

FINAL EXAMINATION

GROUP III

(SYLLABUS 2012)

SUGGESTED ANSWERS TO QUESTIONS

DECEMBER 2017

Paper- 14: ADVANCED FINANCIAL MANAGEMENT

Time Allowed: 3 Hours

Full Marks: 100

The figures on the right margin indicate full marks.

All workings must form part of your answer.

Wherever necessary, suitable assumptions may be made and clearly stated in the answer.

No present value or other statistical table will be provided in addition to this question paper.

Candidates may use relevant values from the information given at the end of the question paper for computation of answers where required.

This paper contains two sections, A and B.

Section A is compulsory and contains question 1 for 20 marks

Section B contains questions 2 to 8, each carrying 16 marks.

Answer any five question from section B.

Section A

1. (a) Answer all sub-divisions. Each carries 2 marks: 2×7 = 14
- (i) The market price (ex-dividend) of an open-ended mutual fund unit was ₹15 at the beginning of the year. A dividend of ₹2 per unit has been paid during the year. At the end of the year, the ex-dividend price is ₹ 18 per unit. Calculate the yield of the fund as a percentage up to two decimal places.
 - (ii) S opened a 'sell' position in two futures contracts of shares in X Ltd., when the futures was trading at ₹1000. Each contract is for 100 shares. The initial margin is 10% and maintenance margin is 80% of the initial margin and the rules require withdrawal of 50% of excess over initial margin. When the price falls to ₹9.60 per share, what would be the amount to be withdrawn or of margin replenishment?
 - (iii) A six-month forward contract on a stock that does not pay dividend is available at ₹340. The risk-free interest rate is 12% p.a. continuously compounded. Calculate the forward price.
 - (iv) A project with an initial investment of ₹50 lakh and life of 10 years generates Cash Flow After Tax (CFAT) of ₹10 lakh per annum. Calculate Payback Reciprocal.

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- (v) State any two situations in which NPV and IRR give conflicting results.
- (vi) The return on market portfolio is 14%. The last dividend of share A was ₹2 and the dividend and earnings have a constant growth rate of 5% p.a. The beta of the share is 2 and the intrinsic value of the share is ₹12.35. Find the risk free return.
- (vii) What is a Zero Coupon Bond? What is the return to the holder of such a bond?
- (b) State whether the following are True (T) or False (F) (You may write only the question Roman numeral and state whether True or False without copying the statements into the answer books.): 1×6=6
- (i) A strangle involves buying a put and call with the same strike price and same expiry date.
- (ii) Black and Scholes Model of option valuation apply to American option.
- (iii) A fully diversified portfolio has zero standard deviation.
- (iv) An investor is compensated by proportionate reward when his investment has more unsystematic risk.
- (v) While adjusting the cash flows of a project for risks using the certainty equivalents, the appropriate discount rate to be used to find the NPV will be the risk adjusted discount rate.
- (vi) Cross rate is the rate of exchange of two currencies on the basis of exchange quotes of other pairs of currencies.

Answer: 1

1. (a)

- (i) Return = (Cash Dividend + Capital Appreciation + Capital Gains) / Opening NAV = (2 + 3) / 15 = 33.33%
- (ii) Position : Sell; Prices have fallen. Hence withdrawal and no margin replenishment.
Initial margin = 2 × 100 × 1000 = 2,00,000
Profit: 40 × 2 × 100 = 8000. (Fall in price is taken as ₹960)
Withdrawal = 50% of 8000 = 4000.
- (iii) The Forward Price (F) = 340 × e^{6/12 × 0.12} = 340 × 1.0618 = ₹361.012
- (iv) Payback Reciprocal = ₹ 10 lakh ÷ ₹50 lakh = 1/5 or 20%
- (v) NPV and IRR give conflicting results in the following situations :
Initial investment disparity or different project sizes.
Project life disparity
Cash outflows arise at different points during the life of the project and not just limited to the initial outlay.
Heavy differences in the CFAT between the projects.
- (vi) Intrinsic value of a share = $\frac{D_1}{K_e - g} = \frac{2.1}{K_e - 0.05} = 12.35$. $K_e = 0.05 + 2.1/12.35 = 22\%$
 $E(R) = R_f + \beta (R_m - R_f) = R_f (1 - \beta) + \beta R_m$
 $22\% = R_f (-1) + 2 \times 14\%$, or, $R_f = 6\%$
- (vii) A zero coupon bond is issued at a discount and repaid at face value. The difference between these two values is the return to the holder. No periodic interest is paid.

1. (b)

- (i) False

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- (ii) False
- (iii) False
- (iv) False
- (v) False
- (vi) True

Section B

Answer any five questions from question number 2 to 8.

2. (a) A sugar mill M expects to produce 300 MT (1MT = 1000 kg) of sugar in 3 months' time. The current price of sugar is ₹42 per kg. Three months' futures contract is trading at ₹45 per kg. The lot size is 10 MT. A chocolate factory F, wants to purchase 300 MT of sugar in three month's time. M wants a cover of 50% while F wants a 100% cover on commodity futures.
- (i) Identify the parties in the long and short position in the spot and futures market.
 - (ii) Identify the respective outflows and inflows for both these parties, if after three months, the price increases to ₹46 or drops to ₹40 per kg. 10
- (b) The total market value of the equity share of E Ltd. is ₹60,00,000 and the total value of the debt is ₹40,00,000. The treasurer estimate that the beta of the stocks is currently 1.5 and that the expected risk premium on the market is 12 per cent. The Treasury bill rate is 10 per cent.
- (i) What is the beta of the Company's existing Portfolio of assets? 6

Answer: 2 (a)

- (i) When a party holds the underlying asset, he is said to be long on the spot market. Then, he will hold the opposite position in the futures market. M holds the underlying asset, sugar and hence is long in the spot market, i.e., short in the futures market. M will sell futures contract at 45 per kg. This will apply to 150 MT (150 × 1000 kg) since M wishes only 50% cover by futures hedging, i.e., M will sell 15 futures contracts. Thus, correspondingly, F, which does not hold the underlying asset, sugar, will be short in the spot market and hence long in the futures market. F will buy 30 futures contracts at ₹45 per kg.
- (ii) Inflows for M:

	Spot price after 3 months is ₹40 per kg	Spot price after 3 months is ₹46 per kg
150T (uncovered, sold at prevailing spot prices)	$150 \times 1,000 \times 40 = 60,00,000$	69,00,000
150T covered by 15 contracts @ 45 ₹/kg	67,50,000	67,50,000
Total	127,50,000	1,36,50,000

Outflows For F:

100% coverage.

300 MT at 45/kg = 135,00,000 irrespective of price change.

Hedging offsets exactly between the spot and futures gains and losses to remain at the hedged futures price.

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Answer: 2 (b)

(1) Beta of Company's existing Portfolio of Assets

Notation	Particulars	Value
β_E	Beta of Equity	1.5
β_D	Beta of Debt (since company's debt capital is risk less, its Beta is Zero)	0
E	Value of Equity	60,00,000
D	Value of Debt	40,00,000
β_A	Beta of company assets	To be ascertained
$R_M - R_F$	Risk Premium	12%
R_R	Risk free Rate of Return	10%

$$\begin{aligned}
 D + E &= \text{Total value of the company} \\
 &= \text{Value of Debt} + \text{Value of Equity} \\
 &= 40,00,000 + 60,00,000 = ₹ 1,00,00,000
 \end{aligned}$$

$$\Rightarrow \beta_A = \{\beta_E \times \text{Equity} \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})]\} + \{(\beta_D \times \text{Debt} (1 - \text{Tax}) \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})])\} = [1.5 \times ₹60 \text{ lakhs} / ₹100 \text{ lakhs}] + [0 \times ₹40 \text{ lakhs} / ₹100 \text{ lakhs}] = 0.9 + 0 = 0.9$$

3. (a) Four investors, A, B, P and T have invested equal amounts of money in different combinations of funds as per their risk aptitude. A has fully invested in Money Multiplier Funds, B has invested 50% in Money Multiplier and 50% in Balanced Growth Funds, P has invested 80% in Balanced Growth Funds and 20% in Safe Money Funds and T has fully invested in a fund that exactly replicates the market portfolio. The following information is given:

Fund Type	Return for the year (%)	Beta Factor
Money Multiplier (100% Equity)	24.00	1.8
Balanced Growth Funds (50% Equity and 50% Debt)	17.5	1.3
Safe Money (20% Equity and 80% Debt)	13.00	0.75

The market return is 16% and the risk-free rate is 8%.

Rank the investors' rewards using Treynor's measure.

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(b) Fill up the contents of the following table:

-	What is the variable on the x axis?	What is the variable on the y axis?	What is the most important information that is read from this graph?
Security Market Line			
Characteristic Line			
Capital Market Line			

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Answer: 3 (a)

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DETAILS	A	B	P	T
Risk free return	8	8	8	8
Fund invested	100% money multiplier	50% MM and 50% balanced growth	80% balanced growth and 20% safe money	Market
Beta	1.80	$0.5 \times 1.3 + 0.5 \times 1.8 = 1.55$	$0.8 \times 1.3 + 0.2 \times 0.75 = 1.19$	1.00
Return on portfolio	24	$0.5 \times 24 + 0.5 \times 17.5 = 20.75$	$0.8 \times 17.5 + 0.2 \times 13 = 16.6$	16
Treynor's ratio = $\frac{(R_p - R_f)}{\beta}$	$\frac{(24 - 8)}{1.8} = 8.89$	$\frac{(20.75 - 8)}{1.55} = 8.23$	$\frac{(16.6 - 8)}{1.19} = 7.23$	$\frac{(16 - 8)}{1} = 8$
Rank	1	2	4	3

Answer: 3 (b)

	What is the variable on the x-axis?	What is the variable on the y-axis?	What is the most important information that is read from this graph?
Security Market Line	Beta of security (a number)	Return on security (%)	For a certain beta value, what would be the return on the security.
Characteristic Line	Return of Market (%)	Return of Security (%)	Slope gives beta; the graph predicts the return for the security for a given market return.
Capital Market Line	Total Risk of the portfolio	Return on the portfolio in %	The ideal portfolio that should be invested by an investor

4. (a) IP, an importer in India has imported a machine from USA for US \$ 20,000 for which the payment is due in three months. The following information is given:

Foreign Exchange Rates (₹/US \$)		
	Bid	Ask
Spot	64.60	64.90
3 months' forward	65.50	65.80

Money Market Rates (p.a.)		
	Deposit	Borrowing
US\$	6%	9%
Rupees	7%	11%

Show with appropriate supporting calculations whether a money market hedge is possible or not.

Compute the cost (in annualized percentage) of a Forward Contract Hedge.

Advise the importer on the best course of action to minimize rupee outflow. 8

- (b) What is a repo and reverse repo? What are the features of a repo? 8

Answer: 4 (a)

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After 3 months, the importer will purchase US\$, i.e., it is a payable. For money market hedge, he should create a US \$ asset by borrowing Rs, investing in \$ @ \$ deposit rate and receiving \$ at the end of three months.

$$\begin{aligned} \text{Spot Ask rate} &\times \frac{(1 + \text{Re borrowal rate for 3months})}{(1 + \$ \text{ deposit rate for 3 months})} \\ &= 64.90 \times \frac{\left(1 + \frac{0.11}{12} \times 3\right)}{\left(1 + \frac{0.06}{12} \times 3\right)} = 64.90 \times \frac{1.0275}{1.015} = 65.70 \end{aligned}$$

This value 65.70 is less than the three months' forward ask rate of 65.80. Hence money market hedge is possible.

$$\begin{aligned} \text{Effective rate of money market hedge} &= \left(\frac{1 + \frac{0.11}{4}}{1 + \frac{0.06}{4}} - 1 \right) \times 100 \times 12 / 3 = \left(\frac{1.0275}{1.015} - 1 \right) \times 400 \\ &= 4.926\% \end{aligned}$$

Under forward contract hedge, effective rate annualized

$$= \frac{(\text{Forward Ask} - \text{Spot Ask})}{\text{Spot Ask}} \times 100 \times \frac{12}{3} = 5.55\%$$

Hence the importer is advised to use money market hedge.

$$\text{Amount to be borrowed} = \frac{20,000}{1 + \frac{6\%}{12} \times 3} \times 64.90 = \frac{20,000}{1.015} \times 64.90 = ₹12,78,817.73$$

Convert to US\$ @ Spot Ask 64.90

$$\text{Purchases \$} \left(\frac{12,78,817.73}{64.90} \right) = 19,704.43$$

$$\begin{aligned} \text{Interest 3 months @ 6\%} &= \frac{295.57}{100} \times 100 \\ \text{US \$ available after 3 months} &= 20,000.00 \end{aligned}$$

Answer: 4 (b)

Repo, a ready forward contract is an instrument for borrowing funds by selling securities with an agreement to repurchase the said securities at a mutually agreed future date and agreed price, which includes interest for the funds borrowed. Repo rate is the return earned on a repo transaction, expressed as an annual interest rate.

The reverse of a repo transaction is called reverse repo, which is lending funds against securities, with an agreement to resell the said securities at a mutually agreed future date and agreed price, which includes interest on the funds lent.

Features of a Repo:

Banks and primary dealers are allowed to undertake both repo and reverse repo transactions. It is a collateralized short term lending and borrowing agreement.

It serves as an outlet for deploying funds on a short term basis.

The interest rates depend on the demand and supply of the short term surplus / deficit amongst the inter bank players. In addition to T bills, all Central and State Government securities are eligible for repo.

For sale of securities, the seller has to actually hold them in his own investment portfolio.

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Immediately upon sale, the corresponding amount should be reduced from the investment of the seller. The securities under repo should be marked to market on the Balance Sheet. The buyer of a repo is usually a bank to meet its Statutory Liquidity Ratio.

5. (a) Shares of E Ltd. are being quoted at ₹600. Three months' futures contract rate is ₹636 per share with a lot size of 500 shares. If the company does not expect to distribute any dividend in the interim period and the risk free return is 9% p.a. continuously compounded, what is the recommended action for a trader in shares in the spot and futures market? Substantiate your conclusion with logical steps and compute the gains, if any, due to futures.

What would be the answers if the three months' futures contract rate is ₹600? 8

- (b) A company is committed to run its production line for four years for the supply of a spare part. At the end of the fourth year, production will be stopped. A machine is used for this production, which has to be purchased at the beginning of the first year. The machine can be replaced at the end of the first, second, third year or used up to the fourth year. At the end of the fourth year, the machine will have to be sold since production is discontinued. Assume that maintenance costs are incurred at the end of the year only if the machine is to be used in the next year. Costs incurred to run the machine according to its age and the salvage values at the end of the respective years are given. Replacement of a machine will be made at the same cost as the original machine. Revenues are unaffected by the age of the machine. Tax rate applicable is 40% for maintenance and the salvage values. The machine qualifies for 100% depreciation and tax benefit at the end of the first year of its use.

Year→	0	1	2	3	4
Purchase Price (₹)	6,00,000				
Maintenance Cost (₹)		1,60,000	1,80,000	2,00,000	2,00,000
Scrap Value (₹)		3,20,000	2,40,000	1,60,000	80,000

Present item-wise and year-wise undiscounted 4-year period cash flows for replacement cycle of one, two, three and four years. Use '+' sign for inflows and '-' for outflows.

Present discounted cash flows at 15% rate only for the computations showing replacement cycle of two years. 8

Answer: 5(a)

$$\text{Theoretical Forward price} = ₹600 \times e^{0.09 \times 0.25} = 600 \times e^{0.0225}$$

$$= 600 \times 1.0228 = ₹613.68$$

Evaluation and suggested course of action:

Particulars	Case A	Case B
3- months future contract rate	₹636 Actual price is higher overvalued	₹600 Actual price is lower Undervalued
Action:	Buy Spot, sell future	Sell spot, buy future
Gains due to Futures	₹(636 - 613.68) = ₹22.32	₹613.68 - 600 = ₹13.68
Round Off	22 or 23	13 or 14

Answer: 5(b)

Replacement Cycle - 1 year, i.e., replace the machine at the end of every year:

End of Year →	0	1	2	3	4
Machine Cost	-(6,00,000)	-(6,00,000)	-(6,00,000)	-(6,00,000)	-

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Depreciation tax shield		+2,40,000	+2,40,000	+2,40,000	+2,40,000
Maintenance Cost - Nil (since m/c is not used next year)	-	-	-	-	-
Scrap Value (net of taxes)		+ 192,000	+ 192,000	+ 192,000	+ 192,000
Total Cash Flows	-(6,00,000)	-(1,68,000)	-(1,68,000)	-(1,68,000)	-4,32,000

Replacement cycle - 2 years, i.e., replace the machine at the end of every two years :

End of Year →	0	1	2	3	4
Machine Cost	-(6,00,000)		-(6,00,000)		
Depreciation tax shield		+2,40,000		+2,40,000	
Maintenance Cost (only for the 1 st year end)		-(96,000)		-(96,000)	
Scrap Value (net of taxes)			+ 1,44,000		+ 1,44,000
Total	-(6,00,000)	+ 1,44,000	-(4,56,000)	+ 1,44,000	+ 1,44,000
PV Factor @ 15%	1	0.870	0.756	0.658	0.572
Present value of cash flows	-(6,00,000)	+ 1,25,280	-(3,44,736)	-94,752	+82,368

Replacement Cycle - 3 years, i.e., replace the machine at the end of three years :

End of Year →	0	1	2	3	4
Machine Cost	-(6,00,000)			-(6,00,000)	-
Depreciation tax shield		+2,40,000			+2,40,000
Maintenance Cost (only for the 1 st & 2 nd year end)	-	-(96,000)	-(1,08,000)	-(96,000)	—
Scrap Value (net of taxes)				+96,000	+ 1,92,000
Total Cash Flows	-(6,00,000)	+ 1,44,000	-(1,08,000)	-(6,00,000)	+4,32,000

Replacement Cycle - 4 years, i.e., use the machine and scrap it at the end of four years :

End of Year --→	0	1	2	3	4
Machine Cost	-(6,00,000)				
Depreciation tax shield		+2,40,000			
Maintenance Cost (only for the 1 st and 2 nd year end)		-(96,000)	-(1,08,000)	-(1,20,000)	
Scrap Value (net of taxes)					+48,000
Total Cash Flows	-(6,00,000)	+1,44,000	-(1,08,000)	-(1,20,000)	+48,000

6. (a) On 01.04.2017, the following are the interest rates quoted on different Government of India Bonds based on their tenor:

Period to Maturity	Interest Rates (%)
1 year	9.5
2 years	10.5
3 years	11.25
4 years	10.5

Calculate the forward interest rates as at the following dates:

- (i) as on 01.04.2018, for 1 year, 2 years and 3 years bonds,
- (ii) as on 01.04.2019, for 1 year and 2 years bonds,

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- (iii) as on 01.04.2020 for 1 year bond,
 (iv) Based on ₹1,00,000 face value of a bond, show computations for only (i) above, the amounts of interests accruing at the said dates at simple annual rests to substantiate the rates computed. 9

(b) A own a portfolio in three stocks as detailed below:

Stock	No. of shares	Price ₹/share	Beta
X	4,00,000	400	1.1
Y	8,00,000	300	1.2
Z	12,00,000	100	1.3

The BSE-SENSEX is at 28,000 and futures price is 28,560. Assume that the index factor is 100. Use stock index futures to

- (i) decrease the portfolio β to 0.8
 (ii) increase the portfolio β to 1.5

Find out the number of contracts of stock index futures to be bought or sold. 7

Answer: 6(a)

- (i) Forward interest rates on 01.04.2018:

$$1 \text{ year rate : } \frac{2 \times 10.5 - 9.5 \times 1}{2 - 1} = 11.5\%$$

$$2 \text{ year rate : } \frac{3 \times 11.25 - 9.5 \times 1}{3 - 1} = \frac{33.75 - 9.5}{2} = \frac{24.25}{2} = 12.13\%$$

$$3 \text{ year rate : } \frac{4 \times 10.5 - 9.5 \times 1}{4 - 1} = \frac{42 - 9.5}{3} = \frac{32.5}{3} = 10.83\%$$

- (ii) As in (i), calculation of forward interest rate as on 01.04.2019

$$1 \text{ year rate : } \frac{3 \times 11.25 - 10.5 \times 2}{3 - 2} = \frac{33.75 - 21}{1} = \frac{24.25}{2} = 12.75\%$$

$$2 \text{ year rate : } \frac{4 \times 10.5 - 10.5 \times 2}{4 - 2} = \frac{42 - 21}{2} = \frac{21}{2} = 10.5\%$$

- (iii) One year rate as on 01.04.2020

$$\frac{4 \times 10.5 - 11.25 \times 3}{4 - 3} = \frac{42 - 33.75}{1} = 8.25\%$$

- (iv) Computation with 1,00,000 as face value to substantiate (i) above:

1 year rate as on 01.04.2018

1,00,000 invested on 1.4.2017 for 1 year gives $9.5\% \times 1,00,000 = ₹9500$ as interest

The rate for 2 years as on 1.4.2017 is $1,00,000 \times 10.5\% = 21,000$ for 2 years

Difference = Interest earned during the 2nd year = 11,500

Hence, it may be said that during the second year, the one year forward rate is $11,500/1,00,000 = 11.5\%$.

When it is viewed at as compounded with 1 year rest, this 11,500 is earned on a principal of 1,09,500 at the beginning of the second year, when the effective rate is 10.5%. Since the government bonds pay the coupon interest, we calculate the interest on the face value and derive the one year forward rate as above.

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2 year forward rate as on 1.4.2018

Interest on 1,00,000 for 3 years at 11.25% = 33,750

Interest upto 1st year at 9.5% = 9,500

Interest for 2 years = 24,250

Interest rate for 2 years = 24,250 / 1,00,000 = 24.25%

Hence, per annum interest rate = 12.13%

3-year forward rate as on 1.4.2018

Interest on 1,00,000 × 10.5% × 4 years = 42,000

Less : Interest for 1 year at 9.5% = 9,500

Interest for 3 years = 32,500 / 1,00,000 = 32.5%

Interest per annum = 32,500 / 3 = 10,833.33 which is 10.83%.

Answer: 6(b)

Computation of existing portfolio beta:

Stock	Market value of stock (₹ in lakh)	Proportion	Beta of the stock	Weighted beta
X	1600	4/13	1.1	0.34
Y	2400	6/13	1.2	0.55
Z	1200	3/13	1.3	0.30
Total	5200			1.19

Value per futures contract = Index price per contract × Lot size per futures contract
= 28,000 × 100 = ₹28,00,000.

(i) To reduce portfolio beta to 0.8, the manager should sell index futures contract.

* Portfolio value = ₹5200 lakh

* Value per futures contract = Index price per contract × Lot size per futures contract
= 28,000 × 100 = ₹28,00,000

* Beta of the existing portfolio = 1.19

* Desired beta of the new portfolio = 0.8

No. of contracts to be sold = Portfolio Value × $\frac{(\text{Beta of the portfolio} - \text{Desired Value of Beta})}{\text{Value of the futures Contract}}$

Number of Contracts = 5,200 lakhs × $\frac{(1.19 - 0.8)}{28 \text{ lakh}}$ = 72.42, say 73 contracts

(ii) To increase the portfolio beta to 1.5 the manager should buy index futures contract.

• Portfolio value = Rs.5200 lakh

• Value per futures contract = Index price per contract × Lot size per futures contract
= 28,000 × 100 = Rs.28,00,000

• Beta of the existing portfolio = 1.19

• Desired beta of the new portfolio = 1.5

No. of contracts to be bought = Portfolio Value × $\frac{(\text{Desired Value of Beta} - \text{Beta of the portfolio})}{\text{Value of the futures Contract}}$

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No of contracts to be bought = $5,200 \text{ lakhs} \times \frac{(1.5 - 1.19)}{28 \text{ lakh}} = 57.57$, say 58 contracts

7. (a) The following information about two funds, Tanni (all equity fund) and Manni (equal debt and equity fund) are given below:

Particulars	Tanni	Manni
Average Return (%)	25	18
Standard Deviation (%)	10	5
Coefficient of Correlation with market	0.3	0.7

If the risk-free return on market portfolio is 16% with a standard deviation of 4%,

- (i) find the covariance of each fund with the market.
 - (ii) find the systematic risk and the expected return of each fund under the Capital Asset Pricing Model (CAPM).
 - (iii) what action will an investor take based on (ii) above?
 - (iv) does any of the funds lie on the Capital Market Line? Why? 10
- (b) P Ltd. has two projects under consideration, A and B, each costing ₹60 lacs. The projects are mutually exclusive. The life of Project A is four years and of Project B is three years. The salvage value is zero for both the projects. Depreciation is charged uniformly for A over four years and 100% depreciation is available for B at the end of the first year. The tax rate is 40% and the hurdle rate for cash flow evaluation is 15%. The cash inflows before tax for A and B are given below:

(Figs. ₹ lacs)

At the end of the year	Project A	Project B
1	30	25
2	55	60
3	60	65
4	25	—

Find the NPV of A and B. Comment on your preference.

Is the NPV the most appropriate measure for your decision? Why?

(Use PV factors up to 3 decimal points, show annual discounted cash flows for each project in ₹ lacs, up to two decimal places.) 6

Answer: 7 (a) R_f is assumed = 5.

- (i) Covariance (Tanni, Market) = Correlation Coefficient (Tanni, Market) $\times \sigma_{\text{Tanni}} \times \sigma_{\text{Market}}$
 $= 0.3 \times 10 \times 4 = 12$
 Covariance (Manni, Market) = Correlation Coefficient (Manni, Market) $\times \sigma_{\text{Manni}} \times \sigma_{\text{market}}$
 $= 0.7 \times 5 \times 4 = 14$

- (ii) Systematic Risk = β

$$\beta_{\text{Tanni}} = \text{Correlation coefficient with market} \times \frac{\sigma_{\text{Tanni}}}{\sigma_{\text{Market}}} = 0.3 \times \frac{10}{4} = 0.75$$

$$\text{Expected return (Tanni)} = R_f + \beta (R_m - R_f) = 5 + 0.75(16 - 5) = 5 + 0.75 \times 11 = 13.25\%$$

$$\beta_{\text{Manni}} = \text{Correlation coefficient with market} \times \frac{\sigma_{\text{Manni}}}{\sigma_{\text{Market}}} = 0.7 \times \frac{5}{4} = 0.875$$

$$\text{Expected Return (Manni)} = R_f + \beta (R_m - R_f) = 5 + 0.875 (16 - 5) = 5 + 0.875 \times 11 = 14.63\%$$

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Note : The answer is given on the assumption that risk free return is 5% . The candidates can assume any other rate .

- (iii) Both the funds have expected returns less than the actual returns. Hence, an investor will sell the funds if he has already invested or will refrain from buying any of these funds.
- (iv) CML gives the ideal portfolio, where the unsystematic risk is fully eliminated. Since the beta value is less than the total risk denoted by σ for each of the funds, there is a significant unsystematic risk inherent in the funds, hence none of the funds lies on the CML.

Answer: 7 (b)

End of Year	0	1	2	3	4
Cash Outflow	-(60)				
Cash inflows		30	55	60	25
Cash inflows after tax		18	33	36	15
Depreciation tax shield		6	6	6	6
Effective cash flows after tax and depreciation shield		24	39	42	21
PV factor	1.0	0.870	0.756	0.658	0.572
PV of Cash inflows		20.88	29.48	27.64	12.01
Total of PV of inflows		90.01			
PV of outflows		-(60.00)			
NPV		+30.01			

Project B:

End of Year	0	1	2	3	
Cash Outflow	-(60)				
Cash inflows		25	60	65	
Cash inflows after tax		15	36	39	
Depreciation tax shield		24			
Effective cash flows after tax and depreciation shield		39	36	39	
PV factor	1.0	0.870	0.756	0.658	
PV of Cash inflows		33.93	27.22	25.66	

Total of PV of inflows		86.81			
PV of outflows		-(60.00)			
NPV		+26.81			

NPV of Project A is higher, but the project lives are unequal. 12 lacs of A's PV in the 4 year has been in favour of A compared to B. Hence, choice based on NPV is not appropriate. Equal annual inflows of A = $90.01 / 2.856 = 31.52$ (PV Annuity 15%, 4 years = 2.856) Equal annual cash inflows of B = $86.81 / 2.284 = 38.00$ (PV Annuity 15%, 3 years = 2.284) Since B yields higher equated annual inflows, B is the better choice. This measure is appropriate for projects with unequal lives.

8. Answer any four of the following five questions: 4×4=16

- (a) Compare the commodity and equity markets on any two of the following aspects:
- (i) Initial margin
 - (ii) Basis of Price movements

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- (iii) Future predictability
- (b) Differentiate between open ended and close ended mutual funds.
- (c) State any four effects of corporate taxation on corporate financing..
- (d) How would you determine the cost of irredeemable preference shares?
- (e) What is meant by "delta" of an option? How would you utilize it in constructing a riskless portfolio?

Candidates may choose appropriate values from the following information as per the requirements of the questions:

Present Values $\frac{1}{(1+x)^n}$; x = interest rate; n = number of years.

Year → X ↓ %	0	1	2	3	4	5	6	7	8	9	10
6	1	0.943	0.890	0.840	0.792	0.747	0.705	0.665	0.627	0.592	0.558
9	1	0.917	0.842	0.772	0.708	0.650	0.596	0.547	0.502	0.460	0.422
10	1	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467	0.424	0.386
15	1	0.870	0.756	0.658	0.572	0.497	0.432	0.376	0.327	0.284	0.247

e ^{0.0225}	=	1.0228
e ^{0.225}	=	1.2523
e ^{0.25}	=	1.2840
e ^{0.06}	=	1.0618
e ^{0.09}	=	1.0942

Answer: 8(a)

Aspects	Commodity Markets	Equity Markets
Initial margins	Lower in the range of 4-5-6%	Higher in the range of 25-40%
Price movements	Price movements are purely based on the supply and demand.	Prices movements based on the expectation of future performance.
Future predictability	Predictability of future prices is not in the control due to factors like failure of monsoon and formation of El-ninos at Pacific.	Predictability of futures performance is reasonably high, which is supplemented by the history of management performance.

Answer: 8(b)

Aspects	Open ended Funds	Close ended Funds
Initial subscription	Open-End Fund is one which is available for subscription all through the year.	Fund is open for subscription only during a specified period.
Maturity	Do not have a fixed maturity.	Stipulated maturity period (3 to 15 years)
Subsequent transactions	Investors can buy and sell units at net asset value related prices.	Investors can invest at the time of the initial public issue and thereafter they can buy or sell

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		the units of the scheme on the stock exchanges where they are listed.
Repurchase	Any time	Based on terms of the fund. Periodic repurchase at NAV related price.

Answer: 8(c)

Effect of corporate taxation on corporate financing :

- (i) **Financing Decisions** : Cost of capital : Debt is cheaper than equity since interest is tax deductible. Leverage increases the EPS and hence mix of debt and equity is decided by the extent of tax advantage.
- (ii) **Investment Decisions** : Capital Budgeting : Proposals are accepted or rejected by discounting at the cost of capital. This cost reduces with increased savings on taxation on inflows / financing.
- (iii) **Dividend Decisions** : Retention vs Payment decision is based on tax impact.
- (iv) **Evaluation of Cash Flows** : The real comparison is the after tax flows. Depreciation shield is on the time of the tax deductibility.
- (v) **Rehabilitation of Sick Units** : Unabsorbed depreciation and loss carried forward is the advantage reckoned because of tax savings.
- (vi) Place / Location, size of industry are dependent on tax benefits.

Answer: 8(d)

Cost of Irredeemable Preference Shares :

= Gross Proceeds = Issue Price (whether discount or par or premium) × No. of shares
Less : Cost of Issue

= Net Proceeds

Preference Dividend / Net Proceeds = Cost of Preference Share.

Answer: 8(e)

The delta of a stock option is the ratio of the change in the price of the stock option to the change in the price of the underlying stock.

Δ = Delta = Change in option price / Change in stock price

Delta gives the number of units of the underlying stock which an investor should hold for each option sold in order to create a riskless hedge.