

PAPER-14: ADVANCED FINANCIAL MANAGEMENT

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

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
		Identify	Recognize, establish or select after consideration
	APPLICATION How you are expected to apply your knowledge	Illustrate	Use an example to describe or explain something
		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
	ANALYSIS How you are expected to analyse the detail of what you have learned	Tabulate	Arrange in a table
		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
	SYNTHESIS How you are expected to utilize the information gathered to reach an optimum conclusion by a process of reasoning	Produce	Create or bring into existence
		Discuss	Examine in detail by argument
		Interpret	Translate into intelligible or familiar terms
EVALUATION How you are expected to use your learning to evaluate, make decisions or recommendations	Decide	To solve or conclude	
	Advise	Counsel, inform or notify	
	Evaluate	Appraise or assess the value of	
		Recommend	Propose a course of action

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

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) Can old, sick physically handicapped pensioner who is unable to sign, open pension account or withdraw his/ her pension from the pension account? [2]

Answer to (a):

A pensioner, who is old, sick or lost both his/her hands and, therefore, cannot sign, can put any mark or thumb/ toe impression on the form for opening of pension account. While withdrawing the pension amount he/she can put thumb/toe impression on the cheque/withdrawal form and it should be identified by two independent witnesses known to the bank one of whom should be a bank official.

- (b) Aircel 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 30% tax rate. Calculate the project's operating cash flow for the year ($t=1$)? [2]

Answer to (b):

Operating Cash Flow: ($t = 1$)

Sales revenue	1,00,00,000
Operating costs	70,00,000
Depreciation	20,00,000
Operating income before taxes	10,00,000
Taxes (30%)	3,00,000
Operating income after taxes	7,00,000
Add back depreciation	20,00,000
Operating cash flow	27,00,000

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

(c) The following securities are available in the market for investment

Securities	Return %	Standard Deviation (%)
Gilt edged security	6	0
Equity of Rolt Ltd.	20	20

If Mr. Vardhan is planning to invest ₹5,00,000 to construct a portfolio with standard deviation of 18%, then calculate the return on such portfolio. [2]

Answer to (c):

Variance of Portfolio: $O_p^2 = W_i^2 O_i^2 + W_r^2 O_r^2 + 2W_i O_i W_r O_r$

Portfolio since Standard deviation of Gilt edged Securities is 0 and its correlation with equity is also 0 the above formula will reduce to

$$O_p^2 = W_r^2 O_r^2$$

Therefore $O_p = W_r O_r$

$$\text{Or, } 18\% = 20\% W_r$$

$$\text{Hence, } W_r = 0.18/0.20 = 0.9 \text{ and } W_i = 1 - 0.9 = 0.10$$

$$\text{Return of portfolio (Rp)} = W_i R_i + W_r R_r = 0.1 \times 6\% + 0.9 \times 20\% = 18.6\%$$

$$\text{Return (In Rupees)} = 0.186 \times 5,00,000 = ₹ 93,000$$

(d) The following market quotes are available. Assume there are no transaction costs be possible, calculate the arbitrage gains on ₹ 10,00,000 from the middle rates given below:

$$₹ 76,200 = £ 1 \text{ in London}$$

$$₹ 46,600 = \$ 1 \text{ in Delhi}$$

$$\$ 1.5820 = £ 1 \text{ in New York}$$

[2]

Answer to (d):

Beginning with ₹ 10,00,000, we can purchase dollars in Delhi to get \$ 21,459 (10,00,000/46.6). Using this we purchase £ 13,564 (21,459/1.582) in New York. Now, we sell these pounds in London at ₹ 76.20 per pound to get ₹ 10,33,577 and make a gain of ₹ 33,577 (10,33,577 – 10,00,000).

(e) State the term "Close" and "Closing Price" in commodity market. [2]

Answer to (e):

Close: - The period at the end of trading session officially designated by exchange during which all transactions are considered made "at the close".

Closing price: - The price (or price range) recorded during the period designated by the exchange as the official close.

(f) Calculate percentage bid-ask spreads in the following cases?

$$\$ 1 = ₹ 35.15 - 36.45$$

$$£ 1 = ₹ 57.05 - 59.20$$

$$\text{DM } 1 = ₹ 21.15 - 21.90$$

$$\text{FF } 1 = ₹ 6.10 - 6.28$$

[2]

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

Answer to (f):

$$\text{\$ 1} = \left[\frac{\text{\₹} 36.45 - 35.15}{36.45} \right] \times 100 = 3.566\%$$

$$\text{\pounds 1} = \left[\frac{\text{\₹} 59.20 - 57.05}{59.20} \right] \times 100 = 3.632\%$$

$$\text{DM 1} = \left[\frac{\text{\₹} 21.90 - 21.15}{21.90} \right] \times 100 = 3.425\%$$

$$\text{FF 1} = \left[\frac{\text{\₹} 6.28 - 6.10}{6.28} \right] \times 100 = 2.866\%$$

(g) A fund manager is contemplating payment of dividend for his scheme in six months time. He has cash but wants to park in Bills. He needs at least 8% returns over a period of 6 months from now. At what price he can purchase a T- Bill from the secondary market? [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 $P = ?$, $F = 100$, $M = 6 \text{ months} = 180 \text{ days}$ [Remember to use 365 in the formula]

$$8 = \left(\frac{100 - P}{P} \right) \times \frac{365}{180} \times 100 \text{ Solving we get } P = \text{\₹} 96.20$$

(h) A put option due to mature is selling at ₹ 5 on a share which is selling at ₹ 75. The option has an exercise price of ₹ 80, is there an arbitrage opportunity? If yes, show how it works. [2]

Answer to (h):

If the arbitrageur buys a put option by paying ₹ 5 & also purchase a share at ₹ 75, his total cost is ₹ 80. If he exercises his put option, he will receive the exercise price of ₹ 80, hence no arbitrage gain possibility exists.

(i) Khan 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 30%. The CFO has calculated the company's WACC as 9.96%. Find out the company's equity cost of capital. [2]

Answer to (i):

40% Debt; 60% Equity; $K_d = 9\%$; $T = 30\%$; $WACC = 9.96\%$; $K_e = ?$

$$WACC = (W_d)(K_d)(1-T) + (W_e)(K_e)$$

$$9.96\% = (0.4)(9\%)(1-0.3) + (0.6) K_e$$

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

$$9.96\% = 2.52\% + 0.6 K_e$$

$$7.44\% = 0.6K_e$$

$$K_e = 12.4\%$$

- (j) Historically, when the market return changed by 10% the return on the stock of Arihant Ltd changed by 16%. If the variance of market is 257.81, then calculate the systematic risk of Arihant Ltd. [2]

Answer to (j):

10% increase in Market return resulted in 16% increase in Arihant Ltd Stock. Thus, the Beta (β) for the Arihant Ltd stock is 1.60 (i.e. $16\% \div 10\%$).

Now Systematic Risk is $\beta^2 \sigma_m^2 = (1.60)^2 (257.81) = 660\%$

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

- 2.(a)(i) A Mutual Fund Co. has the following assets under it on the close of business as on:

Company	No. of Shares	1 st February, 2015 Market Price per share	2 nd February, 2015 Market Price per share
L Ltd	20,000	20.00	20.50
M Ltd	30,000	312.40	360.00
N Ltd	20,000	361.20	383.10
P Ltd	60,000	505.10	503.90

Total No. of Units 6,00,000

I. Calculate Net Assets Value (NAV) of the Fund.

II. Following information is given :

Assuming one Mr. A, submits a cheque of ₹30,00,000 to the Mutual Fund and the Fund manager of this company purchases 8,000 shares of M Ltd; and the balance amount is held in Bank. In such a case, what would be the position of the Fund?

III. Find new NAV of the Fund as on 2nd February, 2015

[2+5+1]

Answer to 2(a)(i):

NAV of the fund currently is the market value of securities divided by the outstanding number of units. In this problem, market value is:

Company	1 st February, 2015			2 nd February, 2015		
	No. of Shares	Market Price	Value of Securities	No. of Shares	Market Price	Value of Securities
L Ltd	20,000	20.00	400,000	20,000	20.50	410,000
M Ltd	30,000	312.40	9,372,000	22,000	360.00	7,920,000
N Ltd	20,000	361.20	7,224,000	20,000	383.10	7,662,000
P Ltd	60,000	505.10	30,306,000	60,000	503.90	30,234,000

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

L Ltd	20000	20.0	4,00,000	20000	20.5	4,10,000
M Ltd	30000	312.4	93,72,000	38000	360.0	1,36,80,000
N Ltd	20000	361.2	72,24,000	20000	383.1	76,62,000
P Ltd	60000	505.1	3,03,06,000	60000	503.9	3,02,34,000
			4,73,02,000			5,19,86,000
Cash			0	Cash = 30,00,000 – 8,000 × 312.4 = 500800		5,00,800
Total NAV			4,73,02,000			5,24,86,800
Units			600000	Additional Units = 30,00,000 ÷ 78.8867 = 38053.4		638053.4
NAV per unit			78.8367			82.2608

2.(b)(i) Under what circumstances can a company registered as a Collective Investment Management Company raise funds from the public? [4]

Answer to 2(b)(i):

- I. A registered Collective Investment Management Company is eligible to raise funds from the public by launching schemes.
- II. Such schemes have to be compulsory credit rated as well as appraised by an appraising agency.
- III. The schemes also have to approved by the Trustee and contain disclosures, as provided in the Regulations which would enable to investors to make informed decision.
- IV. A copy of the office document of the Scheme had to be filed with SEBI and if no modifications are suggested by SEBI within 21 days from the date of filing, then the collective investment Management company is entitled to issue the offer document to the public raising funds from them.

2.(b)(ii) Suppose a company issues a Commercial Paper as per the following details:

Date of Issue	: 17th January 2015
Date of Maturity	: 17th April 2015
No. of Days	: 90 days
Face Value	: ₹1,000
Issue price	: ₹985
Credit rating exp.	: 0.5% of the size of issue
IPA charges	: 0.35%

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

Stamp Duty : 0.5%

Calculate the cost of the commercial paper and yield to investor?

[3+1]

Answer to 2 (b)(ii):

We know that $\left[\frac{\text{Face Value} - \text{Sale Price}}{\text{Sale Price}} \right] \times \left[\frac{360}{\text{Maturity Period}} \right] = \text{cost of CP}$

Numerator = Total Discount = Discount + Rating Charges + IPA charges + Stamp Duty

Therefore Discount [on FV ₹1,000] = ₹15 + 5 + 5 + 3.5 = ₹28.5

Cost of CP = $\frac{28.5}{985} \times \frac{360}{90} = 0.1157$ or 11.6%

Yield to investor = $\frac{15}{985} \times \frac{360}{90} \times 100 = 6.09$

2.(c)(i) List the unique features of National Level Commodity Exchanges.

[4]

Answer: 2 (c)(i):

The unique features of national level commodity exchanges are:

- They are demutualized, meaning thereby that they are run professionally and there is separation of management from ownership. The independent management does not have any trading interest in the commodities dealt with on the exchange.
- They provide online platforms or screen based trading as distinct from the open-out-cry systems (ring trading) seen on conventional exchanges. This ensures transparency in operations as everyone has access to the same information.
- They allow trading in a number of commodities and are hence multi-commodity exchanges.
- They are national level exchanges which facilitate trading from anywhere in the country. This corollary of being an online exchange.

2.(c)(ii) You can earn a return of 13 percent by investing in equity shares on your own. You are considering a recently announced equity mutual fund scheme where the initial issue expense is 7 percent. You believe that the mutual fund scheme will earn 16.5 percent. At what recurring expenses (in percentage terms) will you be indifferent between investing on your own and investing through the mutual fund. [2]

Answer to 2(c)(ii):

Let the annual Recurring expenses be ₹X

Returns from Mutual funds = $\frac{\text{Investors' Expectation}}{100 - \text{Issue Expenses}} + \text{Annual recurring expenses}$

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

$$16.5\% = \frac{13}{(100-7)\%} + x$$

$$16.5\% = 13.97 + x$$

$$x = 16.5 - 13.97 = 2.53\%$$

Therefore, the Amount of Recurring Expenses for which the return will be indifferent is 2.53%.

2.(c)(iii) State the 'Hedging Approach' to financing working capital requirements of a firm. [2]

Answer: 2 (c)(ii)

Hedging Approach: It is a method of financing where each asset would be offset with a financing instrument of the same approximate maturity. With this approach, short-term or seasonal variation in current assets would be financed with short-term debt; the permanent component of current assets and all fixed assets would be met with long-term debt.

The rationale for the policy is that if long-term debt is used to finance short-term needs, the firm will be paying interest for the use of such funds at times when funds are needed.

2. (d) Analyze the following table and select the best portfolio for an investor who has diversified holdings: [8]

	Market	R _f	1	2	3	4	5
Mean	12	6	14	16	26	17	10
SD - Risk	20	-	21	21	30	25	18
Beta	1.0	-	1.15	1.10	1.30	0.90	0.45

Answer to 2 (d):

We know that, for an investor holding diversified holdings, there is virtually no unsystematic risk present in his portfolio. Therefore, using total risk to measure risk adjusted return is less relevant. Thus we would use those risk adjusted measures, which uses beta as a measure of risk.

We know that Treynor ratio is defined as: $(R_p - R_f) / \beta_P$ and

Jensen's alpha is the incremental actual return over the expected return as per CAPM.

	Market	R _f	1	2	3	4	5
Mean	12	6	14	16	26	17	10
SD - Risk	20	-	21	21	30	25	18
Beta	1.0	-	1.15	1.10	1.30	0.90	0.45
Treynor Ratio	6	-	6.96	9.09	15.38	12.22	8.89

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

Jensen's Alpha	12	-	12.9	12.6	13.8	11.4	8.7
Rank			3	2	1	4	5

We can see that portfolio 3 is the best among the lot. Also there is no dispute as regards rank 5. However, one may favour portfolio 1 over portfolio 2. Since the difference in alpha is only marginal, for portfolios 1 & 2, and portfolio 2 has high Treynor ratio as compared to portfolio 1, we have ranked portfolio 2 ahead of portfolio 1. And finally, though portfolio 4 has higher Treynor, it is the alpha (which is lower) which has pushed down the ranking.

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

3.(a)(i) The following data relates to ABC Ltd.'s share prices:

Current price per share	₹ 180
Price per share in the 6m futures market:	₹ 195

It is possible to borrow money in the market for securities transactions at the rate of 12% per annum.

Required:

- I. Calculate the theoretical minimum price of a 6-month futures contract.
- II. Explain if any arbitrage opportunities exist.

[2+5]

Answer to 3(a)(i):

- I. Theoretical Minimum Price of a 6-month forward contract:
 Future's Price = Spot + Cost of Carry – Dividend
 $F = 180 + 180 \times 0.12 \times 0.5 - 0$
 $= 190.80$

Thus we see that Futures price by calculation is ₹ 190.80 and is quoting at ₹ 195 in the exchange.

II. Analysis:

Fair Value of Futures LESS than Actual Futures Price;
 Futures Overvalued. Hence SELL. Do Arbitrage by buying stock in Cash Market.

Step I

Buy ABC Ltd. stock at ₹ 180 by borrowing at 12% for 6 months. Therefore his outflows are

Cost of Stock	180.00
Add: Interest @ 12% for 6 months i.e. 0.5 year	$(180 \times 0.12 \times 0.5) = 10.80$
Total outflows (A)	190.80

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

Step II

He will sell 6-month futures at ₹ 195. Hence, his inflows are

Sales proceeds of futures	195.00
Add: Dividend received for his stock	0.00
Total outflows (B)	195.00

$$\begin{aligned}\text{Inflow} - \text{Outflow} &= \text{Profit earned by Arbitrageur} \\ &= 195 - 190.80 = ₹ 4.20 \text{ per share.}\end{aligned}$$

Note: We have ignored transaction costs like commission, margin, etc.

3.(a)(ii) Nifty Index is currently quoting at 1300. Each lot is 250. Mr. X purchases a March contract at 1300. He has been asked to pay 10% initial margin. Calculate the amount of initial margin. To what level Nifty futures should rise to get a percentage gain of 5%. [1+2]

Answer to 3 (a)(ii):

$$\begin{aligned}\text{Initial margin} &= 10\% \text{ of Transaction value of futures.} \\ &= 0.10 \times 1300 \times 250 \\ &= ₹ 32500\end{aligned}$$

$$\begin{aligned}\text{Now gain} &= 5\% = 0.05 = \text{Return} \div \text{Investment} \\ &= \text{Return} \div 32500\end{aligned}$$

$$\therefore \text{Return} = ₹ 1625$$

$$\text{i.e., Return per unit} = 1625 / 250 = ₹ 6.50$$

$$\therefore \text{Index futures should rise to } 1306.50.$$

3.(b)(i) The annual interest rate is 5% in the United States and 8% in the UK. The spot exchange rate is £/\$ -1.50 and forward exchange rate, with one year maturity, is £/\$ = 1.48 In view of the fact that arbitrageur can be borrow \$ 1000000 at current spot rate, calculate the arbitrageur profit/ loss? [6]

Answer to 3 (b)(i):

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

$$\text{We have spot} = 1£ = \$ 1.50$$

$$\text{LHS} = (1+r_h) = 1 + 0.05 = 1.05$$

$$\text{RHS} = F/S (1+r_f) = 0.987 \times (1 + 0.08) = 1.0656 (\$ \text{ return})$$

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

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

Assume borrowing \$1000000. The repayment would be at the rate of 5% in 12 months i.e., \$ 1000000 \times 1.05 = \$1050000. \$1000000 converted to £ at spot would yield £666667. This on

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

deposit for 12 months would yield £720000. This converted back to \$ would give us \$1065600.

Thus our net arbitrage profit would be = \$1065600 - \$1050000 = \$15600.

Note: Inverse Notations £ / \$ - 1.50 used.

3.(b)(ii) An Indian importer has to settle an import bill for \$1,30,000. The exporter has given the Indian exporter two options:

- I. Pay immediately without any interest charges.
- II. Pay after three months with interest at 5 per cent per annum.

The importer's bank charges 15 per cent per annum on overdrafts. The exchange rates in the market are as follows:

Spot rate (₹/\$): 48.35/48.36

3 Months forward rate (₹/\$): 48.81 / 48.83

The importer seeks your advice. Give your advice.

[2+2]

Answer to 3 (b)(ii):

Total Exposure : \$130000
Spot (₹/\$) : 48.35/48.36
3-month (₹/\$) : 48.81/48.83

Option I

Pay immediately \$ 130000, and pay overdraft interest on rupee proceeds:

Proceeds of immediate payment: \$130000 × 48.36 = ₹ 62,86,800
3 month interest @ 15% i.e. (0.15 × 0.25 × 6286800) = ₹ 2,35,755
Total Cost = ₹ 65,22,555

Option II

Pay \$ 130000 with interest 5% (130000 + 1625) = \$131625
Book forward today at ₹ 48.83
Total cost = 48.83 × 131625 = ₹ 64,27,249

Conclusion: Option II is cheaper.

3 (c)(i). For imports from UK, Philadelphia Ltd. of USA owes £650000 to London Ltd., payable on May, 2014. It is now 12 February, 2015. The following future contracts (contract size £62,500) are available on the Philadelphia exchange:

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

Expiry	Current futures rate
May	1.4900 \$/£ 1
June	1.4960 \$/£ 1

- I. Illustrate how Philadelphia Ltd. can use future contracts to reduce the transaction risk if, on 20 May the spot rate is 1.5030 \$/£ 1 and June futures are trading at 1.5120 \$/£. The spot rate on 12 February is 1.4850 \$/£ 1.
- II. Calculate the hedge efficiency and comment on it. [8+2]

Answer to 3(c)(i):

- I. Philadelphia Ltd. of USA owes £ 650000 to London Ltd., payable on May, 2015. This company would therefore buy Futures contracts. Since information on June Contracts are given for both spot and expiry, and the firm can buy either May or June Futures for hedging, we illustrate the hedging procedure by using June Futures:

Value of exposure today (12th February) = £650000 × 1.4850 = \$965250

Since each contract size = £ 62,500, the firm can buy 10 June expiry contracts at \$1.4960/£ i.e. can cover the exposure to the extent of £625000, thus leaving the balance £650000 - £625000 = £25,000 uncovered. When the payment is due in May, the spot rate would be 1.5030 \$/£ and the June contracts would be trading at 1.5120 \$/£.

At expiry, the value of exposure would increase to £650000 × 1.5030 = \$976950.

Therefore, increase in exposure = \$976950 - \$965250 = \$11,700.

However, since the firm bought futures at 1.4960, it can sell of the same at a higher rate of 1.5120/£.

This would result in a profit = 10 × 62500 × (1.5120 - 1.4960) = \$10000 [Savings due to hedging]

Net loss = \$11700 - \$10000 = \$1700.

- II. Owing to hedging in the futures market the company could reduce its losses by \$10000. i.e., out of a possible loss of \$ 11700, \$10000 could be saved owing to hedging. Thus hedging thus hedging efficiency is = \$10000/\$11700 = 85.5%, which is reasonably good, despite the inability of the firm to hedge 100% of the exposure.

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

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

4 (a). A group of analysts believes that the returns of the portfolios are governed by two vital factors—

1. the rate of economic growth and 2. the sensitivity of stock to the developments in the financial markets. The sensitivities of returns with respect to these two factors are denoted by β_1 and β_2 respectively.

Further these analysts believe that returns on three carefully crafted Portfolios A, B and C must be predominantly governed by these two factors alone leaving remaining to some company/ portfolio specific factors. Assume that these three Portfolios A, B, and C are found to have following beta co-efficients:

Portfolio	Expected Return, %	β_1	β_2
A	16.00	1.00	0.80
B	25.00	1.50	1.30
C	32.00	2.00	1.50

Find out the Arbitrage Pricing Theory (APT) equation governing the returns on the portfolios. [8]

Answer to 4 (a):

Arbitrage Pricing Theory for two factors is

$$R_p = \lambda_0 + \lambda_1\beta_1 + \lambda_2\beta_2$$

Putting the given values in the APT to solve for three unknown variables:

$$\text{For Portfolio A: } 16 = \lambda_0 + \lambda_1 \times 1.00 + \lambda_2 \times 0.80 \quad (1)$$

$$\text{For Portfolio B: } 25 = \lambda_0 + \lambda_1 \times 1.50 + \lambda_2 \times 1.30 \quad (2)$$

$$\text{For Portfolio C: } 32 = \lambda_0 + \lambda_1 \times 2.00 + \lambda_2 \times 1.50 \quad (3)$$

Subtracting (1) from (2)

$$9 = \lambda_1 \times 0.50 + \lambda_2 \times 0.50 \quad (4)$$

Subtracting (1) from (3)

$$16 = \lambda_1 \times 1.00 + \lambda_2 \times 0.70 \quad (5)$$

Multiplying (4) with 2, we get

$$18 = \lambda_1 \times 1.00 - \lambda_2 \times 1.00 \quad (6)$$

Subtracting (5) from (6), we get

$$\lambda_2 = 20/3$$

Putting the value in (4)

$$9 = 10/3 + \lambda_1 \times 0.50$$

$$\text{gives } \lambda_1 = 34/3$$

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

Putting the values of λ_1 and λ_2 in (3) we get

$$32 = \lambda_0 + 2 \times 34/3 + 1.50 \times 20/3$$

$$\text{and } \lambda_0 = -2/3$$

APT would then be $R_p = -2/3 + 34/3 \times \beta_1 + 20/3 \times \beta_2$

4 (b)(i) Mr. Khan has the following investments:

[(1+1)+4]

Stock	Expected return %	Portfolio weight %	Beta
ABC	15.00	40	0.6
BAC	25.40	30	1.4
CAB	20.60	30	1.1

- I. Calculate the expected return and β of Khan's portfolio.
- II. Khan has now decided to take on some additional risk in order to increase his expected return, by changing his portfolio weights. If Khan's new portfolio's expected return is 22.12% and its β is 1.165, calculate the weights of his new portfolio.

Answer to 4(b)(i):

- I. We can calculate the expected return of Mr. Khan as follows:

$$E(R) = (0.40)(0.15) + (0.30)(0.254) + (0.30)(0.206) = 0.198 \text{ and}$$

$$\beta_P = (0.40)(0.60) + (0.30)(1.40) + (0.30)(1.10) = 0.990.$$

- II. Let X_1 be the new weight on ABC, X_2 be the new weight on BAC and $X_3 = 1 - X_1 - X_2$ be the new weight on CAB. Then, we have:

$$X_1 (0.15) + X_2 (0.254) + (1 - X_1 - X_2)(0.206) = 0.2212$$

$$X_1 (0.60) + X_2 (1.40) + (1 - X_1 - X_2)(1.10) = 1.1650$$

Rearranging these two equations gives:

$$X_1 (-0.056) + X_2 (0.048) = 0.0152$$

$$X_1 (-0.50) + X_2 (0.30) = 0.0650$$

Solving we get $X_1 = 0.20$

$$X_2 = 0.55 \text{ and}$$

$$X_3 = 0.25$$

Therefore the new weights are 20% on ABC, 55% on BAC and 25% on CAB.

4.(b)(ii) Explain “Re-investment Risk” involved in investment in Government Securities. [2]

Answer to 4(b)(ii):

Re-investment Risk:

- (i) Re—investment risk is the risk that the rate at which the interim cash flows are re-invested may fall thereby affecting the returns.
- (ii) The most prevalent tool deployed to measure returns over a period of time is the yield-to-maturity (YTM) method which assumes that the cash flows generated during the life of a security is reinvested at the rate of YTM.

4.(c)(i) Arvind Mills has expected dividend growth of 7% and the average market return is 12% per annum. Dividend expected end-year on Arvind is ₹ 2.50. The company stock has $\beta = 2.00$ and the risk free rate is 6%. Calculate the risk-adjusted rate of return on Arvind assuming the CAPM holds. If the current market price is ₹ 20, find the fair price of the equity share. Discuss the risks attached to the investment strategy. [1+1+2]

Answer to 4(c)(i):

Risk adjusted rate of return on Arvind, using CAPM is:

$$\begin{aligned} ER_i &= ER_f + \beta_i (ER_m - ER_f) \\ &= 6\% + 2.00(12\% - 6\%) = 18\% \end{aligned}$$

Fair value of Arvind is:

$$\begin{aligned} V &= D / (ER_i - g) \\ &= ₹ 2.50 / (0.18 - 0.07) \\ &= ₹ 22.73 \end{aligned}$$

Since the Arvind's equity is underpriced, the investor should buy the equity shares. But the CAPM measure ER_i may not hold for all future periods. If the market price diverges from the fair value, the demand for the Arvind will shot up till there is equilibrium.

2.(c)(ii) Write short notes on Unsystematic Risk [4]

Answer to 4(c)(ii):

Unsystematic Risk: These are risks that emanate from known and controllable factors, which are unique and / or related to a particular security or industry. These risks can be eliminated by diversification of portfolio.

(i) Business Risk:

- It is the volatility in revenues and profits of particular Company due to its market conditions, product mix, competition, etc.

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

- It may arise due to external reasons or (Government policies specific to that kind of industry) internal reasons (labour efficiency, management, etc.)

(ii) Financial Risk (RTP):

- These are risks that are associated with the Capital Structure of a Company. A Company with no Debt Financing, has no financial risk. Higher the Financial Leverage, higher the Financial Risk.
- These may also arise due to short term liquidity problems, shortage in working capital due to funds tied in working capital and receivables, etc.

(iii) Default Risk: These arise due to default in meeting the financial obligations on time. Non-payment of financial dues on time increases the insolvency and bankruptcy costs.

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

5. (a) **GMBH GMBH is in software development business. It has recently been awarded a contract from an Asian country for computerisation of its all offices and branches spread across the country. This will necessitates acquisition of a super computer at a total cost of ₹10 crore. The expected life of computer is 5 years. The scrap value is estimated at ₹5 crore. However, this value could even be much lower depending upon the developments taking place in the field of computer technology. A leasing company has offered a lease contract will total lease rent of ₹1.5 crore per annum for 5 years payable in advance with all maintenance costs being borne by lessee. The other option available is to purchase the computer by taking loan from the bank with variable interest payment payable semi-annually in arrears at a margin of 1% per annum above MIBOR. The MIBOR forecast to be at a flat effective rate of 2.4% for each 6 month period, for the duration of loan. Tax rate applicable to corporation is 30%. For taxation purpose depreciation on computer is allowed at 20% as per WDV method, with a delay of 1 year between the tax depreciation allowance arising and deduction from tax paid & capital gain tax arising on sale of computer. You are required to calculate:**
- I. **Compound annualised post tax Cost of Debt.**
 - II. **NPV of lease payment v/s purchase decisions at discount rate of 5% & 6%.**
 - III. **The break even post tax Cost of debt at which corporation will be indifferent between leasing and purchasing the computer.**
 - IV. **Which option should be opted for?** **[1+(3+4)+1+1]**

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

Answer to 5 (a):

I. First we shall compute annual interest rate as follows:

$$\begin{aligned} \text{Annual Interest Rate} &= (1.024)^2 - 1 = 4.9\% \\ \text{Thus, Pre Tax Interest and Post Tax Interest Rate} &= 4.9\% + 1\% = 5.9\% \\ &= 5.9\% (1 - 0.30) = 5.9\% \times 0.70 = 4.13\% \end{aligned}$$

II. Working Notes:

Calculation of Tax Savings on Depreciation

(₹)

Year	Opening value	Depreciation	Closing value	Tax saving @ 30%
1	10,00,00,000	2,00,00,000	8,00,00,000	60,00,000
2	8,00,00,000	1,60,00,000	6,40,00,000	48,00,000
3	6,40,00,000	1,28,00,000	5,12,00,000	38,40,000
4	5,12,00,000	1,02,40,000	4,09,60,000	30,72,000
5	4,09,60,000	81,92,000	3,27,68,000	24,57,600

$$\text{Capital Gain tax} = (\text{₹}5,00,00,000 - \text{₹}3,27,68,000) \times 30\% = \text{₹}51,69,600 \text{ Total}$$

$$\text{Tax Liability for Year 5} = \text{₹}51,69,600 - \text{₹}24,57,600 = \text{₹}27,12,000$$

Statement showing NPV Lease Option

(₹)

Particulars	Period	Cash flow (₹)	5%		6%	
			PVF	PVCO	PVF	PVCO
Lease payment	0-4	1,50,00,000	4.546	6,81,90,000	4.465	6,69,76,584
(-) Tax savings	1-5	(45,00,000)	4.329	(1,94,80,500)	4.212	(1,89,54,000)
PVCO (A)				4,87,09,500		4,80,22,584

Statement showing NPV in Borrow & Buy decision

(₹)

	Period	Cash flows (₹)	5%		6%	
			PVF	PVCO	PVF	PVCO
	0	10,00,00,000	1.000	10,00,00,000	1.000	10,00,00,000
(-) Tax Savings	1	0	0.962	0	0.943	0
	2	(60,00,000)	0.907	(54,42,000)	0.890	(53,58,000)
	3	(48,00,000)	0.864	(41,47,200)	0.840	(40,32,000)
	4	(38,40,000)	0.823	(31,60,320)	0.792	(30,41,280)
	5	(30,72,000)	0.784	(240,84,48)	0.747	(22,94,784)
(+) Tax Liability	6	27,12,000	0.746	20,23,152	0.705	19,11,960
(-) Terminal Value	5	(5,00,00,000)	0.784	(3,92,00,000)	0.797	(3,73,50,000)
				4,76,65,184		4,98,35,896
				(10,44,316)		18,13,312

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

III.
$$5\% + \left[1\% \times \frac{₹10,44,316}{₹28,57,628} \right]$$
$$= 5.37\%$$

- IV. Since the Break Even post tax Cost of debt at which corporation will be indifferent between leasing and purchasing the computer (i.e. IRR of Lease Option) is 5.37%, which is higher than the actual post tax cost of borrowing of 4.13%. Hence, it is advised to the corporation to go for borrow and buy option instead of lease option.

5.(b)(i) 'Fixed Costs are unrelated to output and irrelevant for decision making purpose in all circumstances'.- Justify. [3]

Answer to 5(b)(i):

Fixed Costs are unrelated to output and are generally irrelevant for decision making purpose. However, in the following circumstances, Fixed Costs become relevant for decision-making:

1. When Fixed Costs are specifically incurred for any contract,
2. When Fixed Costs are incremental in nature,
3. When the fixed portion of Semi-Variable Cost increases due to change in level of activity consequent to acceptance of a contract,
4. When Fixed Costs are avoidable or discretionary,
5. When Fixed Costs are such that one cost is incurred in lieu of another (the difference in costs will be relevant for decision-making).

5.(b)(ii) A company wants to invest in a machinery that would cost ₹ 50,000 at the beginning of year 1. It is estimated that the net cash inflows from operations will be ₹18,000 per annum for 3 years; if the company opts to service a part of the machine at the end of year 1 at ₹10,000 and the scrap value at the end of year 3 will be ₹12,500. However, if the company decides not to service the part, it will have to be replaced at the end of year 2 at ₹15,400. But in this case, the machine will work for the 4th year also and get operational cash inflow of ₹18,000 for the 4th year. It will have to be scrapped at the end of year 4 at ₹9,000. Assuming cost of capital at 10% and ignoring taxes, will you recommend the purchase of this machine based on the net present value of its cash flows?

If the supplier gives a discount of ₹ 5,000 for purchase, what would be your decision? (The present value factors at the end of years 0, 1, 2, 3, 4, 5 and 6 are respectively 1, 0.9091, 0.8264, 0.7513, 0.6830, 0.6209 and 0.5644). [5+2]

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

Answer to 5(b)(ii):

(i) Statement showing evaluation of mutually exclusive proposals

Particulars	Time	P. V. Factor	Service Part		Replace Part	
			Amount	P.V.	Amount	P.V.
Cash Outflows:						
Cost of machinery	0	1	50,000	50,000	50,000	50,000
Service cost	1	0.9091	10,000	9,091	---	---
(+) Replace Part	2	0.8264	---	---	15,400	12,727
P.V. of Cash Outflows (A)				59,091		62,727
Cash Inflows:						
Cash inflows from operation	1-3	2.4869	18,000			
	1-4	3.1699		44,764	18,000	57,058
Scrap value of machine	3	0.7513	12,500	9,391		
	4	0.6830			9,000	6,147
P.V. of Cash Inflows (B)				54,155		63,205
NPV (B) – (A)				(4,936)		478

Advise: Purchase machine & Replace the part at end of second year.

(ii) If the supplier gives a discount of ₹5,000 on purchase of machine

Proposals	Service Part	Replace Part
NPV	64	5,478
Cumulative P.V.A.F.	2.4869	3.1699
Equivalent Annual NPV	25.73	1,728

Advise: Purchase machine A Replace the part at end of second year.

5.(c)(i) S Ltd. has ₹ 10,00,000 allocated for capital budgeting purposes. The following proposals and associated profitability indexes have been determined: [6]

Project	Amount (₹)	Profitability Index
1	3,00,000	1.22
2	1,50,000	0.95
3	3,50,000	1.20
4	4,50,000	1.18
5	2,00,000	1.20
6	4,00,000	1.20

Advice which of the above investment should be undertaken. Assume that projects are indivisible and there is no alternative use of the money allocated for capital budgeting.

Answer to MTP_Final_Syllabus 2012_Jun2015_Set 1

Answer to 5(c)(i):

Computation of NPV of Viable Projects:

Project	NPV(₹)	
1	$3,00,000 \times 0.22$	= 66,000
3	$3,50,000 \times 0.20$	= 70,000
4	$4,50,000 \times 0.18$	= 81,000
5	$2,00,000 \times 0.20$	= 40,000
6	$4,00,000 \times 0.20$	= 80,000

Combinations	Initial Cash Outflows (₹)	Overall N.P.V. (₹)
1,3,5	8,50,000	1,76,000
1,4,5	9,50,000	1,87,000
1,5,6	9,00,000	1,86,000
3,4,5	10,00,000	1,91,000
3,5,6	9,50,000	1,90,000
4,6	8,50,000	1,61,000

Advise: Best combination of projects = 3, 4, 5.

Note: Project 2 should not be considered as it provides a negative NPV.

5.(c)(ii) List the relevance of Social Cost Benefit Analysis for Private Enterprise.

[4]

Answer to 5(c)(ii):

Relevance of Social Cost Benefit Analysis for Private Enterprises

- I. Social cost benefit analysis is important for private corporations also which have a moral responsibility to undertake socially desirable projects.
- II. If the private sector includes social cost benefit analysis in its project evaluation techniques, it will ensure that it is not ignoring its own long-term interest, since in the long run only projects that are socially beneficial and acceptable, will survive.
- III. Methodology of social cost benefit analysis can be adopted either from the guidelines issued by the United Nations Industrial Development Organisation (UNIDO) or the Organisation of Economic Cooperation and Development (OECD). Financial Institutions e.g. IDBI, IFCI, etc. even insist on social cost benefit analysis of a private sector project before sanctioning any loan.
- IV. Private enterprise cannot afford to lose sight of social aspects of a project.