PAPER-14: ADVANCED FINANCIAL MANAGEMENT

The following table lists the learning objectives and the verbs that appear in the syllabus learning aims and examination questions:

	Learning objectives	Verbs used	Definition
LEVEL C	KNOWLEDGE What you are expected to know	List	Make a list of
		State	Express, fully or clearly, the details/facts
		Define	Give the exact meaning of
	COMPREHENSION What you are expected to understand	Describe	Communicate the key features of
		Distinguish	Highlight the differences between
		Explain	Make clear or intelligible/ state the meaning or purpose of
		Identity	Recognize, establish or select after consideration
		Illustrate	Use an example to describe or explain something
	APPLICATION How you are expected to apply your knowledge	Apply	Put to practical use
		Calculate	Ascertain or reckon mathematically
		Demonstrate	Prove with certainty or exhibit by practical means
		Prepare	Make or get ready for use
		Reconcile	Make or prove consistent/ compatible
		Solve	Find an answer to
		Tabulate	Arrange in a table
	ANALYSIS How you are expected to analyse the detail of what you have learned	Analyse	Examine in detail the structure of
		Categorise	Place into a defined class or division
		Compare and contrast	Show the similarities and/or differences between
		Construct	Build up or compile
		Prioritise	Place in order of priority or sequence for action
		Produce	Create or bring into existence
	SYNTHESIS How you are expected to utilize the information gathered to reach an optimum conclusion by a process of reasoning	Discuss	Examine in detail by argument
		Interpret	Translate into intelligible or familiar terms
		Decide	To solve or conclude
	EVALUATION How you are expected to use your learning to evaluate, make decisions or recommendations	Advise	Counsel, inform or notify
		Evaluate	Appraise or asses the value of
		Recommend	Propose a course of action

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) The capital of Khan Ltd. Is as follows:

9% preference shares of ₹10 each	**₹ 3,00,000**
Equity shares of ₹10 each	**₹ 8,00,000**

Following further information is available:

Profit after Tax	**₹ 2,70,000**
Equity Dividend paid	**20%**
The market price of equity shares	**₹ 40 each**

Calculate the EPS and PE ratio of Khan Ltd. **[2]**

Answer to (a):

$$EPS = \frac{PAT - Preferece\ Dividend}{No.\ of\ Equity\ Share}$$
$$= \frac{₹2,70,000 - ₹27,000}{80000}$$
$$= ₹3.04$$

$$P\ E\ Ratio = \frac{Market\ Price}{EPS}$$
$$= \frac{40}{3.04}$$
$$= 13.16$$

(b) 'Can all NBFCs accept deposits'- Justify. **[2]**

Answer to (b):

All NBFCs are not entitled to accept public deposits. Only those NBFCs to which the Bank had given a specific authorisation are allowed to accept/hold public deposits.

(c) Yau have ₹ 10,000 to invest in a stock portfolio. Your choices are Stock X with an expected return of 18% and Stock Y with an expected return of 11%. If your goal is to create a portfolio with an expected return of 16.5%, how much money will you invest in Stock X and in Stock Y? [2]

Answer to (c):

We have $Ep = W_1E_1+W_2E_2+W_3E_3+\ldots\ldots\ldots\ldots W_nE_n$

Let w_x & $1 - w_x$ be the ratio of investment in Stock X and Stock Y

Therefore, $E[R_p] = 0.1650$ (Given) $= 0.18w_x+0.11(1 - w_x)$; $w_x = 0.7857$

Thus, investment in X = 0.7857 × (₹10,000) = ₹7,857;

& investment in Y = (1 – 0.7857) × (₹10,000) = ₹ 2,143

(d) A call option is selling for ₹ 6 when the share price is ₹ 54 and the exercise price is ₹ 64, is there an arbitrage opportunity? If yes, show how it works. [2]

Answer to (d):

The arbitrageur will purchase 1 share by paying ₹54. He will then sell a call option & receive ₹6.

∴ Net cost = (₹54 - ₹6) = ₹48

If the call is exercised at ₹64, arbitrage gain (maximum) = ₹64 - ₹48 = 16.

He should also place a stop loss at ₹ 48.

(e) State the term "Buy on Close" and "Buy on Opening" in commodity market. [2]

Answer to (e):

Buy on Close: - To buy at the end of trading session at the price within the closing range.

Buy on opening: - To buy at the beginning of trading session at a price within the opening range.

(f) From the following rates, determine ₹/Canadian $ exchange rate: [2]

₹/US $: ₹47.7568/47.9675

Canadian $/US$: 1.5142/1.5450

Answer to (f):

₹/Canadian $ Bid = (₹/US $) Bid × (US $ /Canadian $)Ask

= ₹47.7568 × 1/(1.5450)

= ₹ 30.9106

(₹/Canadian $) Ask = (₹US $) Ask × (US #$/Canadian $) Bid

= ₹47.9675 × 1/(1.5142)

= ₹ 31.6784

₹/Canadian Exchange Rate is ₹30.9106 - ₹ 31.6784 = ₹ 31.6784

(g) Calculate the price at which a T- Bill maturing on 23rd March 2015 would be valued on July 13, 2014 at a yield of 6.8204%. [2]

Answer to (g):

The formula for calculation of yield of a T-Bill is $Y = \left(\frac{F - P}{P}\right) \times \frac{365}{M} \times 100$

Here P=?, F=100, M= 253 days [period from 13/07/14 to 23/3/15 - remember exclude the maturity date]

$6.8204 = \left(\frac{100 - P}{P}\right) \times \frac{365}{253} \times 100$ Solving we get P = ₹95.4858

(h) An investor wrote a naked call option. The premium was ₹ 2.50 per share and the market price and exercise price of the share are ₹ 37 and ₹ 41 respectively. The contract being for 100 shares, calculate the amount of margin under First Method, which is required to be deposited with the clearing house. [2]

Answer to (h):

Margin = (Option premium × 100) + {100 × 0.20 (market value of the share)} – {100 × (Exercise price – market price)}
= (2.50 × 100) + {100 × (0.20 × 37)} – 100 × (41 – 37) = ₹ 590

(i) Zoom International Ltd. Issued 1,00,000, 14% debentures of ₹100 each, redeemable after 5 years at ₹ 110 each. The commission payable to under writers and brokers is 10%. Calculate the after-tax cost of debt, assuming a tax rate of 45%. [2]

Answer to (i):

$$K_d = \frac{I(1-t) + \left(\frac{F-P}{n}\right)}{\left(\frac{F+P}{n}\right)}$$

$$= \frac{14(1-0.45) + \left(\frac{110-(100-10)}{5}\right)}{\left(\frac{110+90}{2}\right)}$$

=11.7%

(j) The beta of stock of S Ltd. Is 2.0 and is currently in equilibrium. The required rate of return on the stock is 12% and the expected return on the market is 10%. Suddenly due to changes in the economic conditions, the expected return on the market increases to 12%. Other things remaining the same, calculate the new required rate of return on the stock. [2]

Answer to (j):

Given $\beta = 2.0$, $k = E(R_s) = 12\%$, $R_M = 10\%$
As per CAPM:
$12 = R_f + 2\ (10 - R_f)$
$12 = R_f + 20 - 2R_f$
$R_f = 20 - 12$
$R_f = 8\%$
If R_M increases to 12%, the equation tell us that $E(R_s) = 16\%$

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

2 (a)(i). The following data is given about the two mutual funds viz. SB Multi cap Fund & FT Flexi cap Fund. Assuming that Mr. X is an investor wants to invest in one of these, which he should prefer, if this fund is going to be:

I. His entire investment
II. One of the many portfolios in his entire investment **[3+3]**

	SB Multi cap Fund	FT Flexi cap Fund
Average Return	**2.76%**	**7.56%**
Beta	**0.69**	**1.40**
Standard Deviation	**6.17%**	**14.89%**
Sharpe Measure	**0.45**	**0.51**
Treynor Measure	**4.00**	**5.40**
Alpha	**1.63**	**5.28**

Answer to 2(a)(i):

Let us first understand the portfolio and its performance before we advise Mr. X.

It appears that FT Flexi cap Fund is more aggressive than SB Multi cap Fund, because it has higher beta (1.4 Vs 0.69). Secondly FT has high total risk because it has higher standard deviation (14.89% Vs 6.17%). Both funds outperformed the benchmark market index, as can be seen positive alphas.

Now as far as the advice is concerned it is important whether Mr. X is going to hold this fund as only one in his entire investment or one in many investments. If the chosen fund is going to be his only investment, then the correct measure for judgment is the Sharpe measure. It is better to hold a diversified portfolio, i.e. the one which has higher Sharpe measure. Therefore he should prefer FT.

If the chosen fund is going to be one of many in his entire investment, then the correct measure for judgment is the Treynor measure. Still FT is a better choice because it has a higher Treynor measure (5.40 Vs 4.00) indicating higher return per unit of systematic risk. Secondly it has a higher positive alpha indicating superior performance of the fund manager vis-à-vis SB.

2 (a)(ii). Mr. Anil purchased a commercial paper of Zenith Inc. issued for 6 months in the market for ₹ 9,61,000. The company issued the CP with a face value of ₹10,00,000. Determine the rate of return which Mr. Anil earns. [2]

Answer to 2(a)(ii):

Rate of return = $\left(\frac{F - P}{P}\right) \times \frac{12}{M} \times 100$

Given F = ₹10 lakhs, P = ₹9.61 lakhs, M = 6 months

Therefore the yield to issuer = Return of Mr. Anil = 8.11%

2(b)(i). A mutual fund made an issue of 10,00,000 units of ₹10 each on January 01, 2014. No entry load was charged. It made the following investments:

	₹
5,000 Equity shares of ITC @ ₹250	**12,50,000**
100,000 Equity shares of Sabero Organics @ ₹75	**75,00,000**
8% Government Securities	**12,50,000**
	1,00,00,000

During the year, dividends of ₹12,00,000 were received on equity shares. Interest on G – Sec was received as and when due. At the end of the year equity shares of ITC and Sabero are quoted at ₹300 and ₹100 respectively. Other investment is at par.

Find out the Net Asset Value (NAV) per unit given that operating paid during the year amounted to ₹5,00,000.

Also find out the NAV, if the Mutual fund had distributed a dividend of Re. 0.55 unit during the year to the unit holders. [5+1]

Answer to 2(b)(i):

We can find NAV using the formula:

NAV =

$$\frac{\text{Market Value of Investments} + \text{Receivable} + \text{AccruedIncome} - \text{Liabilities} - \text{Accrued expense}}{\text{Number of Shares / Units outstanding}}$$

Value of Investments: **Amount in ₹lakhs**

ITC	5000 × 300	15
Sabera Organiscs	100000 × 100	100
G- Secs	At par	12.50
Total		**127.50**
Dividends received		12
Interest Income	8% × 12,50,000	1
Operating Expenses		5

Using the above formula we get, NAV = ₹135.5/10 = ₹13.55 per unit

Post dividend of 0.55, the Ex- Dividend NAV = ₹13.55 – ₹0.55 = ₹13.00 per unit

2(b)(ii). State Debt Financing by Indian Commercial Banks. [2]

Answer to 2(b)(ii):

Many Indian banks such as SBI, IDBI, and PNB give loan for infrastructure financing. Indian government has legalized few banks in country to issue debt for infrastructure financing in urban area. These loans are easily available but contain complex procedure, as for banks there are high default risk involves.

Moreover one more disadvantage with commercial banks loan is high interest rates which discourage investors to raise money from these resources.

2(c)(i). From the following particulars, calculate the effective rate of interest p.a. as well as the total cost of funds to Bhaskar Ltd., Which is planning a CP issue:

Issue price of CP	**: ₹97,550**
Face Value	**: ₹1,00,000**
Maturity Period	**: 3 Months**
Issue Expenses	**:**
Brokerage	**: 0.15% for 3 months**
Rating Charges	**: 0.50% p.a.**
Stamp Duty	**: 0.175% for 3 months**

[1+3]

Answer to 2(c)(i):

$$\text{Effective interest} = \left(\frac{F - P}{P}\right) \times \frac{12}{M} \times 100$$

Substituting the given values of F, P and M we get,

$$\text{Effective Interest} = \left(\frac{1,00,000 - 97,550}{97,550}\right) \times \frac{12}{3} \times 100 = 10.05\%$$

Cost of funds to the company

Effective interest rate	= 10.05%
Brokerage (0.15 × 4)	= 0.6%
Rating charges	= 0.5%
Stamp duty (0.175 × 4)	= 0.75%
Total cost of Funds to Bhaskar Ltd.	= 11.9% p.a.

2(c)(ii). List the functions of Forward Market Commission of India. [4]

Answer to 2(c)(ii):

Functions of Forward Market Commission of India:

(a) To advice the Central Government in respect of the recognition or withdrawal of recognition from any association. It also advices government about any other matter arising out of the administration of this act.

(b) Second function of the act includes the task of keeping forward market s under observation and take necessary actions. The actions taken should be according to powers given to the commission by the "Forward Contract Regulation Act".

(c) To collect information regarding the trading conditions in respect of goods (to which any of the provisions of this Act is made applicable) including information regarding supply, demand and prices. And publish information whenever the Commission thinks it necessary, It also performs the task of submitting to the Central Government periodical reports on the operation of this Act and on the working of forward markets relating to such goods.

(d) To make recommendations generally with a view to improving the organization and working of forward markets

(e) To undertake the inspection of the accounts and other documents of [any recognized association or registered association or any member of such association] whenever it considers it necessary.

(f) To perform such specified duties and exercise assigned powers by the "Forward Contract Regulation Act".

2.(d) (i) Orange purchased 200 units of Oxygen Mutual Fund at ₹45 per unit on 31st December, 2013. In 2014, he received ₹1.00 as dividend per unit and a capital gains distribution of ₹2 per unit.

Required:

I. Calculate the return for the period of one year assuming that the NAV as on 31st December, 2014 was ₹48 per unit.

II. Calculate the return for the period of one year assuming that the NAV as on 31st December, 2014 was ₹48 per unit and all dividends and capital gains distributions have been reinvested at an average price of ₹46.00 per unit.

Ignore taxation. **[2+4]**

Answer to 2(d)(i):

(i) Return for the period of 1 year (all changes on a per unit basis):

Change in NAV (₹48 – ₹45)	= ₹3.00
Dividends received	1.00
Capital gains distributions	2.00
Total return	₹6.00
Holding period return in % = Return/Investment	₹6/45 = 13.33%

(ii) When all dividends and capital gains distributions are reinvested into additional units of the fund (₹46/unit):

Dividends and capital gains per unit: ₹1.00 + ₹2.00	= ₹3.00
Total received from 200 units: ₹3.00 × 200	= ₹600.00

Additional units acquired: ₹600/rs.46.00 = 13.043 units

Total units after re- investment = 200.000 + 13.043 = 213.043

Value of 213.043 units held at end of year = 213.043 units × ₹48 = ₹10,226.06

Price paid for 20 units = 200 units × ₹45.00 = ₹9,000

At beginning of year

Thus, the holding period return would be: = (10,226.06 – 9,000)/9,000 = 13.62%

2.(d)(ii) State the two main distinguishing features of Project Finance compared to Corporate Finance. [2]

Answer to 2 (d)(ii):

Two main distinguishing features of Project Finance compared to Corporate Finance are:

I. Enhanced verifiability of cash flows: Due to contractual agreements possible because of a single, discrete project in legal isolation from the sponsor and the resultant absence of future growth opportunities in the Project Financed Company. Since Corporate Finance involves a multitude of future and current projects the same contractual agreements cannot be effected in Corporate Finance Company, and

II. Lack of sponsors' assets and cash flows: In case of Corporate Finance the lender has a potentially larger pool of cash flows from which to get paid as compared to Project Finance where the cash flows from the project only are used to pay the investors.

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

3.(a)(i) An Indian exporter has sold handicrafts items to an American business house. The exporter will be receiving US $100000 in 90 days. Premium for a dollar put option with a strike price of ₹ 48 and a 90 days settlement is ₹ 1. The exporter anticipates the spot rate after 90 days to be ₹ 46.50.

I. Should the exporter hedge its account receivable in the option market?

II. If the exporter is anticipating the spot rate to be ₹ 47.50 or ₹ 48.50 after 90 days, how would it effect the exporter's decision? [3+2]

Answer to 3(a)(i):

I. Amount in rupees that will be received by the exporter (if option is not bought) = $ 1000000 × ₹ 46.50 = ₹ 46.50 lakhs. if the option is bought at a strike price of ₹ 48 and the spot at expiry is ₹ 46.50, the option would be exercised. Amount in rupees that will be received by the exporter = $100000 × ₹ 48 – ₹ 100000 = ₹ 47.00 lakhs. Since, the amount received when the option is bought, is more, the exporter should purchase the put option.

II. If the exporter is anticipating the spot rate to be ₹ 47.50 or ₹ 48.50 after 90 days, then purchasing the put option is not worthwhile, as by remaining un-hedged would give him higher receipts.

3.(a)(ii) Which position on the Index future gives a speculator a complete hedge against the following transactions.

I. The share of Right Ltd. is going to rise. He has a long position on the cash market of ₹ 50 lacs on the Right Ltd. The beta of the Right Ltd. is 1.25.

II. The share of Wrong Ltd. is going to depreciate. He has a short position on the cash market of ₹ 25 lacs on the Wrong Ltd. The beta of the Wring Ltd. is 0.9.

III. The share of Fair Ltd. is going to stagnate. He has a short position on the cash market of ₹ 20 lacs of Fair Ltd. The beta of the Fair Ltd. is 0.75. [5]

Answer to 3(a)(ii):

Hedging is taking an equal and opposite position in another market so that loss that may arise in one market would be compensated by a gain in another market. The extent of hedging (hedge ratio) is determined by the beta of a security. If the beta is greater than one (i.e. hedge ratio is greater than one) then the position hedged would be higher than the underlying position and would be proportionate to the beta of the security.

I. In this case the speculator will hedge by selling in the futures market equivalent to 1.25 × ₹ 50 lacs. = ₹ 62.5 lacs.

II. In this case the speculator will hedge by buying in the futures market equivalent to 0.9 × ₹ 25 lacs. = ₹ 22.5 lacs.

III. In this case the speculator may remain un-hedged. However, hedging by buying in the futures market equivalent to 0.75 × ₹ 20 lacs. = ₹ 15 lacs. Would protect him from unanticipated losses.

3.(b)(i) Interest rates for 3 months in US and Canada are as follows:

Can $ / US SOPT 1.235 – 1.240

3m Forward 1.255 – 1.260

Currency	Borrow	Invest
US $	4%	2.5%
Can $	4.5%	3.5%

Advise the currency in which borrowing and lending for 3 months needs to be done for a US company. Taken 3 month = 90/360 fraction of a year. [6]

Answer to 3(b)(i):

We first verify the interest rate parity to decide first, whether any arbitrage exists.

We have spot = 1$ = C$ 1.235/1.240

LHS = $(1+r_h)$ = 1 + 0.035/4 = 1.00875 (C$ return)

RHS = F/S $(1+r_f)$ = 1.0162 × (1+0.025/4) = 1.02255 ($ return)

Since LHS ≠ RHS, parity does not exist, and there exists an opportunity to arbitrage.

Since LHS is lower, the borrowing would be done in Canadian dollar. The borrowed money would be converted to $ and invested. The profit can be calculated as follows:

Assume borrowing C$ 1000000. The repayment would be at the rate of 4.5% in 3 months. i.e., C$ = 1000000 × 1.01125 = C$1011250. C$ 1000000 converted to $ at spot would yield $806452. This on deposit for 3 months would yield $ 811492. This converted back to C$ would give us C$1018423.

Thus, our net arbitrage profit would be = C$1018423. –C$1011250 = C$7173.

3.(b)(ii) On 31-08-2011, the value of stock index was ₹ 2,200. The risk free rate of return has been 8% per annum. The dividend yield on this Stock Index is as under:

Month	Dividend Paid	Month	Dividend Paid
January	3%	July	3%
February	4%	August	4%
March	3%	September	3%
April	3%	October	3%
May	4%	November	4%
June	3%	December	3%

Assuming the interest is continuously compounded daily, find out the future price of contract deliverable on 31-12-2011.
Given $e^{0.01583} = 1.01593$ **[4]**

Answer to 3(b)(ii):

The price of futures, when dividend yield is given, is written as:

$F = Se^{(r-d)\times t}$

Here F = ?, S = 2200, r = 8% or 0.08

d = Average dividend yield of four months viz. September to December

= (3 + 3 + 4 + 3)/4 = 3.25% or 0.0325

t = Time to expiry = 4 months or 4/12 or 0.333

Thus, $F = 2200 \times e^{(0.08 - 0.0325)\times 0.333} = 2200 \times e^{0.01583}$

F = 2200 x 1.01593 = 2235.046

3(c)(i). Shoe Company sells to a wholesaler in Germany. The purchase price of the shipment is 50,000 deutsche marks with term of 90 days. Upon payment Shoe company will convert DM to $. The present spot rate for DM/$ is 1.71, whereas the 90 days forward rate is 1.70. You are required to calculate and explain:

I. If Shoe Company were to hedge its foreign exchange risk, what would it do? What transactions are necessary?

II. Is the DM at a forward premium or at a discount?

III. Calculate the implied differential in interest rates between the two countries.

[Use Interest Rate Parity assumption] [1+1+4]

Answer to 3(c)(i)

I. To hedge its risk, Shoe company would take forward cover by selling DM 90 days forward at DM 1.70/$ i.e., it will get $29412.

II. We see from quotes that, dollar quotes lower in the forward market than in the spot market, i.e., dollar quotes at discount. Obviously DM is at premium.

III. The interest rate parity assumption is that high interest rates on a currency are offset by forward discount and low interest are on a currency is offset by forward premium. The forward discount or premium is approximately equal to interest differential between the currencies i.e., $\frac{F(DM/\$)-S(DM/\$)}{S(DM/\$)} \times \frac{365}{90} = r_{DM} - r_{\$}$

Substituting we get, $r_{DM} - r_{\$} = -0.0237$

The minus sign indicates that $ is at discount to DM and if interest rate parity holds, interest are in US should be 2.37% higher than in Germany.

3(c)(ii). Explain the need for setting-up a Depository in India. [4]

Answer to 3(c)(ii):

The need was realized in the 1990s due to various reasons as under:

- A lot of time was consumed in the process of allotment and transfer of shares
- Increase in volume of transactions
- Large scale irregularities in the securities scam of 1992 exposed the limitations of the prevailing settlement system
- Problems associated with dealing in physical shares, such as
  - ✓ problems of theft, fake and/or forged transfers,
  - ✓ share transfer delays particularly due to signature mismatches; and
  - ✓ paper work involved in buying, selling, and transfer leading to costs of handling, storage, transportation, and other back office costs.

To overcome these problems, the Government of India, in 1996, enacted the Depositories Act, 1996 to start depository services in India.

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

4 (a). Consider the following information on two stocks, A and B: **[1+(1½+1½)+2+1+1]**

Year	Return on A (%)	Return on B (%)
2014	**10**	**12**
2015	**16**	**18**

You are required to determine:

I. The expected return on portfolio containing A and B in the proportion of 40% and 60% respectively.

II. The Standard deviation of return from each of the two stocks.

III. The covariance of returns from the two stocks.

IV. Correlation coefficient between the returns of the two stocks.

V. The risk of a portfolio containing A and B in the proportion of 40% and 60%.

Answer to 4(a)(i):

I. Expected return of the portfolio A and B:

R_A = (10+16)/2 = 13%

R_B = (12+18)/2 = 15%

R_P = 0.4 × 13 + 0.6 × 15 =14.2%

II. Computation of Standard deviation of return from each of two stocks:

Year	Return of A	Deviation	Deviation 2
2014	10%	10% - 13% = - 3%	9
2015	16%	16% - 13% = 3%	9
Average	13%		18

Standard Deviation of A = Risk = σ (sigma) = $\sqrt{\frac{18}{1}} = 4.24\%$

Year	Return of B	Deviation	Deviation 2
2014	12%	12% - 15% = - 3%	9
2015	18%	18% - 15% = 3%	9
Average	15%		18

Standard Deviation of B = Risk = σ (sigma) = $\sqrt{\frac{18}{1}} = 4.24\%$

Return on portfolio = 0.4 × 13 + 0.6 × 15 = 14.2%

III. Computation of Covariance of two stocks:

Year	Return of A	Deviation$_1$	Return of B	Deviation$_2$	Deviation$_1$× Deviation$_2$
2014	10%	10% - 13% = -3%	12%	12% - 15% = -3%	9
2015	16%	16% - 13% = 3%	18%	18% - 15% = 3%	9
Average	**13%**		**15%**		**18**

Covariance $= \frac{\sum\left(R_A - \bar{R}_A\right)\left(R_B - \bar{R_B}\right)}{n-1}$

= 18/1 = 18

IV. Correlation = Covariance / Product of Respective SD's

$= \frac{18}{4.24\% \times 4.24\%}$

= 1

V. Risk of the portfolio = $\sigma_P = \left[w_1^2\sigma_1^{\,2} + 2w_1w_2\sigma_1\sigma_2\rho 12 + w_2^{\,2}\sigma_2^{\,2}\right]^{\frac{1}{2}}$

Substituting respective data we get σ_P = 4.24%

4 (b)(i). The beta coefficient of Target Ltd. Is 1.4. The company has been maintaining 8% rate of growth in dividends and earnings. The last dividend paid was ₹ 4 per share. Return on GOI Securities is 10%. Return on Market Portfolio is 15%. The current market price of one share of Target Ltd. Is ₹ 36. Calculate the equilibrium price per share of Target Ltd. Would you advice purchasing the share? [2+1]

Answer to 4(b)(i):

I. The expected return on Target Ltd. As per CAPM is given by:

$R_{Target} = R_f + \beta(R_m - R_f)$

Given Rm = 15%, β_{Target} = 1.4, R_f = 10%

Therefore, R_{Target} = 0.1 + 1.4 × 0.05 = 17%

Substituting, this for K_e = in the dividend discount model formula $P = \frac{D_o(1+g)}{K_e - g}$

We get the equilibrium price

P = (4 × 1.08)/(0.17 – 0.08) = ₹ 48

II. As the current price is ₹ 36, which is less than the calculated equilibrium/Fair price, it is worth purchasing the share.

4(b)(ii). Following is the data regarding six securities:

	U	V	W	X	Y	Z
Return%	**10**	**10**	**15**	**5**	**11**	**10**
Risk% (Std. Deviation)	**5**	**6**	**13**	**5**	**6**	**7**

I. Which of three securities will be selected?

II. Assuming perfect correlation, analyze whether it is preferable to invest 80% in security U and 20% in security W or to invest 100% in V. [2+3]

Answer to 4(b)(ii)

I. When we make risk-return analysis of different securities from U to Z, we observe that security U gives a return of 10% at risk level 5%. Simultaneously securities V and Z give the same return of 10% as of security U, but their risk levels are 6% and 7% respectively. Security X is giving only 5% return for the risk rate of 5%. Hence, security U dominates securities V, X and Z. Securities W and Y offer more return but it carries higher level of risk. Hence securities U, W and Y can be selected based on individual preferences.

II. In a situation where the perfect positive correlation exists between two securities, their risk and return can be averaged with the proportion. Assuming the perfect correlation exists between the securities U and W, risk and return of U and W for proportion given is calculated as follows:

$$\text{Risk} = [(0.8)^2 \times (0.05)^2 + (0.2)^2 \times (0.13)^2 + 2 \times (0.8) \times (0.2) \times 1.0 \times 0.05 \times 0.13]^{1/2}$$
$$= [0.04356]^{1/2}$$
$$= 6.6\%$$

$$\text{Return} = 0.8 \times 10 + 0.2 \times 15 = 11\%$$

When we compare risk of 6.6% and return of 11% with security V with 6% risk 10% return, we see that the given 2 stock portfolio is not preferable over the stock V.

4(c). Mr Shoaib is considering building a portfolio containing two assets, L and M. Asset L will represent 40% of the rupee value of the portfolio, and asset M will account for the other 60%. The expected returns over the next 6 years, 2010-2015, for each of these assets, are shown in the following table.

	Year	2010	2011	2012	2013	2014	2015
Expected Return %	Asset L	14	16	17	18	18	19
	Asset M	20	18	16	14	12	10

I. Calculate the expected value of portfolio returns, over the 6-year period.
II. Calculate the standard deviation of expected portfolio returns, σ over the 6-year period.
III. Is investing in the negatively correlated equal weighted portfolio of L & M better than individual investment? [3+3+2]

Answer to 4(c):

I. & II. Calculation of Expected Return and Standard Deviation of Portfolio of L & M:

	Expected Return %		Portfolio - L:40% & M:60%			Asset L		Asset M	
Year	Asset L	Asset M	Return	σ	$(\sigma)^2$	σ	$(\sigma)^2$	σ	$(\sigma)^2$
2010	14	20	17.6	1.8	3.24	-3	9	5	25
2011	16	18	17.2	1.4	1.96	-1	1	3	9

2012	17	16	16.4	0.6	0.36	0	0	1	1
2013	18	14	15.6	-0.2	0.04	1	1	-1	1
2014	18	12	14.4	-1.4	1.96	1	1	-3	9
2015	19	10	13.6	-2.2	4.84	2	2	-5	25
Sum	**102**	**90**	**94.8**		**12.4**				**70**
Average	**17**	**15**	**15.8**		**1.57**		**1.79**		**3.74**

III. Portfolio standard deviation of equally weighted stocks of Assets L & M with negative correlation would be:

$$\sigma_P = \left[\sum_{j=1}^{n} x_i x_j \rho_{ij} \sigma_i \sigma_j\right]^{\frac{1}{2}}$$

Substituting we have σ_P =

$$= \left[(0.5)^2 \times (0.0179)^2 + (0.5)^2 \times (0.0374)^2 + 2 \times (0.5) \times (0.5) \times -1 \times 0.0179 \times 0.0374\right]^{\frac{1}{2}} = 0$$

We get the standard deviation of this portfolio as zero, implying zero total risk. Thus in terms of risk this portfolio is better than individual investments in assets L and M. In terms of return only stock L provides a higher return of 17% as against the portfolio return of 15.8%.

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

5 (a)(i). The capital structure of Hindustan Traders Ltd. as on 31.3.2004 is as follows:

Equity Capital: 100 lakh equity shares of ₹10 each	**₹10 crores**
Reserves	**2.00 crores**
14% Debentures of ₹100 each	**3.00 crores**

For the year ended 31.3.2004 the company is to pay equity dividend at 20%. As the company is a market leader with good future, dividend is likely to grow by 5% every year. The equity shares are now traded at T80 per share on the stock exchange. Income-tax rate applicable to the company is 50%.

Required:

I. The current weighted cost of capital.

II. The company has plans to raise a further ₹ 5 crores by way of long-term loan at 16% interest. When this takes place the market value of the equity shares is expected to fall to ₹ 50 per share. Calculate the new weighted average cost of capital of the company. [3+4]

Answer to 5(a)(i):

I. Current Weighted Average Cost of Capital

Cost of debt (K_d) = $\frac{I(1-t)}{P} = \frac{14(1-0.5)}{100}$ = 7%

$K_e = \frac{D_1}{P_0} + g = \frac{(20\% \text{ of } ₹10)}{₹80} + 0.05 = 7.5\%$

Weighted Average Cost of Capital

Capital Structure	Amount (₹)	Weights	Cost of capital	WACC
Equity & Reserves	12 crores	0.8	7.5%	6.0%
14% Debentures	3 crores	0.2	7.0%	1.4%
	15 crores	1.0		7.4%

II. Weighted Average Cost of Capital with Additional Loan:

Cost of New Debt (Kd_2) = $\frac{I(1-t)}{P} = \frac{16(1-0.5)}{100}$ = 8%

Cost of Equity Capital (K_e) = $\frac{DPS}{MPS} = \frac{(20\% \text{ of } ₹10)}{₹50} + 0.05 = 9\%$

Weighted Average Cost of Capital with Additional Loan

Capital Structure	Amount (₹)	Weights	Cost of capital	WACC
Equity	12 crores	0.60	9%	5.4%
16% Loan	5 crores	0.25	8%	2.0%
14% Debentures	3 crores	0.15	7%	1.05%
	20 crores	1.00		8.45%

5 (a)(ii) List the problems in determination of cost of capital. [3]

Answer to 5(a)(ii):

Problems in determination of cost of capital:

(i) Conceptual controversy regarding the relationship between cost of capital and capital structure is a big problem.

(ii) Controversy regarding the relevance or otherwise of historic costs or future costs in decision making process.

(iii) Computation of cost of equity capital depends upon the excepted rate of return by its investors. But the quantification of expectations of equity shareholders is a very difficult task.

(iv) Retained earnings have the opportunity cost of dividends forgone by the shareholders. Since different shareholders may have different opportunities for reinvesting dividends, it is very difficult to compute cost of retained earnings.

(v) Whether to use book value or market value weights in determining weighted average cost of capital poses another problem.

5 (b)(i). Following are the date on a capital project being evaluated by management of X Ltd.

Particulars	Project M
Annual Cost Saving	₹ 40,000
Useful Life	4 years
I.R.R.	15%
Profitability index (PI)	1.064
NPV	?
Cost of capital	?
Cost of project	?
Pay back	?
Salvage value	0

Find the missing values considering the following table of discount factor only.

Discount factor	15%	14%	13%	12%
1 year	0.869	0.877	0.855	0.893
2 years	0.756	0.769	0.783	0.797
3 years	0.658	0.675	0.693	0.712
4 years	0.572	0.592	0.613	0.636
	2.855	2.913	2.974	3.038

[1+1½+1½+1]

Answer to 5 (b)(i):

I. At IRR, Present Value of Cash Outflows = Present Value of Cash Inflows Hence, cost of Project = ₹ 40,000 × 2.855 = ₹1,14,200.

II. Profitability Index at cost of capital = 1.064

$$1.064 = \frac{\text{Present Value of Cash Inflows at cost of capital}}{1,14,200}$$

Present Value of Cash Inflows at cost of capital = ₹1,21,509.
Net Present Value at cost of capital = ₹1,21,509 – ₹1,14,200 = ₹7,309

III. Cumulative P.V.A.F at cost of capital (1 - 4) = $\frac{\text{Present Value of Cash Inflows}}{\text{Annual Cash Inflows}}$

$$= \frac{1,21,509}{40,000} = 3.038$$

Reference to Cumulative P.V.A.F table gives us the cost of capital 12%.

IV. Payback Period = $\frac{1,14,200}{40,000}$ = 2.855 years.

5(b)(ii). ABC Ltd. furnished you the following information:

Cost of Plant	₹10,00,000
Working Capital	₹5,00,000
Annual Sales Value	₹15,00,000
Annual Cash operating expenses	₹7,00,000

Project life	**4 years**
Tax rate	**40%**
Depreciation	**SLM**
Cost of Capital	**10% p.a.**
Terminal value	**Plant 20% of Cost & Working Capital 100%**

Compute Modified Internal Rate of Return or Terminal Rate of Return. [5]

Answer 5(b)(ii):

Computation of Annual CFAT:

	(₹) (1-4)
Annual Sales value	15,00,000
(-) Annual Cash operating expenses	(7,00,000)
Annual CFBT (1)	8,00,000
(-) Annual Depreciation (10,00,000 - 2,00,000/4)	(2,00,000)
Annual PBT	6,00,000
Tax Liability (40%) (2)	(2,40,000)
Annual CFAT (1) - (2)	5,60,000

Computation of Terminal value of cash flows at end of each year

Time	**Terminal Value (₹)**
1	5,60,000 × $(1.10)^3$ = 7,45,360
2	5,60,000 × $(1.10)^2$ = 6,77,600
3	5,60,000 × $(1.10)^1$ = 6,16,000
4	5,60,000 + 2,00,000 + 5,00,000 = 11,60,000

Total Terminal Value at end of year 4 = ₹ 32,98,960

₹ 32,98,960 × PVF4 of MIRR = ₹ 15,00,000

PVF4 of MIRR = $\frac{15,00,000}{32,98,960}$ = 0.4547

MIRR = 21.78%

5 (c). Forward Planning Ltd. is considering whether to invest in a project which would entail immediate expenditure on capital equipment of ₹ 40,000. Expected sales from the project are as follows:

Probability	**Sales Volume (Units)**
0.10	**2,000**
0.25	**6,000**
0.40	**8,000**
0.15	**10,000**
0.10	**14,000**

Once sales are established at a certain volume in the first year, they will continue at that same volume in subsequent year. The unit selling prices will be ₹ 10, the unit variable cost ₹ 6 and the additional fixed costs will be ₹ 20,000 (all cash items). The project would have a life of 6 years after which the equipment would be sold for scrap which would fetch ₹ 3,000. You are required to find out:

I. The expected value of the NPV of the project

II. The expected volume of sales per annum required to justify the project.

The cost of capital of the company is 10%. Discount factor of ₹1 per annum for 6 years @ 10% is 4.355 and the discount factor of ₹ 1 at the end of the sixth year at 10% is 0.5645. Ignore taxation. [5+5]

Answer to 5 (c):

I. Statement showing Expected Value of Sales Volume p.a.

Sales Volume (Units)	Probability	Expected Sales Volume (Units)
2,000	0.10	200
6,000	0.25	1,500
8,000	0.40	3,200
10,000	0.15	1,500
14,000	0.10	1,400
Total	**1.00**	**7,800**

Estimated value of contribution will be ₹ 31,200 [i.e. 7,800 × (10 – 6)] All additional fixed costs are cash items (As given in question). Estimated value of additional cash profits each year will therefore be ₹ 11,200.

Year	Cash Flows ₹	Discount Factor 10%	Expected Sales Value (Units)
0	(40,000)	1.000	(40,000)
1.6	11,200	4.355	48,776
6	3,000	0.5645	1,694
Expected Value of NPV			**10,470**

II. In order to break-even, the NPV must be Zero. Assuming that the cost of the equipment and its residual value are known with certainty, we can calculate the minimum required PV of annual cash profits as given below:

	Present Value (₹)
PV of capital outlay	40,000
Less: PV of residual value	(1,694)
PV of annual cash profit required for NPV of 0	**38,306**
Discount Factor of ₹ 1 p.a. for 6 years @ 10%	4,355
Annual cash profit required (38,306/4.355)	8,796
Add: Annual (Cash) Fixed costs	20,000
Annual contribution required for NPV = 0	**28,796**
Contribution per unit	4

Hence, Annual Sales required to Break-even = 28.796/4 = 7,199 units or 7,200 units (rounded off).