,000×0.15% = Rs. 150

Total Cost = Rs. 2000+ Rs. 100+ Rs. 600+ Rs. 150 = Rs. 2850

Cost of funds (%) = $\frac{2850}{98000} \times \frac{12}{4} \times 100$ = **8.7245%**

B. Whenever, the interest rates are continuously compounded, the Cost of Carry Model for Futures Pricing can be written as,

$TF = S \times e^{(i-d)\times n}$

Where,

TF = Theoretical Futures Price

S = Spot Price of the index

i= risk free rate of interest

d = dividend yield

n = time to maturity

Average dividend yield for four months = (3+3+4+3)/4 = 3.25% p.a.

$TF = 2200 \times e^{(0.08-0.0325)\times 0.333}$ (n = 4/12 =0.333)

$TF = 2200 \times e^{(0.01583)}$

TF = 2200 ×1.01593 = 2235.0460

C. This sum can be understood in two ways:

1. **if** the investor in the bond is US based, then return to the investor would be simply Holding Period Return (HPR) i.e.

   HPR = $\frac{Interst+capital\ gain}{Original\ Price}$ ×100

   HPR = $\frac{\$350+(\$5250-\$5000)}{\$5000} \times 100$

   HPR = 12%

2. if the investor is from another country outside US, he would receive a twofold return.
   - Appreciation in foreign currency (here, $)
   - Appreciation in the asset denominated in that currency (here,$ bond)

   Return to a foreign investor = $[(1.12) \times (1.02)] - 1 \times 100$ = 14.24%

D. In these type of sums, we are provided with,

- Standard deviation of the Spot price (σs)
- Standard deviation of the Spot price (σF)
- Correlation coefficient between the two (r)

We will take Spot as dependent (y) and Futures as independent (x) the hedge ratio(b) ie.

Y= a+ bX

$$b = \frac{r \times \sigma s}{\sigma F}$$

It means that if 'F' changes by 1%, 'S' changes by the hedge ratio. It can be used to hedge any existing position in the spot. Thus if anyone is long/ short in the spot market to the extent of 'X', it should go short/ long in the futures market to the extent of 'bX'.

Since the company is long in copper, it should go short on Copper Futures.

Hedge ratio (b) $= \frac{0.75 \times 0.04}{0.06} = 0.5$

This means that if futures go up by 1%, Copper spot would go up by 0.5.

Therefore, if the company is long in copper, it should go short on futures.

Value of the long position = 10 MT of copper× Rs. 474/kg× 1000 (1MT = 1000 kg)

= Rs. 4,740,000.00

Short on futures to achieve a perfect hedge = Rs. 4,740,000× 0.5

= Rs. 2,370,000.

#2.

A. Since there is no information with regard to tax and depreciation, the tax savings on operating and repair expense can be ignored. Also Depreciation tax shield will not appear.

Note: there are two types of lives of a plant: Physical life and Economic life.

Physical life is that life during which the plan can be used, but economic life of a plant means, the no. of years, the plant should be used.

Hence we need to find out the Economic life of the machine. We will calculate 'Annual Capital charge(ACC)' for all the years, and the year giving the lowest ACC will be the economic life of the plant.

Year	Maintenance cost (1)	Repair cost (2)	Total operating cost (1+2) = (3)	PV of (3) @ of 15% (4)	Cumulative Value of(4) (5)	PV Of Salva. Value (6)	Initial Outlay (7)	Net Cost 5+7-6 (8)	ACC = Pv of all Costs/ $PVIFA_{r\%, n}$
1	16,000	0	16,000	13,913.60	13,913.60	27,827.20	60,000	46,086.4	52,997.24
2	18,000	4,000	22,000	16,634.20	30,547.80	18,146.40	60,000	72,401.4	44,535.52
3	20,000	8,000	28,000	18,410.00	48957.80	10,520.00	60,000	98,437.8	43,113.96
4	20,000	16,000	36,000	20,584.80	69,542.60	4,574.40	60,000	124,968.2	43,771.70

- ACC = PV of all costs/ PVIFA $_{(r\%, n)}$
- Thus we can see that the economic life of this plant is 3 yrs, as the ACC is lowest and it starts increasing beyond that.

B. Given Information**,**

P_0 = Rs. 146/-

D_1 =Rs.3.36/-

g_c =7.5%

$$Ke = \frac{D1}{P0} + gc$$

$$Ke = \frac{3.36}{146} + 0.075$$

= 0.098014

= 9.8014%

b. As per sustainable growth rate,

gc = br

Where, gc = constant growth rate or sustainable growth rate.

b = retention ratio (60%, given)

r = ROE (10%, given)

g = 0.60× 0.10 = 0.06= 6%

$$\text{Ke} = \frac{3.36}{146} + 0.06$$

= 0.0830 = 8.30%

Thus, we can see that with the decrease in growth rate the cost of equity also decrease×.

#3.

A.

Particulars	LMN	XYZ
No. of shares	3,00,00	1,60,000
EAT	6,00,000	1,60,000
EPS	Rs.2/-	Rs.1/-
MPS	Rs. 30/-	Rs.15/-
P/E	15	15

b. If P/E ratio of XYZ is 9.6, then Market price/ share = 9.6× 1 = Rs. 9.6/share (P/E × EPS)

Exchange ratio = MPS of XYZ/ MPS of LMN

= 9.6/30 = 0.32

$$\text{Post merger EPS} = \frac{\text{PAT of LMN} + \text{PAT of XYZ}}{\text{No. of shares of LMN} + \text{No. of shares of XYZ} \times \text{ER}}$$

$$= \frac{6,00,000 + 1,60,000}{3,00,000 + 1,60,000 \times 0.32} = 2.164$$

c. In order to have same EPS Pre and post merger,

$$\text{EPS of LMN} = \frac{\text{PAT of LMN} + \text{PAT of XYZ}}{\text{No. of shares of LMN+ No. of shares of XYZ} \times \text{ER}}$$

$$2 = \frac{6{,}00{,}000 + 1{,}60{,}000}{3{,}00{,}000 + 1{,}60{,}000 \times \text{ER}}$$

$$\text{ER} = 0.50$$

Thus in order to have, same EPS pre and post merger, LMN should exchange ratio of 0.5.

#4.

A. Portfolio Revision:

Portfolio Revision Portfolio revision means alteration of the composition of debt/equity instruments. Any portfolio requires monitoring and revision. As time passes, securities, which were once attractive, may cease to be so. It may also be necessitated due to some investor related changes. Portfolio revision has to be done scientifically and objectively. Portfolio revision is not a casual process to be carried out without much care.

Strategies to Rebalance the Portfolio

- Buy and Hold Strategy
- Constant Mix Strategy
- Constant Proportion Portfolio Insurance

This sum is based on Constant Proportion Portfolio Insurance method. The investment in stocks will be equal to-
m(portfolio Value- Floor value)

Where,
m = multiplier
Portfolio value= total market value of the portfolio
Floor value= value below which the portfolio is not supposed to go.

Investment in stocks = m(portfolio Value- Floor value)
= 2(3, 00,000- 2, 70,000*)
= 60,000
Investment in cash/ risk free = 3, 00,000- 60,000 = 2, 40,000

Given information,

*present Nifty = 5326
Lowest Range = 4793.4
Present portfolio value = Rs. 3, 00, 000
Floor value = (3, 00, 000/5326) × 4793.4 = 2,70, 000

Case -1. If Nifty moves down to 5122.96, i.e.

The stock's value becomes from Rs. 60,000 to Rs. 57712.655

The new portfolio value will be = Rs. 2, 40,000 (cash) + Rs. 57712.655 (stock) = Rs. 2, 97,712.65
Now, a rebalancing is required.
Investment in stocks = m (portfolio Value- Floor value)
= 2(Rs. 2, 97,712.65 – Rs. 2, 70,000)
= Rs. 55,425.31
Present investment value of stocks = Rs. 57712.655
We need to sell (Rs. 57712.655- Rs55, 425.31) = **Rs. 2,287.3452** worth of stocks and convert into cash.

Case- 2 If Nifty moves up to 5539.04 further 10 days.
The stock's value becomes from Rs. 55,425.31 to Rs. Rs. 59,926.88.

The new portfolio value will be = Rs. 2, 40,000+ Rs.2, 287.3452 (cash) + Rs. 59,926.88(stock)
= Rs. 3, 02,214.23
Now, a rebalancing is required.
Investment in stocks = m (portfolio Value- Floor value)
= 2(Rs. 3, 02,214.23 – Rs. 2, 70,000)
= Rs. 64,428.46

Present value of stocks = Rs. 55,425.31
We need to buy (Rs. 64,428.46- 55,425.31) = Rs. 9003.15 worth of stocks.

#B. Given,

Internal rate of return	= 20%
Cost of equity	=?
Face value	= Rs. 10
Payout ratio	= 36%
P/E ratio	= 7.25
Dividend declared	= 18%

Dividend/ share = 18% of Rs. 10 = Rs. 1.80
Payout ratio = 36%
Therefore,
EPS = Dividend per share/ Payout ratio
EPS= 1.80/ 36% = Rs. 5.00/ share

P/E = MPS/ EPS
7.25 = MPS/ 5.00
MPS = Rs. 36.25

<u>Computation of Ke as per Walter Model,</u>
Walter's Model

$$P_0 = \frac{D+\frac{r}{Ke}(E-D)}{Ke}$$

Where,

P_0 = Current price of share

D_0 = Dividend per share

r = rate of return on investment/ IRR/ return on equity

Ke = cost of equity share capital/ discount rate/ opportunity cost/ capitalization rate

$$36.25 = \frac{1.80+\frac{0.20}{Ke}(5.0-1.80)}{Ke}$$

$36.25ke^2 - 1.80ke - 0.64 = 0$

A quadratic equation can be solved by,

$$\text{Ke} = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$\text{Ke} = \frac{-(-1.80) \pm \sqrt{(1.80)^2-4\times 36.25\times(-0.64)}}{2\times 36.25}$$

Ke = 16%

1. When r > K_e, the value of shares is inversely related to the D/P ratio. As the D/P ratio increases, the market value of shares decline. Its value is the highest when D/P ratio is 0. So, if the firm retains its earnings entirely, it will maximize the market value of the shares. The optimum payout ratio is zero.
2. When r < K_e, the D/P ratio and the value of shares are positively correlated. As the D/P ratio increases, the market price of the shares also increases. The optimum payout ratio is 100%.
3. When r = K_e, the market value of shares is constant irrespective of the D/P ratio. In this case, there is no optimum D/P ratio.

#5. A. Exposure:

Payable: $ 7, 00,000; maturity – 3 months

Receivable: $ 4, 50,000; maturity – 2months

Alternative – 1 => cover the payables in the forward market

Inflow from receivables = $4, 50,000× Rs. 48.90 = Rs. 22,005,000.00

Outflow from the receivables = $ 700,000× Rs. 49.15 = (Rs. 34,405,000.00)

Net outflow = Rs. 12,400,000.00

(We assume that receivables are sold forward @48.90 – 3 month as the rate coincide with 3m)

Alternative- 2 => Lag the receivables.

Since, it is given in the question that receivables are already sold forward, we need to cancel it and cover the risk for (Payable- receivable) only. We ignore the transactions involved in cancellation.

Net outflow = $7, 00,000- $4, 50,000= $2, 50,000

Net outflow = $2, 50,000× Rs. 49.15 = Rs. 12,287,500.00

It is advisable to lag the receivable.

#B.

a. Computation of Standard deviation of stocks.
We know that,
$\sigma A^2 = (\beta A^2 \times \sigma M^2) + \sigma e^2$ (SD = Systematic risk + unsystematic risk)

Where,

σA^2 = variance of stock

βA^2 = beta of the stock

σM^2 = variance of the market

σe^2 = unsystematic risk
$\beta A^2 \times \sigma M^2$ = systematic risk

Stocks	$\boldsymbol{\beta A^2}$ **(1)**	$\boldsymbol{\sigma M^2}$ **(2)**	**Sys. Risk (1)×(2) = (3)**	**Unsys. Risk** $\boldsymbol{\sigma e^2}$ **(4)**	**SD =** $\boldsymbol{\sigma^2}$ **(3)+ (4)**
L	2.56	324	829.44	49	878.44
M	1.3225	324	428.49	121	549.49
N	1.96	324	635.04	9	644.04
K	1.00	324	324.00	81	405.00

Also,
Covariance (A, B) = beta of A × beta of B× variance of market
Similarly,

$\text{Cov}_{LM} = \beta_L \times \beta_M \times \sigma M^2$

$\text{Cov}_{LM} = 1.6 \times 1.15 \times (18)^2$ = 596.16 (%²)

$\text{Cov}_{LN} = 1.6 \times 1.40 \times (18)^2$ =725.76 (%²)
$\text{Cov}_{LK} = 1.6 \times 1.0 \times (18)^2$ = 518.40 (%²)
$\text{Cov}_{MN} = 1.15 \times 1.40 \times (18)^2$ = 521.64 (%²)
$\text{Cov}_{MK} = 1.15 \times 1.0 \times (18)^2$ = 372.60 (%²)
$\text{Cov}_{NK} = 1.4 \times 1.0 \times (18)^2$ = 453.60 (%²)

Computation of the risk of the portfolio-

$$\text{SD} = \sigma p = \sqrt{\begin{matrix} WL^2 \times \sigma L^2 + WM^2 \times \sigma M^2 + WN^2 \times \sigma N^2 + WK^2 \times \sigma K^2 + \\ 2WL \times WM \times Cov(l,M) + \\ 2WL \times WN \times Cov(l,N) + \\ 2WL \times WK \times Cov(l,K) + \\ 2WM \times WN \times Cov(M,N) + \\ 2WM \times WK \times Cov(M,K) + \\ 2WN \times WK \times Cov(N,K) + \end{matrix}}$$

$$\sigma p = \sqrt{\begin{matrix} 0.25^2 \times 878.44 + 0.30^2 \times 549.49 + 0.25^2 \times 644.04 + 0.20^2 \times 405.00 + \\ 2 \times 0.25 \times 0.30 \times 596.16 + \\ 2 \times 0.25 \times 0.25 \times 725.76 + \\ 2 \times 0.25 \times 0.20 \times 518.40 + \\ 2 \times 0.30 \times 0.25 \times 521.64 + \\ 2 \times 0.30 \times 0.20 \times 372.60 + \\ 2 \times 0.25 \times 0.20 \times 453.60 + \end{matrix}}$$

σp = ***23.69%***

#6.

#A. This sum is to be solved as per Risk neutral method of Bionomial method of Options valuation

Present Spot = Rs. 421
Up Expected Spot = Rs. 592
Down Expected Spot = Rs. 411
Exercise Price = Rs. 522

Probability of stock going up = $\frac{R-d}{U-d}$

Where,

R = $e^{rt} = e^{.036} = 1.037$ (assume the interest rate is for 1 month)

U = up going factor = $\frac{592}{421} = 1.4062$

D = down going factor = $\frac{411}{421} = 0.9762$

P (probability of stock attaining Rs. 592) $= \frac{R-d}{U-d} = \frac{1.037-0.9762}{1.4062-0.9762} = 0.1414$

P = 14.14%

#B.

i) Computation of NAV as on 1st Feb.

Stocks	No. of shares	Price as on 1st Feb	Value of holdings
L	20,000	Rs. 20.00	Rs. 4,00,000
M	30,000	Rs. 312.40	Rs. 9,372,000
N	20,000	Rs. 361.20	Rs. 7,224,000
P	60,000	Rs. 505.10	Rs. 30,306,000
Total			Rs. 47,302,000.00

No. of Units = 6, 00,000
NAV as on 1st Feb. = Rs. 47,302,000.00/ 6, 00,000
= Rs. 78.84/ unit

ii) Mr. A invests Rs. 300,000 at NAV = Rs. 78.84/ unit and
The number of units issued to Mr. A = Rs. 300,000/ Rs. 78.84
= 38,052 units

*Total no. of units outstanding with the Mutual fund = 6, 00,000+ 38,052
= 6, 38, 052 units

*given that, 8,000 shares of M Ltd. are bought.
Value of 8000 shares @ Rs. 360 = Rs. 2, 880, 000
Cash = Rs. 1, 20,000

Stocks	No. of shares	Price as on 1st Feb	Value of holdings
L	20,000	Rs. 20.50	Rs. 4,10,000
M	38,000	Rs. 360.00	Rs. 13,680,000
N	20,000	Rs. 383.10	Rs. 7,662,000
P	60,000	Rs. 503.90	Rs. 30,234,000
Total			Rs. 51,986,000

Value of assets with the fund = Rs. 51,986,000 + Rs. 1, 20, 00(cash) = Rs. 52, 106, 000

iii) NAV as on 2nd Feb = Rs. 52,106,000/ 6,38, 052
= **Rs. 81.66/ Unit**