

**Nahata Professional Academy**

**[www.npaindore.com](http://www.npaindore.com)**

**Ph: 0731-4045408**

**IDEAL ANSWERS**

**CA Final (New)**

**Financial Management**

**Nov, 2009 Exam**

---

Prepared by: **CA Tarun Mahajan**,  
Address: 161, Tilak Nagar Ext., Indore  
email: tarunmahajanca@gmail.com  
Mobile: 9893040600

(Special thanks to my student **Varun Tibrewal** for proof reading & Cross checking)

(Disclaimer: Questions asked in the exam may have wrong/inadequate information and/or ambiguous language. In that case the answers provided by institute may differ from this Ideal Answers. Every step has been taken to make accurate these answers, still if you find some clerical errors, please bring it to our notice through email. )

**Question 1 (a)**

M/s ABC Ltd. is to acquire a personal computer with modem and a printer. Its price is Rs. 60,000. ABC Ltd. Can borrow Rs 60,000 from a commercial bank at 12% interest per annum to finance the purchase. The principal sum is to be repaid in 5 equal year-end installments. ABC Ltd. can also have the computer on lease for 5 years.

The firm seeks your advice to know the maximum lease rent payable at each year end. Consider the following additional information:

- (i) Interest on bank loan is payable at each year end.
- (ii) The full cost of the computer will be written off over the effective life of computer on straight-line basis. This is allowed for tax purposes.
- (iii) At the end of year 5, the computer may be sold for Rs.1,500 through a second-hand dealer, who will charge 8% commission on the sale proceeds.
- (iv) The company's effective tax rate is 30%.
- (v) The cost of capital is 11%.

Suggest the maximum annual lease rental for ABC Ltd. PV Factor at 11%

|             |       |       |       |       |       |            |
|-------------|-------|-------|-------|-------|-------|------------|
| <b>Year</b> | 1     | 2     | 3     | 4     | 5     |            |
| <b>PVF</b>  | 0.901 | 0.812 | 0.731 | 0.659 | 0.593 | (12 marks) |

**Answer 1(a)****Evaluation of loan option:**

Step 1: **Annual Cash Flows:**

| Year | Principal | Interest | Tax Benefit |       | Net Cash Flow | PVF@11% | PV     |
|------|-----------|----------|-------------|-------|---------------|---------|--------|
|      |           |          | Interest    | Depn. |               |         |        |
| 1    | -12000    | -7200    | 2160        | 3600  | -13440        | 0.901   | -12109 |
| 2    | -12000    | -5760    | 1728        | 3600  | -12432        | 0.812   | -10095 |
| 3    | -12000    | -4320    | 1296        | 3600  | -11424        | 0.731   | -8351  |
| 4    | -12000    | -2880    | 864         | 3600  | -10416        | 0.659   | -6864  |
| 5    | -12000    | -1440    | 432         | 3600  | -9408         | 0.593   | -5579  |
|      |           |          |             |       |               |         | -42998 |

Step 2: **Terminal Cash Flows:**

|                                               |                |
|-----------------------------------------------|----------------|
|                                               | Rs.            |
| Sale price of computer                        | 1,500          |
| Commission                                    | <u>-120</u>    |
| Net proceeds                                  | 1,380          |
| Tax on Capital gain (1380 x 30%)              | <u>-414</u>    |
| Net Cash flow                                 | 966            |
| Present Value factor for 5 <sup>th</sup> year | <u>x 0.593</u> |
| Present Value                                 | <u>573</u>     |

Step 3: **Cost of loan option:** -42998 + 573 = -42425

**Calculation of maximum (break even) lease rent**

Break even lease rent is the rent at which present value of after tax lease rent is equal to cost of loan option. Let us assume that break even lease rent is "R". Hence present value of after tax lease rents is:

$$-R \times 0.7 \times 3.696 = -2.5872R$$

$$-2.5872R = -42425$$

$$R = 16398$$

**Question 1 (b)**

A mutual fund made an issue of 10,00,000 units of Rs. 10 each on January 01, 2008. No entry load was charged. It made the following investment:

|                                                | Rs.       |
|------------------------------------------------|-----------|
| 50,000 Equity shares of Rs. 100 each @ Rs. 160 | 80,00,000 |
| 7% Government Securities                       | 8,00,000  |
| 9% Debentures (Unlisted)                       | 5,00,000  |
| 10% Debentures (Listed)                        | 5,00,000  |

During the year, dividends of Rs. 12,00,000 were received on equity shares. Interest on all types of debt securities was received as and when due. At the end of the year equity shares and 10% debentures are quoted at 175% and 90% respectively. Other investments are at par.

Find out the Net Asset Value (NAV) per unit given that operating expenses paid during the year amounted to Rs. 5,00,000. Also find out the NAV, if the Mutual fund had distributed a dividend of Re. 0.80 per unit during the year to the unit holders. (8 marks)

**Answer 1(b)**

| Particulars                                     | Rs.              | Rs.              |
|-------------------------------------------------|------------------|------------------|
| Equity Shares (50000 x 280)                     |                  | 1,40,00,000      |
| 7% Government Securities                        |                  | 8,00,000         |
| 9% Debentures (Unlisted)                        |                  | 5,00,000         |
| Cash & Bank:                                    |                  | 4,50,000         |
| Cash not invested <sup>#</sup> (1cr. -98 Lakhs) | 2,00,000         |                  |
| Dividend Received                               | 12,00,000        |                  |
| Interest @7%                                    | 56,000           |                  |
| Interest @9%                                    | 45,000           |                  |
| Interest @10%                                   | 50,000           |                  |
| Operating expenses                              | <u>-5,00,000</u> |                  |
|                                                 |                  | <u>10,51,000</u> |
| Value of assets at the end of year              |                  | 1,68,01,000      |
| No. of Units                                    |                  | 1000000          |
| NAV= Assets/No. of units                        |                  | 16.801           |

# It is assumed that this amount is not paid as distribution commission to the dealers.

NAV if dividend of Rs.0.80 is given = 16.801 – 0.80 = Rs.16.001

**Question 2 (a)**

An investor holds two stocks A and B. An analyst prepared ex-ante probability distribution for the possible Economic scenarios and the conditional returns for two stocks and the market index as shown:

| Economic scenario | Probability | Conditional Returns % |    |        |
|-------------------|-------------|-----------------------|----|--------|
|                   |             | A                     | B  | Market |
| Growth            | 0.40        | 25                    | 20 | 18     |
| Stagnation        | 0.30        | 10                    | 15 | 13     |
| Recession         | 0.30        | -5                    | -8 | -3     |

The risk free rate during the next year is expected to be around 11%. Determine whether the investor should liquidate his holdings in stocks A and B or on the contrary make fresh investments in them. CAPM assumptions are holding true. (10 marks)

**Answer 2(a)**

| A  | B  | M  | Prob. | A x P | B x P | M x P | M <sup>2</sup> x P | Cov(M,A) | Cov(M,B) |
|----|----|----|-------|-------|-------|-------|--------------------|----------|----------|
| 25 | 20 | 18 | 0.4   | 10    | 8     | 7.2   | 129.6              | 42.12    | 30.888   |
| 10 | 15 | 13 | 0.3   | 3     | 4.5   | 3.9   | 50.7               | -1.26    | 4.116    |
| -5 | -8 | -3 | 0.3   | -1.5  | -2.4  | -0.9  | 2.7                | 65.34    | 71.676   |
|    |    |    |       | 11.5  | 10.1  | 10.2  | 183                | 106.2    | 106.68   |

Expected Return of Stock A = 11.5%

Expected Return of Stock B = 10.1%

Expected Return of Market Portfolio = 10.2%

$$\text{Variance of Market Portfolio} = \sum M^2 P - \left( \sum MP \right)^2 = 183 - (10.2)^2 = 78.96$$

Beta of **A** with respect to market =  $\text{Cov}(M,A) / \text{Variance of market portfolio} = 106.2 / 78.96 = 1.34$

Beta of **B** with respect to market =  $\text{Cov}(M,B) / \text{Variance of market portfolio} = 106.68 / 78.96 = 1.35$

$$E(R_p) = R_f + (R_m - R_f)\beta$$

Required return (Ideal expectations) for **Stock A** =  $11 + (10.2 - 11) \times 1.34 = 9.93$

Required return (Ideal expectations) for **Stock B** =  $11 + (10.2 - 11) \times 1.35 = 9.92$

For both stock A & B expected return is more than the ideal expectations hence the stocks must be undervalued. Therefore investor can make fresh investments in them.

**Question 2 (b)**

What are the limitations of Credit Rating?

(4 marks)

**Answer 2(b)**

Many times Credit rating agencies suddenly change credit rating by three or more notches. The high proportion of companies whose investment grade rating was overnight changed to non-investment grade is not conducive for enhancing the faith of investors in ratings. There are several limitations of credit ratings as follows:

First, credit ratings are changed when the agencies feel that sufficient changes have occurred. The rating agencies are physically unable to constantly monitor all the firms in the market. The opinions of rating agencies may turn wrong in the context of subsequent events that may have an adverse impact on asset quality of the issuer.

Second, the use of credit ratings imposes discrete categories on default risk, while, in reality default risk is a continuous phenomenon. Moody's recognized this way back in 1982 by adding numbers to the letter system, thereby increasing its number of rating categories from 9 to 19. Nevertheless, this limitation still pertains. The letter grades assigned by rating agencies serve only as a general, somewhat coarse form of discrimination.

Third, owing to time and cost constraints, credit ratings are unable to capture all characteristics for an issuer and issue. A borrowing company can reduce the cost of borrowing, if it obtains a higher rating for its contemplated issue. The stakes and pressures, consequently, to get a good quality rating are high. If the company comes to know that its issue is going to get a low quality rating, it may approach another agency and then use the best rating among them since it is not under obligation to disclose all ratings. Investors should, therefore, not follow blindly the ratings of different agencies in regard to the safety of fixed income instruments. The investors should explore other alternative evaluation sources so that they become aware of the true risks involved.

**Question 2 (c)**

Following Financial data are available for PQR Ltd. for the year 2008:

|                                      | Rs. In lakh |
|--------------------------------------|-------------|
| 8% Debentures                        | 125         |
| 10% bonds (2007)                     | 50          |
| Equity shares (Rs. 10 each)          | 100         |
| Reserve and Surplus                  | 300         |
| Total Assets                         | 600         |
| Assets Turnovers ratio               | 1.1         |
| Effective interest rate              | 8%          |
| Effective tax rate                   | 40%         |
| Operating margin                     | 10%         |
| Dividend payout ratio                | 16.67%      |
| Current market Price of Shares       | 14          |
| Required Rate of return of investors | 15%         |

You are required to:

- Draw income statement for the year
- Calculate its sustainable growth rate
- Calculate the fair price of the company's shares using dividend discount model, and

What is your opinion on investment in the company's share at current price? (6 marks)

**Answer 2(c)**

(i) Asset Turnover ratio = Turnover / Total Assets

$$1.1:1 = \text{Turnover} / 600$$

$$\text{Turnover} = 660$$

**Income Statement for the year**

| Particulars                               | Rs. In Lakhs      |
|-------------------------------------------|-------------------|
| Turnover                                  | 660               |
| Operating Profit (10% of Sales)           | 66                |
| Interest on Debentures @8%                | -10               |
| Interest on Bonds @10%                    | -5                |
| Profit before tax                         | 51                |
| Tax @40%                                  | -20.4             |
| Earnings Available to equity shareholders | 30.6              |
| No. of shares                             | 10                |
| EPS                                       | 3.06              |
| Pay-out ratio                             | 1/6 <sup>th</sup> |
| DPS                                       | 0.51              |

(ii) Sustainable growth rate = Return on equity x Retention Ratio

$$\begin{aligned} \text{Return on equity} &= \text{Earnings available to equity shareholders} / \text{Equity shareholders fund} \\ &= 27 / (100 + 300) = 6.75\% \end{aligned}$$

$$\begin{aligned}\text{Retention Ratio} &= 1 - \text{Pay-out ratio} \\ &= 1 - 1/6 \\ &= 5/6\end{aligned}$$

$$\begin{aligned}\text{Growth Rate} &= 6.75\% \times 5/6 \\ &= 5.625\%\end{aligned}$$

(iii) Fair price of share as per dividend discount model

$$\begin{aligned}\text{Fair Price} &= \text{Dividend at the end of first year} / (\text{required return} - \text{growth rate}) \\ &= (0.45 \times 1.05626) / (0.15 - 0.05625) \\ &= 0.475 / 0.09375 \\ &= \text{Rs.5.07}\end{aligned}$$

(iv) Fair price of the share is Rs.5 while actual price is Rs.14. It means share is currently overvalued. Therefore one should sell the same.

### Question 3 (a)

Closing values of BSE Sensex from 6<sup>th</sup> to 17<sup>th</sup> day of the month of January of the year 200X were as follows:

| Days | Date | Day | Sensex     |
|------|------|-----|------------|
| 1    | 6    | THU | 14522      |
| 2    | 7    | FRI | 14925      |
| 3    | 8    | SAT | No Trading |
| 4    | 9    | SUN | No Trading |
| 5    | 10   | MON | 15222      |
| 6    | 11   | TUE | 16000      |
| 7    | 12   | WED | 16400      |
| 8    | 13   | THU | 17000      |
| 9    | 14   | FRI | No Trading |
| 10   | 15   | SAT | No Trading |
| 11   | 16   | SUN | No Trading |
| 12   | 17   | MON | 18000      |

Calculate Exponential moving Average (EMA) of Sensex during the above period. The 30 days simple moving average of Sensex can be assumed as 15,000. The Value of exponent for 30 days EMA is 0.062. Give detailed analysis on the basis of your calculations. (6 marks)

### Answer 3(a)

$$\text{Exponential Moving average} = (\text{Today's closing price} \times 0.062) + (\text{Yesterday's Moving average} \times (1 - 0.062))$$

$$\text{For example for day 1 EMA} = 14522 \times 0.062 + 15000 \times 0.938 = 14970$$

| Day | Sensex | EMA    |
|-----|--------|--------|
| 1   | 14,522 | 14,970 |
| 2   | 14,925 | 14,968 |
| 5   | 15,222 | 14,983 |
| 6   | 16,000 | 15,046 |
| 7   | 16,400 | 15,130 |
| 8   | 17,000 | 15,246 |
| 12  | 18,000 | 15,417 |

**Analysis of above calculation:**

Exponential moving average is a tool used in technical analysis. It is a lagging indicator. It indicates us that when to buy and when to sell. If we draw a line diagram of Sensex as well as EMA then:

- (1) A buying signal is generated when the sensex line intersects EMA line from downside. And
- (2) A selling signal is generated when the sensex line intersects EMA line from upside.

In the above calculation we can observe that when we move from day 2 to day 3 sensex is crossing EMA therefore there is a buy signal in the market. If on the basis of this buy signal somebody makes buying on Tuesday he will make profit because from that day sensex is continuously rising.

**Question 3 (b)**

XYZ company has current earnings of Rs.3 per share with 5,00,000 shares outstanding. The company plans to issue 40,000, 7% convertible preference shares of Rs.50 each at per. The preference shares are convertible into 2 shares for each preference shares held. The equity share has a current market price of Rs. 21 per share.

- (i) What is preference shares conversion value?
- (ii) What is conversion premium?
- (iii) Assuming that total earnings remain the same, calculate the effect of the issue the basic earnings per share (a) before conversion (b) after conversion.
- (iv) If profits after tax increases by Rs.1 million what will be the basic EPS (a) before conversion and (b) on a fully diluted basis. (8 marks)

**Answer 3(b)**

(i) One preference share is convertible into 2 equity share and currently one equity share is having a market value of Rs.21. hence the conversion value is Rs.42 per preference share or Rs.16,80,000

(ii) Conversion premium. One preference share of Rs.50 is converted into two equity shares means one equity share will cost Rs.25. it means equity shares are issued at a premium of Rs.15 (Considering face value of Rs.10). If the current market price prevails, preference shareholders will have a loss of Rs.8 per preference share ( $21 \times 2 - 50$ ).

**(iii) Effect on Basic EPS**

Earnings  $5,00,000 \times \text{Rs.}3 = \text{Rs.}15,00,000$

| Particulars                               | Before Conversion | After Conversion |
|-------------------------------------------|-------------------|------------------|
| Earnings                                  | 15,00,000         | 15,00,000        |
| Dividend on preference shares             | 1,40,000          | -                |
| Earnings available to equity shareholders | 13,60,000         | 15,00,000        |
| No. of equity shares                      | 5,00,000          | 5,80,000         |
| EPS                                       | 2.72              | 2.59             |

**(iv) Effect on EPS**

Earnings =  $\text{Rs.}15,00,000 + 10,00,000 = \text{Rs.} 25,00,000$

| Particulars                               | Basic EPS | Diluted EPS |
|-------------------------------------------|-----------|-------------|
| Earnings                                  | 25,00,000 | 25,00,000   |
| Dividend on preference shares             | 1,40,000  | -           |
| Earnings available to equity shareholders | 23,60,000 | 25,00,000   |
| No. of equity shares                      | 5,00,000  | 5,80,000    |
| EPS                                       | 4.72      | 4.31        |

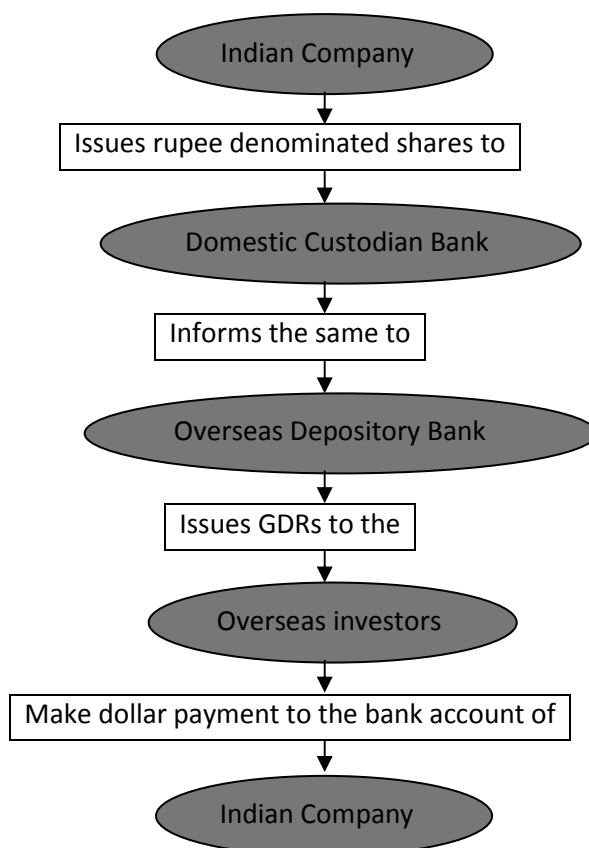
**Question 3 (c)**

What is the impact of GDRs on Indian Capital Market?

(6 marks)

**Answer 3(c)****What is global depository receipt?**

If an Indian company wants to issue its shares outside India then it issues the same in the form of Global depository receipt. The process of issue of GDR is as follows:

**Impact of GDR on Indian capital market:**

We can say that GDR is a derivative of its underlying shares of Indian company. And any change in the price of shares in India should result in change in price of GDR. But practically it has been observed that the reverse is also true means change in International prices also results in change in price in Indian market. Since inception of GDRs a remarkable changes in Indian capital market has been observed as follows:-

- Indian stock market is no longer independence from rest of the world. This puts additional strain on the investors as they now need to keep updated with worldwide economic events.
- Indian retail investors are completely sidelined. Because of this issue they can no longer expect to make easy money on heavily discounted rights/public issues.
- There is arbitrage possibility in GDRs issue. It means if GDR's are cheaper than the underlying share than foreign investor can buy GDR at a low price, convert it into the underlying shares and sell the same at a high price.

**Question 4 (a)**

You have been provided the following Financial data of two companies:

|                             | Krishna Ltd. | Rama Ltd.     |
|-----------------------------|--------------|---------------|
| Earnings After taxes        | Rs. 7,00,000 | Rs. 10,00,000 |
| Equity Shares (Outstanding) | 2,00,000     | 4,00,000      |
| EPS                         | 3.5          | 2.5           |
| P/E Ratio                   | 10 times     | 14 times      |
| Market price per share      | Rs.35        | Rs.35         |

Company Rama Ltd. is acquiring the company Krishna Ltd. exchange its shares on a one-to-one basis for company Krishna Ltd. the exchange ratio is based on the market prices of the shares of the two companies.

Required:

- What will be the EPS subsequent to merger?
- What is the changes in EPS for the shareholders of companies Rama Ltd. and Krishna Ltd.?
- Determine the market value of the post-merger firm: PE ratio is likely to remain the same.
- Ascertain the profits accounting to shareholders of both the companies. (10 marks)

**Answer 4(a)**

- (i) Post merger EPS = Post merger earnings / post merger no. of shares  
 $= 10,00,000 + 7,00,000 / (4,00,000 + 2,00,000)$   
 $= 2.83$
- (ii) Change in EPS
- Rama Ltd. = Post merger EPS – Pre merger EPS  
 $= 2.83 - 2.5$   
 $= +0.33$
- Krishna Ltd. = Post merger EPS x exchange ratio – Pre merger EPS  
 $= 2.83 \times 1 - 3.5$   
 $= -0.67$
- (iii) Post merger market Price = Post merger EPS x P/E  
 $= 2.83 \times 14$   
 $= Rs.39.67$
- Value of firm = Rs.39.67 x 6,00,000 = Rs.2.38 crores
- (iv) Profit to shareholders
- Rama Ltd. = Post merger price – Pre merger price  
 $= 39.67 - 35$   
 $= Rs.4.67 \text{ per share}$
- Krishna Ltd. = Post merger price x exchange ratio – Pre merger price  
 $= 39.67 \times 1 - 35$   
 $= Rs.4.67 \text{ per share}$

**Question 4 (b)**

An investors is considering the purchase of the following Bond:

|             |         |
|-------------|---------|
| Face value  | Rs. 100 |
| Coupon rate | 11%     |
| Maturity    | 3 years |

- (i) If he wants a yield of 13% what is the maximum price he should be ready to pay for?  
 (ii) If the Bond is selling for Rs. 97.60, what would be his yield? (4 marks)

**Answer 4(b)**

(i) Valuation of bond

| Year | Amount | PVF@13% | PV    |
|------|--------|---------|-------|
| 1    | 11     | 0.885   | 9.73  |
| 2    | 11     | 0.783   | 8.61  |
| 3    | 111    | 0.693   | 76.93 |
|      |        |         | 95.28 |

Investor will be ready to pay a maximum price of Rs.95.28

(ii) Calculation of yield:

| Year | Amount | PVF@12% | PV    |
|------|--------|---------|-------|
| 1    | 11     | 0.893   | 9.82  |
| 2    | 11     | 0.797   | 8.77  |
| 3    | 111    | 0.712   | 79.01 |
|      |        |         | 97.60 |

From the above calculations it is clear that If the bond is selling for Rs.97.6, investor's yield will be 12%.

**Question 4 (c)**

A firm had been paid dividend at Rs. 2 per share last year. The estimated growth of the dividends from the company is estimated to be 5% p.a. Determine the estimated market price of the equity share if the estimated growth rate of dividends (i) rises to 8%, and (ii) falls to 3%. Also find out the present market price of the share, given that the required rate of return of the equity investors is 15.5%. (6 marks)

**Answer 4(c)**

Formula for calculation of current market price under growth approach (Gordon's model):

$$P_0 = D_1 / (K_e - g)$$

Here

$P_0$  = Current market price

$D_1$  = Dividend for the first year =  $D_0 \times (1+g)$

$K_e$  = required rate of return

$g$  = growth rate

|                          |                                    |                                     |
|--------------------------|------------------------------------|-------------------------------------|
| Existing market price    | = $2 \times (1.05) / 0.155 - 0.05$ | = $2.10 / 0.105 = \text{Rs.} 20$    |
| Market price ( $g=8\%$ ) | = $2 \times (1.08) / 0.155 - 0.08$ | = $2.16 / 0.075 = \text{Rs.} 28.80$ |
| Market price ( $g=3\%$ ) | = $2 \times (1.03) / 0.155 - 0.03$ | = $2.06 / 0.125 = \text{Rs.} 16.48$ |

**Question 5 (a)**

M/s Omega Electronics Ltd. exports air conditioners to Germany by importing all the components from Singapore. The company is exporting 2,400 units at a price of Euro 500 per unit. The cost of imported components is S\$ 800 per unit. The fixed cost and other variables cost per unit are Rs.1,000 and Rs.1,500 respectively. The cash flows in Foreign currencies are due in six months. The current exchange rates are follows:

|         |          |
|---------|----------|
| Rs/Euro | 51.50/55 |
| Rs/S\$  | 27.20/25 |

After six months the exchange rates turn out as follows:

|         |          |
|---------|----------|
| Rs/Euro | 52.00/05 |
| Rs/S\$  | 27.70/75 |

- (1) You are required to calculate loss/gain due to transaction exposure
- (2) Based on the following additional information calculate the loss/gain due to transaction and operating exposure if the contracted price of air conditioners is Rs.25,000:
  - (i) The current exchange rate changes to
 

|         |          |
|---------|----------|
| Rs/Euro | 51.75/80 |
| Rs/S\$  | 27.10/15 |
  - (ii) Price elasticity of demand is estimated to be 1.5
  - (iii) Payments and receipts are to be settled at the end of six months. (12 marks)

**Answer 5(a)**

(1) Gain or loss due to transaction exposure:

|                                                                              |                     |
|------------------------------------------------------------------------------|---------------------|
| Export: $(52.00 - 51.50) \times 500 \text{ euro} \times 24000 \text{ units}$ | = Rs.60,00,000 gain |
| Import: $(27.75 - 27.25) \times 800 \text{ S\$} \times 24000 \text{ units}$  | = Rs.96,00,000 loss |
| Net : Rs.96,00,000 – Rs.60,00,000                                            | = Rs.36,00,000 loss |

(2)

Immediate loss due to home currency invoicing:  $= [\text{Rs.}25000 - (500 \times 51.75)] \times 2400$   
 $= [25000 - 25875] \times 2400$   
 $= 875 \times 2400$   
 $= \text{Rs.}21,00,000$

Opportunity Loss due to changes in exchange

Rate in coming 6 months  $= [(51.75 - 52) \times 500] \times 2400$   
 $= [0.25 \times 500] \times 2400$   
 $= [125] \times 2400$   
 $= \text{Rs.}3,00,000$

**Question 5 (b)**

A study by a Mutual fund has revealed the following data in respect of three securities:

| Security | $\Sigma$ (%) | Correlation with index, Pm |
|----------|--------------|----------------------------|
| A        | 20           | 0.60                       |
| B        | 18           | 0.95                       |
| C        | 12           | 0.75                       |

The standard deviation of market portfolio (BSE Sensex) is observed to be 15%.

- (i) What is the sensitivity of returns of each stock with respect to the market?
- (ii) What are the co variances among the various stocks?
- (iii) What would be the risk of portfolio consisting of all the three stocks equally?
- (iv) What is the beta of the portfolio consisting of equal investment in each stock?
- (v) What is the total, systematic and unsystematic risk of the portfolio in (iv)? (8 marks)

**Answer 5(b)****(i)  $\beta$**  = Correlation Coefficient x  $(\sigma_P / \sigma_M)$ 

$$A = 0.60 \times (20/15) = 0.80$$

$$B = 0.95 \times (18/15) = 1.14$$

$$C = 0.75 \times (12/15) = 0.60$$

**(ii) to (v)**

$$\sigma_P^2 = \beta_P^2 \sigma_M^2 + e_P^2 \quad (\text{Total Risk} = \text{Systematic Risk} + \text{Unsystematic Risk})$$

Here

 $\sigma_P^2$  = Variance or total risk of the security $\beta_P^2 \sigma_M^2$  = Systematic Risk of the security $e_P^2$  = Unsystematic Risk of the security $\beta_P$  = Regression Coefficient or risk index for systematic risk $\sigma_M^2$  = Variance or total risk of the market portfolio

Calculation of unsystematic risk of Individual securities:

$$e_P^2 = \sigma_P^2 - \beta_P^2 \sigma_M^2$$

$$e_A^2 = 20^2 - (0.8 \times 15)^2 = 256$$

$$e_B^2 = 18^2 - (1.14 \times 15)^2 = 31.59$$

$$e_C^2 = 12^2 - (0.6 \times 15)^2 = 63$$

$$\text{Beta of portfolio} = 0.80 \times 1/3 + 1.14 \times 1/3 + 0.60 \times 1/3 = 0.8467$$

**Unsystematic risk Three security portfolio:**

$$e_P^2 = \sum e_i^2 w_i^2 = 256 \times 1/9 + 31.59 \times 1/9 + 63 \times 1/9 = 38.95$$

**Systematic Risk of Three security portfolio:**

$$\beta_P^2 \sigma_M^2 = (0.8467 \times 15)^2 = 161.29$$

**Total Risk of Three security portfolio:**

$$\sigma_P^2 = \beta_P^2 \sigma_M^2 + e_P^2 = 38.95 + 161.29 = 200.24$$

$$\sigma_P = (200.24)^{1/2} = 14.15$$