PAPER-14: Advanced Financial Management

Time Allowed: 3 hours **Full Marks:** 100

This paper contains 5 questions. All questions are compulsory, subject to instruction provided against each question. All workings must form part of your answer.

Assumptions, if any, must be clearly indicated.

Question No. 1. (Answer **all** questions. Each question carries **2 marks**)

(a) Are Secured debentures treated as Public Deposit? If not who regulates them? [2]

Answer to (a):

Debentures secured by the mortgage of any immovable property of the company or by any other asset or with an option to convert them into shares in the company, if the amount raised does not exceed the market value of the said immovable property or other assets, are excluded from the definition of 'Public Deposit' in terms of Non-Banking Financial Companies Acceptance of Public Deposits (Reserve Bank) Directions, 1998. Secured debentures are debt instruments and are regulated by Securities & Exchange Board of India.

(b) Tata Ltd. has a target capital structure of 40% debt and 60% equity for one of its new subsidiaries. The yield to maturity of the company's outstanding bonds is 9% and the tax rate is 40%. The CFO has calculated the company's WACC as 9.96%. Find out the company's equity cost of capital. [2]

Answer to (b):

40% Debt; 60% Equity; r_d = 9%; T = 40%; WACC = 9, 96%; r_d =?

WACC = $(W_d)(R_d)(1-T)+(W_{09})(r_3)$

9.96% = $(0.4)(9\%)(1-0.4) + (0.6)r_3$

9.96% = $2.16\% + 0.6r_3$

7.8% = $0.6r_3$

r_3 = 13%

(c) What types of risk is involved in Investment in Government Securities? [2]

Answer to (c):

Government Securities are usually referred to as risk free securities. However, these securities are subject to only one type of risk, i.e. interest rate risk. Subject to changes in the overall interest rate scenario, the price of these securities may appreciate or depreciate.

(d) The spot USD/Yen = 190 yen and one year forward rate of USD/Yen = 210 Yen. The prime rate in US is 15%. What should the Japanese prime rate be? [2]

Answer to (d):

From Interest parity (¥210/$)/(¥190/$) = (1+i¥)/1.15

= i¥ = 27.11%

(e) Write down the objectives of interbank participation certificate? [2]

Answer to (e):

Inter Bank Participation Certificates (IBPC) are short-term instruments to even out the short term liquidity within the Banking system particularly when there are imbalances affecting the maturity mix of assets in Banking Book.

It provides a degree of flexibility in the credit-portfolio of Banks. It can be issued by Scheduled Commercial Bank and can be subscribed by any Commercial Bank.

(f) The spot USD/INR = 43.70 and six-month forward premium is 40 paise (= ₹ 0.40). Calculate the annualized forward premium. [2]

Answer to (f):

Annualised Premium = (Premium × 100 × 365)/ (Spot × n)

(Where n = 180)

= (0.40 × 100 × 365)/ (43.70 × 180) = 1.86%

(g) Mr. Pravin requires a monthly payment of ₹ 1000 for 5 years from a mutual fund that has a track record of paying 9% per annum. What should be his investment today to get this amount? [2]

Answer to (g):

The money Parvin invests should given him ₹ 1000 per month for 5 years @ 9%. This implies that the monthly interest is 9%/12 = 0.75% and the total number of periods is 5 x 12 = 60. Therefore, Amount to be invested today = 1000 x PVIFA (0.75%, 60) = 1000 x 48.17337 = ₹ 48173.37.

(h) The spot and 6 months forward rates of US$ in relation to the rupee (₹/$) are ₹ 48.95/49.13 and ₹ 49.85/49.96 respectively. What will be the annualized forward margin (premium with respect to bid price)? [2]

Answer to (h):

Forward margin (premium with respect of Bid Price)

= [(₹ 49.85 – ₹ 48.95) ÷ 48.95] x $\frac{12}{6}$ x 100

=0.03677 x 100 = 3.677 i.e., 3.68% per annum

(i) Airtel Communications is trying to estimate the first-year operating cash flow (at t = 1) for a proposed project. The finance staff has collected the following information:

Projected Sales = ₹ 1 crore
Operating costs = ₹ 70 lakhs (not including depreciation)
Depreciation = ₹ 20 lakhs
Interest expense = ₹ 20 lakhs

The company faces a 4% tax rate. What is the project's operating cash flow for the year (t=1)? [2]

Answer to (i):

Operating Cash Flow: (t = 1)

Sales revenue	10,00,000
Operating costs	7,00,000
Depreciation	2,00,000
Operating income before taxes	10,00,000
Taxes (40%)	4,00,000
Operating income after taxes	6,00,000
Add back depreciation	20,00,000
Operating cash flow	6,00,000

(j) Mr. Adhiraj is planning to construct a minimum risk portfolio by investing in the shares of Arihant Ltd. and Suzlon Ltd. The risks associated with the returns of Arihant Ltd. and Suzlon Ltd. are 23% and 25% respectively. If the co-efficient of correlation between the returns of shares of both companies is "O", what proportion of funds to be invested in the shares of Arihant Ltd? [2]

Answer to (j):

Let the proportion of investment to be made in the shares of ARIHANT LTD be W_A

For constructing a minimum risk portfolio the condition to be satisfied is

$$W_A = \frac{\sigma S^2 - COV(A,S)}{\sigma A^2 + \sigma S^2 - 2COV(A,S)}$$

$$= \frac{(0.25)^2 - 0}{(0.23)^2 + (0.25)^2 - 2\times 0}$$

$$= \frac{0.0625}{0.1154} = 0.5416 \text{ i.e. } 54.16\%$$

$$\text{Where } COV(A,S) = \rho_{AS}\sigma_A\sigma_S$$

$$\rho_{AS} = \text{Correlation Coefficient}$$

$$COV(A,S) = 0 \times 0.23 \times 0.25 = 0$$

Question No. 2. (Answer **any three** questions. Each question carries **8 marks**)

2.(a)(i) Two funds are available for investment. Fund X is being launched i.e. 31.12.2013 and available for investment at ₹ 10 per unit. A similar Fund Y (same risk profile like Fund X) is also available for investment at ₹ 19.45 per unit. The information of quarterly NAV for the next three quarters are available as given below. Investor Mr. A prefers Fund X and Investor Mr. B prefers Fund Y for investment through SIP (Systematic Investment Plan) each installment entailing ₹ 2,000 for four quarters including initial investment:

Closing NAV	Fund X ₹	Fund Y ₹
31.12.2013	**10.00**	**19.45**
31.03.2014	**11.1567**	**21.50**
30.06.2014	**14.7680**	**27.15**
30.09.2014	**12.8554**	**23.69**

Which investor (Mr. A or B) would clock a higher return on investment as on 30.09.2014? (Ignore Time Value of Money). [6]

Answer to 2(a)(i):

Amount (₹)	FUND X		FUND Y	
Installment -2000	**NAV**	**Units**	**NAV**	**Units**
31.12.2013	10.0000	200.0000	19.45	102.8278
31.03.2014	11.1567	179.2645	21.50	93.0233
30.06.2014	14.7680	135.4280	27.15	73.6648
30.09.2014	12.8554	155.5766	23.69	84.4238
Total		670.2691		353.9397
Value of Investment	670.269 × 12.8554 = ₹ 8,616.58		353.9397 × 23.69 = ₹ 8,384.83	
Return	= (8,000.00)		= (8,000.00)	
Return	616.58/8,000 = 7.71%		384.83/8,000 = 4.81%	

Mr. A has fetched a higher return from Fund X.

2.(a)(ii) Define Cash Reserve Ratio. [2]

Answer to 2(a)(ii):

Cash Reserve Ratio (CRR): The share of net demand and time liabilities that banks must maintain as cash balance with the Reserve Bank. The Reserve Bank requires banks to maintain a certain amount of cash in reserve as percentage of their deposits to ensure that banks have sufficient cash to cover customer withdrawals. The adjustment of this ratio is done as an instrument of monetary policy, depending on prevailing conditions. Our centralized and computerized system allows for efficient and accurate monitoring of the balances maintained by banks with the Reserve Bank of India.

2. (b) On 24th March. A refinery needs 1,050 barrels of crude oil in the month of September. The current price of crude oil is ₹ 3,000 per barrel. September futures contract at Multi Commodity Exchange (MCX) is trading at ₹ 3,200. The firm expects the price to go up further and beyond ₹ 3,200 in September. It has the option of buying the stock now. Alternatively it can hedge through futures contract.

(1) If the cost of capital, insurance, and storage is 15% per annum, examine if it is beneficial for the firm to buy now?

(2) Instead, if the upper limit to buying price is ₹ 3,200 what strategy can the firm adopt?

(3) If the firm decides to hedge through futures, find out the effective price it would pay for crude oil if at the time of lifting the hedge (I) the spot and futures price are ₹ 2,900 and ₹ 2,910 respectively, (II) the spot and futures price are ₹ 3,300 and ₹ 3,315 respectively. [(2+2+4)]

Answer to 2 (b):

(1) If cost of carry (including interest, insurance, and storage) is 15%, the fair price of the futures contract is $s_0 \times e^{-rt} = 3,000 \times e^{-6/12 \times 0.15} =$ ₹ 3,233.65.

It implies that if the firm buys crude oil today to be used after six months it would effectively cost ₹ 3,233.65 per barrel.

(2) Since futures are trading at ₹ 3,200 it can lock-in the price of around ₹ 3,200 through a long hedge. Under long hedge the firm would buy the futures on crude oil today and sell it six months later while simultaneously meeting the physical requirements from the market at the price prevailing at that time. Irrespective of price six months later, the firm would end up paying a price of around ₹ 3,200.

(3) If the firm adopts the strategy as mentioned in (ii), the effective price to be paid by the firm in cases of rise and fall in spot values is shown below:-

Quantity of crude oil to be hedged	=1,075 barrels
Size of one futures contract	= 100 barrels
No. of futures contracts bought 1,075/100	= 11 contracts (Rounded)
Futures price	= ₹ 3,200
Exposure in futures 3,200 x 11 x 100	= ₹ 35,20,000

Six months later the firm would unwind its futures position and buy the requirement from the spot market.

	₹	₹
Futures sold at price	2910	3315
Amount of futures sold	32,01,000	36,46,500
Gain/Loss on futures (11 contracts)	(3,19,000)	1,26,500

Spot Price	2,900	3,300
Actual Cost of buying(1075 barrels)	31,17,500	35,47,500
Effective cost of buying	34,36,500	34,21,000
Effective Price	**3,197**	**3,182**

2.(c)(i) 'Clearing of trades that take place on an exchange happens through the exchange clearing house.'- Justify. [5]

Answer to 2(c)(i):

Clearing of trades that take place on an exchange happens through the exchange clearing house.

A clearing house is a system by which exchanges guarantee the faithful compliance of all trade commitments undertaken on the trading floor or electronically over the electronic trading systems. The main task of the clearing house is to keep track of all the transactions that take place during a day so that the net position of each of its members can be calculated. It guarantees the performance of the parties to each transaction.

Typically it is responsible for the following:

- Effecting timely settlement.
- Trade registration and follow up.
- Control of the evolution of open interest.
- Financial clearing of the payment flow.
- Physical settlement (by delivery) or financial settlement (by price difference) of contracts.
- Administration of financial guarantees demanded by the participants.

The clearing house has a number of members, who are mostly financial institutions responsible for the clearing and settlement of commodities traded on the exchange. The margin accounts for the clearing house members are adjusted for gains and losses at the end of each day (in the same way as the individual traders keep margin accounts with the broker).

2.(c)(ii) Find out NAV per unit from the following information of Scheme Money Plant [3]

Name of the scheme	Money Plant
Size of the scheme	**₹100 Lakhs**
Face value of the shares	**₹100**
Number of the outstanding shares	**₹1 Lakhs**
Market value of the fund's investments	**₹180 Lakhs**

Receivables	**₹2 Lakhs**
Liabilities	**₹1 Lakh**

Answer to 2(c)(ii):

Calculation of NAV per unit:

Particulars	Amount
Total Assets	Market Value of Fund's Investment = + Receivables = ₹ 180 Lakhs + ₹ 2 Lakhs = ₹ 182 Lakhs
Liabilities	₹ 1 Lakhs
No. of shares	1 Lakhs
Net Asset Value	(Total Assets + Receivables – Liabilities) / No. of shares =₹ (182 – 1) Lakhs/ 1 Lakhs =₹ 181.00

2.(d)(i) A petrochemical plant needs to process 10,000 barrels of oil in three months time. To hedge against the rising price the plant needs to go long on the futures contract of crude oil. The spot price of crude oil is ₹ 1,950 per barrel, while futures contract expiring three months from now is selling for ₹ 2,200 per barrel. By going long on the futures the petrochemical plant can lock-in the procurement at ₹ 2,200 per barrel. Assuming the size of one futures contract of 100 barrels, the firm buys 100 futures to cover its exposure of 10,000 barrels.
Find out the price that would be payable under two scenarios of rise in price to ₹ 2,400 or fall in price to ₹ 1,800 per barrel after three months. [4]

Answer to 2(d)(i):

Figures [in ₹/barrel)

Price after 3 months	**₹ 1,800/barrel**	**₹ 2,400/barrel**
Actual purchase price	1,950	1,950
Gain/loss on futures		
Bought futures at	2,200	2,200
Sold futures at	1,800	2,400
Profit/loss on futures	-400	+ 200
Effective Price (₹/barrel)	**2,200**	**2,200**

Here we observe that the loss in the physical position is offset by the gain in the futures position and vice versa. This results in effective price equal to the price of futures at the time of setting up the hedge.

2.(d)(ii) 'As the nation's financial regulator, the Reserve Bank handles a range of activities.'- List the activities. [4]

Answer to 2(d)(ii):

As the nation's financial regulator, the Reserve Bank handles a range of activities, including:

- Licensing;
- Prescribing capital requirements;
- Monitoring governance;
- Setting prudential regulations to ensure solvency and liquidity of the banks;
- Prescribing lending to certain priority sectors of the economy;
- Regulating interest rates in specific areas;
- Setting appropriate regulatory norms related to income recognition, asset classification, provisioning, investment valuation, exposure limits and the like;
- Initiating new regulation.

Question No. 3. (Answer **any two** questions. Each question carries **10 marks**)

3.(a)(i) Consider a trader who buys an European call option on British Pound with a strike price of $ 1.6500 and a premium of 2 cents ($0.020). The current spot rate is $ 1.6329. Calculate his gain/loss when the option expires if the spot rates are as follows. 1.6300, 1.6270, 1.6400, 1.6500, 1.6549, 1.6320, 1.6500, 1.6900, 1.7000. [6]

Answer to 3(a)(i):

Spot Rate	Premium	Payoff	Gain/Loss
1.6300	0.02	0	(0.02)
1.6270	0.02	0	(0.02)
1.6400	0.02	0	(0.02)
1.6500	0.02	0	(0.02)
1.6549	0.02	0.0049	(0.0151)
1.6320	0.02	0	(0.02)
1.6500	0.02	0	(0.02)
1.6900	0.02	0.04	0.02
1.7000	0.02	0.05	0.03

3.(a)(ii) Write a note on the process of Dematerialisation. [4]

Answer to 3 (a)(ii):

In order to dematerialise physical securities one has to fill in a DRF (Demat Request Form) which is available with the DP and submit the same along with physical certificates that are to be dematerialised. Separate DRF has to be filled for each ISIN. The complete process of dematerialisation is outlined below:

- Surrender certificates for dematerialisation to your DP.
- DP intimates to the Depository regarding the request through the system.
- DP submits the certificates to the registrar of the Issuer Company.
- Registrar confirms the dematerialisation request from depository.
- After dematerialising the certificates, Registrar updates accounts and informs depository regarding completion of dematerialisation.
- Depository updates its accounts and informs the DP.
- DP updates the demat account of the investor.

3.(b)(i) Unitech DLS's, international transfer of funds amounts to US $20 Lakhs monthly. Presently the average transfer time is 10 days. It has been proposed that the transfer of funds be turned over to one of the larger international banks, which can reduce the transfer time to an average of two days. A charge of 0.5% of the volume of transfer has been proposed for this service. In view of the fact that the firm's opportunity cost of funds is 12%, should this offer be accepted? [4]

Answer to 3 (b)(i):

Effective Yield on Saving

Period Saved = 10 Days **Less** 2 Days	8 Days
Cost of Funds	12%p.a.
Percentage Yield for the period saved (8/365 x 12%p.a.)	0.263%

Evaluation

(i) The cost of international transfer of 0.5% is more than the amount of interest saved at 0.263% i.e. more by around 0.237%. Therefore, prima facie the Company should not opt for the proposal of transferring through International Bank.

(ii) However, saving in time also reduces the exposure of funds to various foreign exchange risks. The Company has to consider the effect of such exposure and decide on the proposal of the International Bank. If expected cost of such exposure is more than 0.237%, then the Company should go for transfer through International Banks.

3.(b)(ii) You as a dealer in foreign exchange have the following position in Swiss Francs on 31.10.2013-

Particulars	SFr.	Particulars	SFr.
Balance in the Nostro A/c Credit	1,00,000	Forward purchase contract cancelled	30,000
Opening Position Over bought	50,000		
Purchased a bill on Zurich	80,000	Remitted by TT	75,000
Sold forward TT	60,000	Draft on Zurich cancelled	30,000

What steps would Mr. Sen take, if he required maintaining a credit balance of S Fr. 30,000 in the? [6]

Answer to 3 (b)(ii):

Particulars	Sw. Frcs	Particulars	Sw.Frcs
To Balance b/d	50,000	By Sales of Forward TT	60,000
To Purchase of Bill on Zurich	80,000	By Forward Purchase Contract	
To Cancellation of Draft	30,000	Cancellation	30,000
To Buy Spot TT (Nostro)	5,000	By Remittance by TT (Nostro)	75,000
To Buy Forward (To maintain Balance)	10,000	By Balance c/ d (Given)	10,000
	1,75,000		**1,75,000**

Dr. Nostro Account Cr.

Particulars	Sw. Frcs	Particulars	Sw. Frcs
To Overbought Remittance	75,000	By Balance b/d	1,00,000
To Balance c/d	30,000	By Buy Spot TT (To maintain Balance)	5,000
	1,05,000		**1,05,000**

Courses of Action

The Bank has to buy spot TT Sw. Fcs. 5,000 to increase the balance in Nostro Account to Sw. Fcs. 30,000.

Since the bank requires an overbought position of Sw. Fes. 10,000, it has to buy forward Sw. Fcs. 10,000.

3 (c)(i). A company has borrowed $200 million on floating basis for 3 years. The interest rates are reset every year. The spread over LIBOR is 25 bps. The company buys a 3 year cap on a 1-year LIBOR with a strike rate of 9% and having a face value of $200 million. The cap carries a premium of 2% of face value or $4 million. Current 1 year LIBOR is 9%. If the LIBOR at the end of 1,2 and 3 years are 9.5% 8.5% and 10%. What is the cash flow from cap each year? Amortize premium equally over three years. [7]

Answer to 3(c)(i):

The strike rate of the cap is Libor which is currently 9%. Since the spread over Libor is 25 bps, the interest rate applicable on the borrowing would be 9.75%, 8.75% & 10.25% respectively for the three years. Thus the interest payable in amount terms over three years would be $1,95,00,000, $1,75,00,000 and $2,05,00,000 respectively. Now, the premium paid for buying this cap is $4 million. As given in the problem equal amortization would involve $ 13,33,333 each year. The seller of the cap would part with the difference whenever Libor is above the strike price. Therefore we can construct the cash flow table as follows:

Time	Cash Flow Loan	Amortization of premium	Cash Flow from Cap	Total
0	+ 20,00,00,000	—	—	+ 20,00,00,000
1	– 1,95,00,000	– 13,33,333	+10,00,000	– 1,98,33,333
2	– 1,75,00,000	– 13,33,333	—	– 1,88,33,000
3	– 2,05,00,000	– 13,33,333	+20,00,000	– 1,98,33,333
3	– 20,00,00,000	—	—	– 20,00,00,000

3 (c)(ii). State the types of credit risk. [3]

Answer to 3(c)(ii):

Credit risk can be classified in the following way:

- **Credit default risk -** The risk of loss arising from a debtor being unlikely to pay its loan obligations in full or the debtor is more than 90 days past due on any material credit obligation; default risk may impact all credit-sensitive transactions, including loans, Securities and derivatives.
- **Concentration risk -** The risk associated with any single exposure or group of exposures with the potential to produce large enough losses to threaten a bank's core operations. It may arise in the form of single name concentration or industry concentration.
- **Country risk -** The risk of loss arising from sovereign state freezing foreign currency payments (transfer/conversion risk) or when it defaults on its obligations (sovereign risk).

Question No. 4. (Answer **any two** questions. Each question carries **8 marks**)

4 (a). A Study by a Mutual Fund has revealed the following data in respect of the three securities:

Security	σ (%)	Correlation with Index, ρ_{sm}
P	**20**	**0.66**
Q	**18**	**0.95**
R	**12**	**0.75**

The Standard Deviation of the Market Portfolio (BSE Sensex) is observed to be 18%.

(1) What is the sensitivity of returns of each stock with respect to the market?

(2) What are the Co-variances among the various stocks?

(3) What would be the risk of portfolio consisting of all the three stocks equally?

(4) What is the beta of the portfolio consisting of equal investment in each stock?

[1+2+4+1]

Answer to 4 (a):

(1) Sensitivity

Security		P	Q	R
Standard Deviation	[A]	20.00	18.00	12.00
Correlation to Market Portfolio	[B]	0.66	0.95	0.75
Beta (Sensitivity) = [A] X [B] / σ_M		**0.73**	**0.95**	**0.50**

(2) Covariance between the securities

$$\text{Covariance of Returns between the securities P and Q} = Cov_{PQ} = \beta_P \times \beta_Q \times \sigma_M^2$$

Securities		P	Q	R
	Beta	**0.73**	**0.95**	**0.50**
P	0.73	—	0.73 ×0.95 × 324	0.73 0.5 ×0 × 324
Q	0.95	0.73 ×0.95 × 324	—	0.50 × 0.95 × 324
R	0.50	0.73 0.5 ×0 × 324	0.50 × 0.95 × 324	—
Covariance Between		**Computation**		
P and Q		β_P x β_Qx σ^2_M = 0.73 × 0.95 × 324 = 224.69		

P and R	$\beta_P \times \beta_R \times \sigma^2_M = 0.73 \times 0.50 \times 324 = 118.26$
Q and R	$\beta_Q \times \beta_R \times \sigma^2_M = 0.95 \times 0.50 \times 324 = 153.90$

(3) Risk of the Portfolio consisting of Equal Investment in each stock Matrix

Securities		**P**	**Q**	**R**
	Weights	1/3 W_P	1/3 W_Q	1/3 W_R
P	1/3 W_P	400 (σP^2)	224.69 (Cov_{PQ})	118.26 (Cov_{PR})
Q	1/3 W_Q	224.69 (Cov_{PQ})	324 (σQ^2)	153.90 (Cov_{QR})
R	1/3 W_R	118.26 (Cov_{PR})	153.90 (Cov_{QR})	144 (σR^2)

Computation of Portfolio Variance $(\sigma_{PQR})^2$

	Description	**Computation (W x W x Cov) or (W x W x σ^2)**	**Product**
1	$W_P \times W_P \times \sigma_P^2$	1/3 x 1/3 x 400	44.44
2	$W_P \times W_Q \times Cov_{PQ}$	1/3 x 1/3 x 224.69	24.97
3	$W_P \times W_R \times Cov_{PR}$	1/3 x 1/3 x 118.26	13.14
4	$W_Q \times W_P \times Cov_{PQ}$	1/3 x 1/3 x 224.69	24.97
5	$W_Q \times W_Q \times \sigma_Q^2$	1/3 x 1/3 x 324	36.00
6	$W_Q \times W_R \times Cov_{QR}$	1/3 x 1/3 x 153.90	17.10
7	$W_R \times W_P \times Cov_{PR}$	1/3 x 1/3 x 118.26	13.14
8	$W_R \times W_Q \times Cov_{QR}$	1/3 x 1/3 x 153.90	17.10
9	$W_R \times W_R \times \sigma_R^2$	1/3 x 1/3 x 144	16
	Variance of the Portfolio $(\sigma_{PQR})^2$		**206.86**
	Standard Deviation (Risk) of the Portfolio (σ_{PQR})		**14%**

(4) Beta of the Portfolio consisting of equal investment in each stock

Security	**P**	**Q**	**R**
a) Beta	0.73	0.95	0.50
b) Weight	1/3	1/3	1/3
c) Product	0.243	0.317	0.167

Portfolio Beta = 0.243+0.317+0.167 = 0.727

4.(b)(i) Securities X and Y have standard deviations of 3% and 9%. Nitin is having a surplus of ₹20 Lakhs for investment in these two securities. How much should he invest in each of these securities to minimize risk, if the correlation co-efficient for X and Y is — (i) -1; (ii) -0.30; (iii) 0; (iv) 0.60 [5]

Answer to 4(b)(i):

(i) Basic Values of Factors for Determination of Portfolio Risk

Standard Deviation of Security X	σX	3%
Standard Deviation of Security Y	σY	9%
Correlation co-efficient of Securities X and Y	ρXY	-1,- 0.30, 0,0.60
Weight of Security X	W_X	a
Weight of Security Y	W_Y	1-a

(ii) Computation of Investment in Securities

$$\text{Proportion of Investment in Security X, } W_X = \frac{\sigma Y^2 - Cov_{XY}}{\sigma X^2 + \sigma Y^2 - 2Cov_{XY}}$$

Proportion of Investment in Security Y, $W_Y = 1 - W_X$

$$Cov_{XY} = \rho XY \times \sigma X \times \sigma Y$$

If ρXY is	Cov_{XY} is	Computation	Investment
-1	-27 (-1x3x9)	$W_X = [\sigma Y^2 - Cov_{XY}]\ [\sigma X^2 + \sigma Y^2 - 2Cov_{XY}]$ $W_X = [9^2 - (-27)]\ [3^2 + 9^2 - 2 \times (-27)]$ $W_X = [81 + 27]\ [9 + 81 + 54]$ $W_X = 108/144 = 0.75$	0.750 in X 0.250 in Y ₹15,00,000 in X ₹5,00,000 in Y
-0.3	-8.1 (-0.3x3x9)	$WX = [\sigma Y^2 - Cov_{XY}]\ [\sigma X^2 + \sigma Y^2 - 2Cov_{XY}]$ $WX = [92 - (-8.1)]\ [32 + 92 - 2 \times (-8.1)]$ $WX = [81 + 8.1]\ [9 + 81 + 16.2]$ $WX = 89.1 / 106.2 = 0.839$	0.839 in X 0.161 in Y ₹16,78,000 in X ₹3,22,000 in Y
0	0 (0x3x9)	$WX = [\sigma Y^2 - Cov_{XY}]\ [\sigma X2 + \sigma Y2 - 2Cov_{XY}]$ $WX = [92 - 0]\ [32 + 92 - 2 \times 0]$ $WX = [81 - 0]\ [9 + 81 - 0]$ $WX = 81/90 = 0.90$	0.900 in X 0.100 inY ₹ 18,00,000 in X ₹ 2,00,000 in Y
0.60	16.2 (0.6 x 3 x 9)	$WX = [\sigma Y^2 - Cov_{XY}]\ [\sigma X2 + \sigma Y2 - 2Cov_{XY}]$ $WX = [92 - 16.2]\ [32 + 92 - 2 \times 16.2]$ $WX = [81 - 16.2]\ [9 + 81 - 32.4]$ $WX = 64.8 / 57.60 = 1.125 > 1$ At this correlation level, risk reduction is not possible.	Reducing Risk below 3% is not possible.

4.(b)(ii) Discuss the techniques used in company analysis. [3]

Answer to 4(b)(ii):

Techniques Used in Company Analysis:

(1) Correlation & Regression Analysis: Simple regression is used when inter relationship covers two variables. For more than two variables, multiple regression analysis is followed. Here the inter relationship between variables belonging to economy, industry and company are found out. The same is quantified using the correlation co-efficient between the variables and standard deviation of the variables.

(2) Time Series and Trend Analysis: A Trend line or characteristic line is drawn using the method of least squares to identify and extrapolate the trend obtained based on a given Time Series.

(3) Decision Tree Analysis: This involves the use of probability to find out the expected value arising out a given course of action. In this method various probabilities arc assigned to states of nature and the expected value of a given course of action is determined.

4.(c)(i) Calculate the market sensitivity index and the expected return on the Portfolio from the following data;

Standard deviation of an asset	**4.5%**
Market standard deviation	**4.0%**
Risk – free rate of return	**15.0%**
Expected return on market Portfolio	**17.0%**
Correlation coefficient of Portfolio with market	**0.89**

What will be the expected return on the Portfolio? If Portfolio beta is 0.5 and the risk free return is 10%. [2+1]

Answer to 4(c)(i):

Computation of Expected Return

	Case (a)	Case (b)
Portfolio Beta $\beta_P = \sigma_P \div \sigma_M \times \rho_{MP}$	$4.5 \div 4 \times 0.89 = 1.001$	0.5
Exacted Return = $R_F + \beta_P \times (R_M - R_F)$	0.15 + [1.001 x (0.17 - 0.15)] = 17.002%	0.10 +[0.5x(0.17 - 0.10)] = 13.5%

4.(c)(ii) 'Systematic Risk arises out of external and uncontrollable factors, which are not specific to a security or industry to which such security belongs.'- Justify. [5]

Answer to 4(c)(ii):

Systematic Risk: It arises out of external and uncontrollable factors, which are not specific to a security or industry to which such security belongs. It is that part of risk caused by factors that affect the price of all the securities. Systematic Risk cannot be eliminated by diversification.

(1) Market Risk:

- These are risks that are triggered due to social, political and economic events. Example: When CBDT issued a draft circular on how to treat income from trading in shares, whether as Capital Receipts or Business Receipts, the stock prices fell down sharply, across all sectors.
- These risks arises due to changes in demand and supply, expectations of the investors, information flow, investor's risk perception, etc. consequent to the social, political or economic events.

(2) Interest Rate Risk:

- Uncertainty of future market values and extent of income in the future, due to fluctuations in the general level of interest, is known as Interest Rate Risk.
- These are risks arising due to fluctuating rates of interest and cost of corporate debt. The cost of corporate debt depends on the interest rates prevailing, maturity periods, credit worthiness of the borrowers, monetary and credit policy of RBI, etc.

(3) Purchasing Power Risk: Purchasing Power Risk is the erosion in the value of money due to the effects of inflation.

Question No. 5. (Answer **any two** questions. Each question carries **10 marks**)

5. (a) A company is considering two mutually exclusive projects X and Y. Project X costs ₹3,00,000 and Project Y ₹3,60,000. You have been given below the net present value, probability distribution for each project:

Project X		Project Y	
NPV Estimate	**Probability**	**NPV Estimate**	**Probability**
₹		₹	

30,000	**0.1**	**30,000**	**0.2**
60,000	**0.4**	**60,000**	**0.3**
1,20,000	**0.4**	**1,20,000**	**0.3**
1,50,000	**0.1**	**1,50,000**	**0.2**

(1) Compute the expected net present value of Projects X and Y.

(2) Compute the risk attached to each project i.e., Standard Deviation of each probability distribution.

(3) Which project do you consider more risky and why?

(4) Compute the profitability index of each project. **[4+2+2+2]**

Answer to 5 (a):

Project X

NPV Estimate	Probability	NPV Estimate x Probability	Deviation from Expected NPV i.e. ₹ 90,000	Square of the deviation	Square of the deviation x Probability
₹		₹		₹	₹
30,000	0.1	3,000	60,000	36,00,000,000	3,60,000,000
60,000	0.4	24,000	30,000	9,00,000,000	3,60,000,000
1,20,000	0.4	48,000	-30,000	9,00,000,000	3,60,000,000
1,50,000	0.1	15,000	-60,000	36,00,000,000	3,60,000,000
Expected NPV		90,000			14,40,000,000

Project Y

NPV Estimate	Probability	NPV Estimate x Probability	Deviation from Expected NPV i.e. ₹ 90,000	Square of the deviation	Square of the deviation x Probability
₹		₹		₹	₹
30,000	0.2	6,000	60,000	36,00,000,000	7,20,000,000

60,000	0.3	18,000	30,000	9,00,000,000	2,70,000,000
1,20,000	0.3	36,000	-30,000	9,00,000,000	2,70,000,000
1,50,000	0.2	30,000	-60,000	36,00,000,000	7,20,000,000
Expected NPV		90,000			19,80,000,000

(1) The expected net present value of Projects X and Y is ₹ 90,000 each.

(2) Standard Deviation = $\sqrt{\text{Square of the deviation} \times \text{probability}}$

In case of Project X: Standard Deviation = $\sqrt{₹14,40,000,000}$

= ₹ 37,947

In case of Project Y: Standard Deviation = $\sqrt{₹19,80,000,000}$

= ₹ 44,497

(3) Coefficient of variation = $\frac{\text{standard deviation}}{\text{Expected net present value}}$

$$\text{In case of Project X : Coefficient of variation} = \frac{37,947}{90,000} = 0.42$$

$$\text{In case of Project Y : Coefficient of variation} = \frac{44,497}{90,000} = 0.4944 \text{ or } 0.50$$

Project Y is riskier since it has a higher coefficient of variation.

(4) Profitability index = $\frac{\text{Discounted cash inflow}}{\text{Discounted cash outflow}}$

$$\text{In case of Project X : Profitability Index} = \frac{90,000 + 3,00,000}{3,00,000} = 1.30$$

$$\text{In case of Project Y : Profitability Index} = \frac{90,000 + 3,60,000}{3,60,000} = \frac{4,50,000}{3,60,000} = 1.25$$

5.(b)(i) Determine the risk adjusted net present value of the following projects: [5]

	A	B	C
Net cash outlays (₹)	**1,00,000**	**1,20,000**	**2,10,000**
Project life	**5 years**	**5 years**	**5 years**
Annual cash inflow (₹)	**30,000**	**42,000**	**70,000**

Coefficient of variation	0.4	0.8	1.2

The company selects the risk-adjusted rate of discount on the basis of the co-efficient of variation:

Coefficient of variation	Risk adjusted rate of discount	Present value factor 1 to 5 years at risk adjusted rate of discount
0.0	10%	3.791
0.4	12%	3.605
0.8	14%	3.433
1.2	16%	3.274
1.6	18%	3.127
2.0	22%	2.864
More than 2.0	25%	2.689

Answer to 5(b)(i):

Statement showing the determination of the risk adjusted net present value

Projects	Net cash outlays	Coefficient of variation	Risk adjusted discount rate	Annual cash inflow	PV factor 1-5 years at risk adjusted rate of discount	Discounted cash inflow	Net present value
	₹			₹	₹	₹	₹
(I)	(ii)	(iii)	(iv)	(v)	(vi)	(vii) = (v) x (vi)	(viii) = (vii) - (ii)
A	1,00,000	0.4	12%	30,000	3.605	1,08,150	8,150
B	1,20,000	0.8	14%	42,000	3.433	1,44,186	24,186
C	2,10,000	1.20	16%	70,000	3.274	2,29,180	19,180

5.(b)(ii) List the advantages of Project Report. **[5]**

Answer to 5(b)(ii):

Advantages of a Project Report –

(1) A Project Report lists the objective in various spheres of business and evaluates them from the right perspective.

(2) Facilitates planning of business by setting guidelines for future action. The successful implementation of a project depends upon the line of action as suggested in the project

report. Besides, comparison of results will depend upon the projected profitability and cash flows, production schedule and targets as laid down in the project report.

(3) Identifies constraints on resources viz. manpower, equipment, financial and technological etc. well in advance to take remedial measures in due course of time.

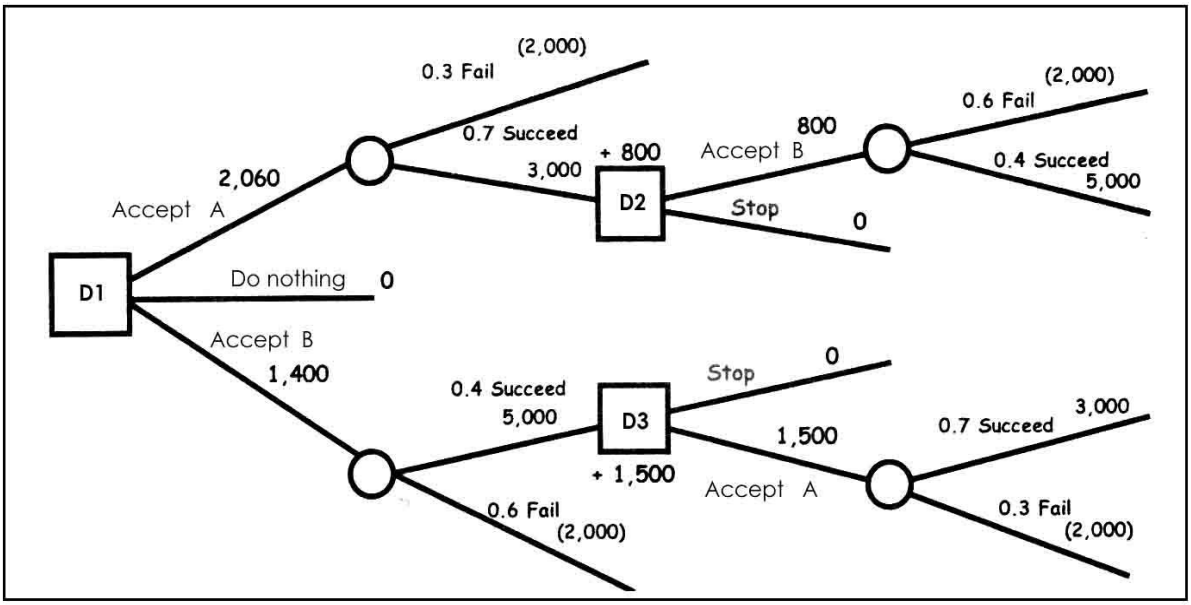
(4) Helps in procuring finance from various financial institutions and banks which ask for such detailed information before giving any assistance.

(5) Provides a framework of the presentation of the information regarding business required by Government for granting licenses, etc.

5. (c) Mr. Samik, a business man has two independent investments A and B available to him: but he lacks the capital to undertake both of them simultaneously. He can choose to take A first and then stop, or if A is successful then take B, or vice versa. The probability of success on A is 0.7, while for B it is 0.4. Both investment require an initial capital outlay of ₹ 2,000, and both return nothing if the venture is unsuccessful. Successful completion of A will return ₹ 3,000 (over cost), and successful completion of B will return ₹ 5,000 (over cost). Draw the decision tree and determine the best strategy. [4+6]

Answer to 5(c):

(a) The required decision tree is as shown below:



There are three decision points in this tree. These are indicated as 1, 2 and 3.

Evaluation of decision point 3:

I. Accept A **(₹)**

Outcome	Probability	Conditional Values	Expected Values
Success	0.7	3,000	2,100
Failure	0.3	(2,000)	(600)
			1,500

II. Stop: Expected Value = 0

Evaluation of decision point 2:

I. Accept B **(₹)**

Outcome	Probability	Conditional Values	Expected Values
Success	0.4	5,000	2,000
Failure	0.6	(2,000)	(1,200)
			800

II. Stop: Expected Value = 0

Evaluation of decision point 1:

I. Accept A **(₹)**

Outcome	Probability	Conditional Values	Expected Values
Success	0.7	3,000+800	2,660
Failure	0.3	(2,000)	(600)
			2,060

II. Accept B **(₹)**

Outcome	Probability	Conditional Values	Expected Values
Success	0.4	5,000+1,500	2,600
Failure	0.6	(2,000)	(1,200)
			1,400

III. Do Nothing: Expected Value = 0

Hence, the best strategy is to accept A first, and if it is successful, then accept B.