FINAL EXAMINATION

GROUP III

(SYLLABUS 2016)

SUGGESTED ANSWERS TO QUESTIONS

DECEMBER 2018

Paper- 14: STRATEGIC FINANCIAL MANAGEMENT

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

The figures in the margin on the right side indicate full marks.

Working Notes should form part of your answers.

Wherever necessary, candidates may make appropriate assumptions and clearly state them.

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

Candidates may use relevant values from tables given at the end of the question paper.

This paper contains two sections. A and B. Section A is compulsory and contains questions No.1 for 20 marks. Section B contains question Nos. 2 to 8, each carrying 16 marks.

Answer any five questions from Section B.

SECTION – A

Answer all the question. Each question carries two marks.

1. Choose the correct option from the four alternatives given : (1 mark is for the correct choice and 1 mark is for the justifications/workings. You may present only the Roman numeral, your choice and the reasons/workings, without copying the question).

2×10=20

(i) M buys a call option contract for a premium of Rs. **200. The exercise price is RS. 25 and the current market price of the share is Rs. 22. If the share price after three months reaches Rs. 30, what is the profit made by M on exercising the option? A contract is for 100 shares. Ignore transaction charges.**

(A) Rs. 200
(B) Rs. 300
(C) Rs. 100
(D) Rs. 600

(ii) You are a forex dealer in India. Rates of rupee and pound in the international market are US $0.01386952 and US $1.3181401 respectively. What will be your direct quote of £ (pound) to your customer.

(A) Rs.54.6987
(B) Rs.71.1408
(C) Rs.95.0386
(D) Rs.**0.0105**

(iii) 'Bank rate' published by the Reserve Bank refers to

(A) the repo rate transacted by RBI.
(B) the rate at which housing or other long term loans shall be sanctioned by

scheduled banks to their customers.

(C) The rate at which RBI is willing to buy or rediscount bills of exchange or other commercial paper.

(D) the rate which RBI uses as cut-off for auction of Government securities.

(iv) An investor has invested in a mutual fund when the NAG was Rs. 15.50 per unit. After 90 days the NAV was Rs. 14.45 per unit. During the period the investor got a cash dividend of Rs. 1.35 per unit and capital gain distribution of Re. 0.20. The annualized return based on 360 days year count will be

(A) 3.23%
(B) 12.92%
(C) 0.8075%
(D) 16.45%

(v) Initial investment of a project is Rs. 25 lakh. Expected annual cash flows are Rs. 6.5 lakh for 10 years Cost of capital is 15%. The annuity factor for 15% for 10 years is 5.019. The Profitability Index of the project will be

(A) 1.305
(B) 3.846
(C) 0.26
(D) 0.7663

(vi) Rate of inflation = 5.1%, β = 0.85, Risk premium = 2.295%, Market return = 12%. The real rate of return will be

(A) 4.2%
(B) 11.70%
(C) 6%
(D) 5.95%

(vii) In a constant dividend model, the following estimates the difference between the required rate of return and the growth rate :

(A) Earnings Retention ratio
(B) Leverage ratio
(C) Dividend Pay-out ratio
(D) Dividend yield ratio

(viii) Presently, a company's share price is Rs. 120. After 6 months, the price will be either Rs. 150 with a probability of 0.8 or Rs. 110 with a probability of 0.2. A call option exists with an exercise price of Rs. 130. What will be the expected value of call option at maturity date?

(A) Rs. 20
(B) Rs. 16
(C) Rs. 12
(D) Rs. 10

(ix) A stock is currently selling at Rs. 270. The call option to buy the stock at Rs. 265 costs Rs. 12. What is the Time Value of the option ?

(A) Rs. 5
(B) Rs. 17
(C) Rs. 7
(D) None of (A), (B) or (C)

(x) A Ltd., an export customer requested his banker B to purchase a bill for USD 80,000. Calculate the rate to be quoted to A Ltd. if B wants a margin of 0.08%, given that the inter bank rate is Rs./$ 71.50/10.

(A) Rs. 71.1569
(B) Rs. 71.0431
(C) Rs.71.5572
(D) Rs.71.4428

Answer: 1

(i) (B) Strike price – price after 3 m = 25-30 = Rs. 5 increase. Hence gain by exercising call option is 5 x 100 shares = Rs. 500. Less premium = Rs. 200. Net gain = 500 – 200 = 300

(ii) (C) Rs./$ = 1/0.01386952 = Rs. 72.1005 ; $/£ = 1.3181401

Rs./£ = 72.1005 x 1.3181401 = 95.0386

(iii) (C) This is the base rate upon which many other rates are determined. It is a medium term policy rate.

(iv) (B) -15.50 + 14.45 +1.35 + 0.20 = +0.50

Annualized return = 0.50 / 15.5 x (360/90) = 12.92%

(v) (A) PI = 6.50 X 5.019 / 25 = 1.305

(vi) (A) Rf = Real rate + Inflation rate

Risk premium = β(Rm-Rf)

2.295 = 0.85 (12-Rf)

12- Rf= 2.295/0.85 = 2.7

Rf= 12-2.7 = 9.3

Real Rate of return – 9.3 – 5.1 = 4.2%

(vii) (D) P = D/(ke-g) Hence, Ke-g = D/P = Dividend Yield ratio

(viii) (B) Expected value of call option :

Expected share price (Rs.)	Exercise price (Rs.)	Call value (Rs.)	Probability	Call option value (Rs.)
150	130	20	0.8	16
110	130	0	0.2	0
				16

(ix) (C) Time Value of option = Call premium – Intrinsic Value = Rs.(265+12)-(Rs.270)=Rs. 7

(x) (B) A's banker will purchase $ from A and sell in the interbank market. In the interbank market, B is a customer and hence he can sell at only 71.10 while B can purchase in the interbank market at 71.50. Hence , if B sells at 71.10, it has for itself only the margin of 0.08%. Hence it will quote to A 71.10 -.08% x 71.10 for purchasing the $ from A.

i.e. 71.10-0.0569 = 71.0431

SECTION – B

Answer any five question

2. (a) The distribution of return of security 'S' and the market portfolio 'M' is given below :

Probability	Return %	
	S	M
0.30	30	- 10
0.40	20	20
0.30	0	30

You are required to calculate :

(i) the expected return of security 'S' and the market portfolio 'M'.

(ii) the covariance between the market portfolio and security, and
(iii) beta for the security. 8

(b) Shares of N Limited are being quoted at Rs. **600. Three months' futures rate is** Rs. **636 per share with a lot size of 500 shares. The company does not expect to distribute any dividend in the interim period and the risk free return is 9% p.a. continuously compounded.**

(i) Compute the Theoretical Forward Price.

(ii) 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 per contract if any, due to futures.

(iii) What would be the recommended action and gains, if the three months' future rate is Rs. **600 per share? 8**

Answer : 2(a)

(i) Security S

Probability (P)	R_s	P x R_s	Deviations of S(R_s_ERs)	(Deviation)^2 of S	(Deviation)^2 P_x
0.3	30	9	13	169	50.7
0.4	20	8	3	9	3.6
0.3	0	0	-17	289	86.7
		ER_s = 17			Var_s = 141

Std. Dev $\sigma_s = \sqrt{141} = 11.87$

(ii) Market Portfolio M

R_M	P_M	Exp. Return P_M X R_M	Dev. of M ($R_M - ER_M$)	(Dev of M)^2	(Dev)^2 P_M	(Dev of S) x Dev of M)	(Dev of S)x Dev of M) x P_M
-10	0.3	-3	-24	576	172.8	-312	-93.6
20	0.4	8	6	36	14.4	18	7.2
30	0.3	9	16	256	76.8	-272	-81.6
		ER_M = 14			Var_M = 264 σ_M = 16.25		Covariance P_M = -168

(iii) Beta = Covariance P_M / σ^2_M = -168 / 264 = -0.636

Answer :2 (b)

(b) Theoretical Forward Price = Rs. 600 x $e^{0.09 \times 0.25}$ = 600 x $e^{0.0225}$

= 600 × 1.0228 = Rs. 613.68

Evaluation & suggested course of action :

Particulars	Case A	Case B
3- months future contract rate	Rs.636	Rs. 600
Actual Price	Higher	Lower
Valuation	Overvaluation	Undervalulation
Action	Buy Spot, Sell Future	Sell Spot, Buy Future
Gains due to Futures	Rs.(636-613.68) = Rs. 22.32	Rs.(613.68-600) = Rs. 13.68
Rounded Off	22 or 23	13 or 14

3. (a) An Indian exporter has sold handicraft items to an American business house. The exporter will be receiving US dollar 1 lakh in 90 days. Premium for a dollar put option with a strike price of Rs. 71.00 and a 90 days settlement is Rs. 1. The exporter anticipates the spot rate after 90 days to be Rs. 69.50.

(i) Should the exporter hedge its account receivable in the options market ?

(ii) If the exporter is anticipating a spot rate to be Rs. 70.50 or Rs. 71.50 after 90 days, how would it affect the exporter's decision ? 8

(b) A company operating in USA has on 1st September 2018 invoiced sales in $ to an Indian company, the payment being due on 1st December 2018. The invoice amount is $ 13,750. At spot rate on 1/9/2018 it is equivalent to Rs. **10,18,875. The 3 months forward rate is presently quoted at $ 0.01340 per rupee. The importer wants to hedge half his exposure by a forward contract. Explain the hedging transaction by forward contract that he will enter into and calculate the pay outs and the net gain or loss due to hedging if the spot rates are as follows on 1st December 2018.**

(i) $ 0.01338

(ii) $ 0.01352

Present your calculation using Rs./**$ upto two decimal places. Ignore transaction cost. 8**

Answer : 3(a)

Option	Put
Strike price	Rs.71 per US $
Premium	Rs. 1 per US $
Settlement (expiration) rate	Rs. 69.50

(i) Benefit from Put option = Max [(Strike rate – Expiration rate),0] – Premium

= Max [(Rs. 71 per US $ - Rs. 69.50 per US $), 0] – Rs. 1 per US $

= Rs. (1.50 – Rs. 1) per US $ = Rs. 0.50 per US $

Here, if the exporter remains un-hedged, it will receive

=[Rs. 69.50 per US $ x US $ 1,00,000) = Rs. 69,50,000

But with hedging using Put Option, the exporter receives at the end of 90 days

=[(Rs. 71 x US $ 1,00,000) – (Rs. 1 x US $ 1,00,000)] = Rs. 70,00,000

Gain = Rs. 50,000

OR

Gain = (71 – 69.50) – 1 = 1.5 – 1 = 0.5 Rs./$

1,00,000$ x 0.5 = 50,000 Rs.

As there is benefit in owing the Put, so the Exporter should hedge using the Put Option.

(ii) For Settlement price of Rs. 70.50 per US $, BENEFIT FROM Put Option

= Max [(Rs. 71 per US $ - Rs. 70.50 per US $),0] – Rs. 1 per US $ = (-) Rs. 0.50 per US $, negative

For settlement price of Rs. 71.50 per US $, BENEFIT FROM Put Option

= Max [(Rs. 71 per US $ - Rs. 71.50 per US $), 0] – Rs. 1 per US $

= 0 – Rs. 1 per US $

= (-) Rs. 1 per US $

So, for anticipated price of Rs. 70.50 per US $ or Rs. 71.50 per US $, the exporter will not be hedging through a Put Option, as he does not have positive benefit.

Answer : 3(b)

The importer will loss if the $ appreciates, as is indicated by the forward rate/

Spot rate on 1/9/2018= 74.10 Rs/$ (Rs.10,18,875/$13,750)

3m forward rate = 1/0.01340 = 74.63

Hence by a forward contract, he will ask his banker to sell him at Rs. 74.63, 3 months later, irrespective of what happens to the spot rate on 1st Dec.

(i) On Dec 1st, if the sport rate increases to 74.74 (i.e. 1/0.01338),

Half of his exposure is hedged. His pay out will be on 1st Dec, 13750/2 × 74.74+13750/2 × 74.63 i.e. 6875 × 74.40 + 6875 × 74.63 = 513838 + 513081 = 10,26,919.

If he had not gone for the Forward contract, he would have paid 13750 x 74.74= 10,27,675
By forward contract, the net gain is 1027675– 1026919 = 757

Or

He can still buy from his bank at 74.63. He saves Rs.0.11 per $ by hedging i.e. 0.11x6875= 757

(ii) If the exchange rate falls to 73.96 (i.e. 1/0.01352) on 1st December,

His pay out on 1/12 will be 6875 x 73.96 + 6875 x 74.63

i.e. he will pay 508475 + 513081 = 1021556

If not gone for forward contract, he would have paid 13750 x 73.96 = 10,16,950

By forward contract the net loss = 1021556 – 1016950 = Rs. 4606

Or

He will lose due to the forward contract to the extent of 6875 x (74.63 – 73.96) = Rs. 4606

Since the forward rate was indicting a premium , the importer would only go for forward purchase agreement from the bank. If the actual spot rate goes in a different direction, then the forward contract will not result in hedging and will instead create loss.

4. (a) A company wishes to acquire an asset costing Rs. **1,00,000. The company has an offer from a bank to lend @ 18%. The principal amount is repayable in equal 5 year end instalments. A leasing company has also submitted a proposal to the company to acquire the asset on lease at year end rentals of** Rs. **280 per** Rs. **1,000 of the asset value for 5 years. The asset's life is estimated at 5 years with residual value of** Rs. **10,000 and the cost net of residual value is depreciated equally each year over its life. Assume that this is the only asset of its class so that at the end of the 5th year there will be a capital gain or lss with 20% tax effect when the asset is sold. The tax rate of the company is 50%.**

For what minimum sale value of the asset at the end of the 5th year will the decision to borrow and own the asset be preferred to leasing ? Present annual cash flows and arrive at the discounted cash flows for each year showing salvage value separately. Use PV factors as provided. Round off calculations to the nearest rupee. Assume cash flows on interest and taxes also at year ends.

8

(b) A Ltd. has an investment proposal, requiring an outlay of Rs. **5 lakh. The investment proposal is expected t have two years economic life with no salvage value.**

In year 1, there is a 0.4 probability that cash inflow after tax will be Rs. **3 lakh and 0.6 probability that cash inflow after tax will be** Rs. **4 lakh. The probability assigned to cash inflow after tax for year 2 are as follows :**

Cash inflow for year 1 (Rs.**)**	**3 Lakh**		**4 Lakh**	
Cash inflow for year 2 (Rs.**)**	Rs.	**Probability**	Rs.	**Probability**
	1.50 lakh	**0.2**	**2.40 lakh**	**0.4**
	1.92 lakh	**0.3**	**3.00 lakh**	**0.5**
	2.64 lakh	**0.5**	**3.60 lakh**	**0.1**

The company uses 10% discount rate for this type of investment.

(i) Construct a decision tree for the proposed investment project.

(ii) Calculate the expected Net Present Value (NPV), giving the break up of each path of the decision tree.

(iii) What Net Present Value will the project yield, if the worst outcome is realized? What is its probability?

(iv) What is the probability of having a negative NPV?

(v) Will the project be accepted?

Use pv factors as given in the table. Present calculations to the nearest rupee. 8

Answer : 4(a)

Lease Rental = 28000 before tax = 14000 after tax

14000 x annuity factor 3.889 = 54,446 = PV of lease rentals

In a lease vs borrow evaluation, after tax cost of debt should be the pv factor.

End of yr	Principal O/S	Principal Repayment	Interest	Depn	Interest +Depn	Tax Shield 50%	Cash Outflow	PV Factor 9%	PV of cash outflow
1	80000	20000	18000	18000	36000	18000	20000	0.917	18340
2	60000	20000	14400	18000	32400	16200	18200	0.842	15324
3	40000	20000	10800	18000	28800	14400	16400	0.772	12661
4	20000	20000	7200	18000	25200	12600	14600	0.708	10337
5	0	20000	3600	18000	21600	10800	12800	0.650	8320
Total									64982

Assuming x is the sale value on sale of the asset at the end of the 5th year

64982-[x-.2 {x-10000}] < 54446 to justify purchase by loan

-[x – 0.2x + 2000] x pv factor 0.65 <10,536

or 0.8x + 2000 > 16,209 (I.e. 10,536/0.65)

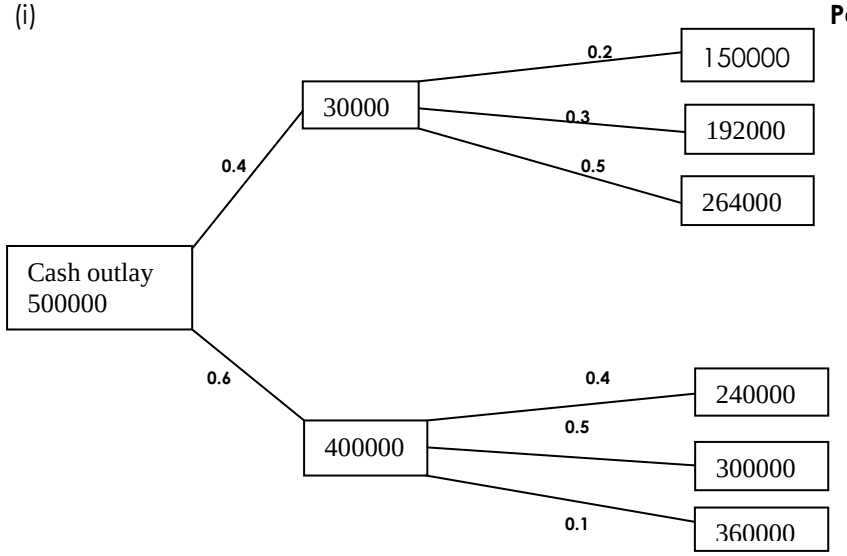
or 0.8x = 16,209 – 2000 = 14209

or x > 17,761

For any sale value above Rs.17,761, purchasing the asset out of bank borrowing is preferable

Answer :4(b)

(i)



Path No.	Joint probability
1	0.08
2	0.12
3	0.20
4	0.24
5	0.30
6	0.06

Decision Tree

(ii) The decision tree given above shows that there are six possible outcomes each represented by a path. The net present value (NPV) of each path at 10% discount rate is given below :-

Path No.	Cash inflow year 1 (Rs.)	Cash inflow year 2 (Rs.)	Total Cash inflow (Rs.)	Cash outflow (Rs.)	Net present value (Rs.)
	(a)	(b)	(c)=(a)+(b)	(d)	e=(c)-(d)
1.	300000 x 0.9091 = 272730	150000 x 0.8264 = 123960	396690	500000	(103310)
2.	300000 x 0.9091 =272730	192000 x 0.8264 = 158669	431399	500000	(68601)
3.	300000 x 0.9091 = 272730	264000 x 0.8264 = 218170	490900	500000	(9100)
4.	400000 x 0.9091 = 363640	240000 x 0.8264 = 198336	561976	500000	61976
5.	400000 x 0.9091 = 363640	300000 x 0.8264 = 247920	611560	500000	111560
6.	400000 x 0.9091 = 363640	360000 x 0.8264 = 297504	661144	500000	161144

Statement showing the expected NPV

Path	NPV @ 10% (a)	Joint Probability (b)	Expected NPV = (a) x (b)
1.	(103310)	0.08	(8265)
2.	(68601)	0.12	(8232)
3.	(9100)	0.20	(1820)
4.	61976	0.24	14874
5.	111560	0.30	33468
6.	161144	0.06	9669
	Total	1.00	39694

(iii) If the worst outcome is realized, the Net present value (NPV) which the project will yield is Rs. 103310 (Negative).

(iv) .08 + .12 + .20 = .40 or 40%

(v) Yes, the project will be accepted since the total expected net present value (ENPV) is positive of Rs. 39694 based on joint probability.

5. (a) The returns on strock @ and market portfolio M for a period of six periods in excess of the risk free rate of 6% are given as follows :

Period	Return on stock S %	Return on market portfolio %
1	12.0	8.0
2	15.0	12.0
3	11.0	11.0
4	2.0	-4.0
5	10.00	9.5
6	-12.0	-2.0

Additional details that may be used optionally :

Variance (%)²	82.93	40.15
Mean (%)	6.33	5.75
Covariance (%)	48.27	

(i) Determine the equation for the characteristic line of the stock – S.

(ii) What would be the return on stock S if the market return is 17.5%?

(iii) Is your finding in (ii) above compatible with the data given ? Why ? Comment on the correlation coefficient. 8

(b) Sagar owns a portfolio in three stocks as detailed below :

Stock	No. of shares	Price (Rs./share)	Beta
X	400000	400	1.3
Y	800000	300	1.2
Z	1200000	100	1.1

The index futures is traded at Rs. 10,250. Assume that the index factor is 100.

(i) Compute the existing portfolio beta upto two decimals.

(ii) Find out the number of contracts (rounded off to the nearest integer) of stock index futures to be bought or sold in order to :

(A) Decrease the portfolio β to 0.8

(B) Increase the portfolio β to 1.5. What will be the proportion of market value of investments in X to the value of total investments plus 10% margin on futures? 8

Answer 5(a)

(i) The characteristic line is given by the formula :

$\alpha_i + \beta_i R_m$

$\beta_i = \frac{\sum XY - n\overline{XY}}{\sum x^2 - n(\overline{X})^2}$

$\alpha_i = \overline{Y} - \beta\overline{X}$

Return on 1(%) (Y)	Return on market (%) (X)	XY	X^2	$(X - \overline{X})$	$(X - \overline{X})^2$	$(Y - \overline{Y})^2$
12.0	8.0	96.0	64.00	2.25	5.06	32.15

15.0	12.0	180.0	144.00	6.25	39.06	75.17
11.0	11.0	121.0	121.00	5.25	27.56	21.81
2.0	-4.0	-8.0	16.00	-9.75	95.06	18.75
10.0	9.5	95.0	90.25	3.75	14.06	13.47
-12.0	-2.0	24.0	4.00	-7.75	60.06	325.99
38.0	34.5	508.0	439.25		240.86	487.34

$\overline{Y} = \frac{38}{6} = 6.33$

$\overline{X} = \frac{34.5}{6} = 5.75$

$\beta_i = \frac{\sum XY - n\overline{XY}}{\sum X^2 - n(\overline{X})^2}$

$= \frac{508-6(5.75)(6.33)}{439.25-6(5.75)^2} = \frac{508-218.385}{439.25-198.375} = \frac{289.615}{240.875} = 1.202$

$\alpha = \overline{Y} - \beta(\overline{X})$

= 6.33 – 1.202 (5.75)

= 6.33 – 6.91 = -0.58

Hence, the characteristic line is -0.58 + 1.202 R_m [X = R_m]

Characteristic Line : y = 1.202x – 0.58

(ii) When market return is 17.5%, x = 17.5 – 6 = 11.5%

Substituting 11.5% in the above equation,

Y = 1.202 x 11.5 – 0.58

= 13.823 – 0.58

= 13.243% is the excess over the risk free rate.

Hence stock's return = 13.243 + 6% = 19.243%, say 19%

This is not compatible with the given data where for 11% market excess, 11% is the stock return excess. And 12% corresponds to 15% (the first two lines in the data). Hence for market 11.5%, awe should expect from the data that the computed value lies mid way between 11 and 15. But it is not so.

Correlation Coefficient r = Cov (X,Y) / σx ay = 48.27 / (9.11 x 6.34) = 0.83

Even in spite of a high correlation, the data is not compatible since the correlation coefficient is reported high only be periods 3 and 5, where data on both market and stock is identical, whereas period 4 shows opposite correlation. Since the data is widely fluctuating, the expected values of covariance tend to average and hence the value as per characteristic line and the actual data are very different.

Answer : 5(b)

Stock	No. of Shares	Price Rs/Share	Beta	Market Value	Weighted Value of beta
X	400000	400	1.3	16,00,00,000	20,80,00,000
Y	800000	300	1.2	24,00,00,000	28,80,00,000
Z	1200000	100	1.1	12,00,00,000	13,20,00,000
Total				52,00,00,000	62,80,00,000

Weighted Beta = 62,80/52,00 = 1.21

Futures Contract value = 10,250 x 100 = 10,25,000

No. of contracts = (1.21-0.8) x 52,00,00,000 / 10,25,000 = 0.41 x 507.32 = 208 contracts have

to be sold in the futures market.

Margin money = 10% x 208 x 10,25,000 = 2,13,20,000

Total investments = 52,00,00,000 +2,13,20,000 = 54,13,20,000

Proportion of X= 16,00,00,000 / 54,13,20,000 = 29.55%, say 30%

To increase the beta on 1.5, no of futures to be purchased = (1.5 – 1.21) x 52,00,00,000 /10,25,000 = 0.29 x 507.32 = 147.1229 = 147 contracts.

Value of the futures contracts = 147 x 10,25,000

= 15,06,75,000

Initial Margin 10% = 1,50,67,500

Total value of investments

in shares = 52,00,00,000

Margin = +1,50,67,500

53,50,67,500

Proportion of X = 16,00,00,000 / 53,50,67,500 = 29.90 or 30%

6. The following are the data on five mutual funds :

Mutual Fund	Return	Standard Deviation	Beta
A	**15**	**7**	**1.25**
B	**18**	**10**	**0.75**
C	**14**	**5**	**1.40**
D	**12**	**6**	**0.98**
E	**16**	**9**	**1.50**

(i) Compute the Sharpe Ratio and Treynor's Ratio and rank these funds assuming the risk free rate as 6% .
(ii) Compute the unsystematic risk of these funds.
(iii) Which of the two measures in (i) is more appropriate ? Why ?
(iv) Assuming that the risk free rate is not known, would you still be able to rank the funds using the Sharpe's and Treynor's ratios ? Why?

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Answer :6 (i) & (ii)

	Return	Rf	R-Rf	Std dev	Sharpe ratio	Sharpe rank	Beta	Treynor ratio	Rank Trey	Unsystematic risk
A	15	6	9	7	1.285714	2	1.25	7.2	2	5.75
B	18	6	12	10	1.2	3	0.75	16	1	9.25
C	14	6	8	5	1.6	1	1.4	5.714286	5	3.6
D	12	6	6	6	1	5	0.98	6.122449	4	5.02
E	16	6	10	9	1.111111	4	1.5	6.666667	3	7.5

(iii) Treynor's method assumes that there is no unsystematic risk and that there is full diversification, whereas Sharpe's method does not assume this. Moreover, as is seen, standard deviation represents the total risk consisting of systematic and unsystematic risk. Unsystematic risk is high and hence, Treynor's assumption is not satisfied. Hence Sharpe's method results in a more appropriate ranking.

(iv) In practical application, the mean return and the standard deviation are estimated

from historical data over the period of interest (for which the comparison to be made) and the risk free return is chosen accordingly Rate of return is required for the computation.

7. (a) Saptarshi Ltd. has just installed Machine- M at a cost of Rs. **2,10,000. The machine has a five year life with no residual value. The annual volume of production is estimated at 150000 units, which can be sole at** Rs. **6 per unit in the first two years and at** Rs. **7,8 and 9 in the third, fourth and fifth years. The first year's operating costs are estimated at** Rs. **2,00,000 (excluding depreciation) at this output level. Fixed costs are estimated at** Rs. **3 per unit for the same level of production. The second year's cost will be the same as in the first year. Thereafter, costs (operating and fixed) will increase over the first year's cost by 10%, 20% and 25% respectively in the third, fourth and fifth years.**

Saptarshi Ltd. has just come across another model called Machine-N capable of fiving the same output at the same fixed and operating costs as in the first year of Machine- M. There will be no change over the first year's costs in the next four years also. Capital cost of this machine is Rs. **2,50,000 and the estimated life is five years with nil residual value.**
The company has an offer for sale of Machine- M at Rs.**1,10,000. But the cost of dismantling and removal will amount to** Rs.**40,000. As the company has not yet commenced operations, it wants to sell Machine- M and purchase Machine- N.**

Saptarshi Ltd. will be a zero-tax company for seven years in view of several incentives and allowances available.

The cost of capital is 15%.

(i) Advise whether the company should opt for the replacement. Present calculations of discounted annual cash flows to the nearest rupee without netting off.

(ii) Will there be any change in your view, if machine-M has not been installed, but the company is in the process of selecting one or the other machine ?

Support your view with necessary workings. Cash flows of revenue and cost may be taken at year ends.

8

(b) From the following project details, calculate the sensitivity of the

(i) Project cost

(ii) Cash inflows

(iii) Which variable is more sensitive ?

Project cost	Rs. **12,000**	**Salvage value**	**Nil**
Life of the project	**4 years**	**Cost of capital**	**14%**
Nil salvage value			

Cash inflows after tax :

end of year 1 : Rs. **5,000**

end of year 2 : Rs. **5,000**

end of year 3 : 10% increase over year 1 inflow

end of year 4 : 10% increase over year 1 inflow

(iv) Would you conclude that cost of capital is more sensitive than (i) or (ii) above? 8

Answer : 7(a) (i)

Replacement :		Rs.
Cash outflow on Machine – N		2,50,000
Less : Sale value of Machine- M	1,10,000	
Less : Cost of Dismantling and Removal =	40,000	70,000

Net outflow =	1,80,000

P.V. of incremental cash inflows = (From (ii) workings below)

13,32,200 (N) – 11,34,308 (M) = 197892

NPV of Machine – N = 1,97,892 – 1,80,000 = 17,892

Rs. 210000 spent on Machine – M is a sunk cost and hence not relevant for deciding the replacement.

Decision : Since NPV of Machine – N is positive, replacement is advised.

(ii) Independent evaluation :

Machine- M

	Total Cost (Op + Fixed)	Sale Value	Net C/I	PV	Total Inflow
Y_1	6,50,000	9,00,000	2,50,000	0.870	2,17,500
Y_2	6,50,000	9,00,000	2,50,000	0.756	1,89,000
Y_3	7,15,000	10,50,000	3,35,000	0.658	2,20,430
Y_4	7,80,000	12,00,000	4,20,000	0.572	2,40,240
Y_5	8,12,500	13,50,000	5,37,500	0.497	2,67,138
					11,34,308
Less : Cash outflow					2,10,000
				NPV	9,24,308

Machine- N

Y_1	6,50,000	9,00,000	2,50,000	0.870	2,17,500
Y_2	6,50,000	9,00,000	2,50,000	0.756	1,89,000
Y_3	6,50,000	10,50,000	4,00,000	0.658	2,63,200
Y_4	6,50,000	12,00,000	5,50,000	0.572	3,14,600
Y_5	6,50,000	13,50,000	7,00,000	0.497	3,47,900
					13,32,200
Less : Cash outflow					2,50,000
				NPV	10,82,200

As the NPV of Machine – N is higher than that of Machine – M, the choice should fall on Machine – N.

Note : As the company is a zero tax company depreciation and the tax effect on the same are not relevant for consideration.

Answer : 7(b)

NPV :

End of Year	Cash flow	PV Factor	PV of cash flows	
0	-12000	1	-12000	-12000
1	+5000	0.877	4385	
2	+5000	0.769	3845	
3	+5500	0.675	3713	
4	+5500	0.592	3256	+15199
			NPV	**3199**

(i) Project costs is 12000 with NPV = 3199
If project cost increases by 3199, NPV = 0

∴ sensitivity of project cost = $\frac{3199}{12000}$ = 26.66% or 27%

(ii) Let x be the after tax each inflow in the 1st yr.
PV of inflows = x × 0.877 + x x 0.769 + 1.1 x × 0.675 + 1.1 x × 0.592
= x(0.877 + 0.769) + 1.1x (0.675 + 0.592)
= x(1.646) + 1.1x (1.267)
= x(1.646 + 1.3937)
= x(3.0397)
For NPV= 0, x × 3.0397 = 12000
x = 12000 / 3.0397 = 3947.76 = 3948
Difference = 5000 – 3948 = 1052
Sensitivity = 1052/5000 = 21.04% , say = 21%
Or NPV/ Annual cash flow = 3199/15199 x 100 = 21.04%

(iii) Cash inflows are more sensitive than project cost.

(iv) If cost of capital is most sensitive , it should change
NPV to zero by a 20% increase
14% + 20% x 14% = 16.8%
At 17% cost of capital
PV of inflows = 5000(0.855 + 0.731) + 5500(0.624 + 0.534)
= 5000(1.586) + 5500(1.158)
= 7930 + 6369
= 14299
NPV = +2299
Hence, we cannot say that cost of capital is more sensitive than (i) or (ii) above.

OR

with 26.6% discount rate,
PV inflows = 5000(0.790 + 0.624) + 5500(0.493 + 0.389)
= 5000 x 1.414 + 5500 x 0.882
= 7070 + 4851
= 11921
NPV = 12000 -11921 ∴ almost zero
∴ Sensitivity = (26.6% - 14%) /14% = 12.6/14 = 90%
Hence cost of capital is the least sensitive.

8. Answer any four out of the following five questions :

(a) Compare commodity futures and financial futures with respect to the following aspects : 4

(i) Valuation
(ii) Delivery and settlement
(iii) Contract features and life
(iv) Supply and consumption pattern

Answer : 8(a)

(i) Valuation

Financial futures are easier to understand as the cost of carry model for its valuation applies. The argument of arbitrage also holds because of the absence of convenience yield in financial futures. Financial futures involve financial instruments which do not have consumption value. The consumption value makes valuation of futures contracts on commodities difficult.

(ii) Delivery and Settlement

The provisions of delivery are applicable equally to commodities and financial futures. In case of financial futures delivery of underlying assets is prompt and hassle free, and so is its settlement. For futures on financial assets the price adjustment on account of discrepancy in quality of which was contracted and what is being delivered, is not required. There is ample scope of controversy over quality in case of commodity futures. In case of futures on indices or intangibles the underlying is non-deliverable and futures contracts on them are necessarily cash settled.

(iii) **Contract Features and Life.**

Commodity futures are governed by seasons and perishable nature of the underlying asset. The delivery is linked to the availability, and therefore contracts specifications have to consider physical characteristics of the underlying assets. Futures contracts on commodities normally do not exceed 90 days, while there is no such limitation on the financial futures. Financial futures can have much longer life, though generally maturity of many financial futures is kept at 90 days.

(iv) **Supply and Consumption Patterns**

In case of financial products, such as stocks, indices and foreign exchange, the supply can be considered as unlimited and independent of weather and seasons. The supply of commodities is dependent upon weather, storage capacity, shelf life etc. For commodity, consumption is uniform throughout the year. Deterioration in value of commodities with time is another phenomenon that does not effect futures on financial products.

(b) State the type of risk in each of the following independent situations : 4
(You may present only the question Roman numeral and type of risk without copying the situations into your answer books).

(i) The owner of a house property wants to sell it, but he is not able to find buyers.
(ii) The risk of recession anticipated by the automobile industry
(iii) The risk of loss in value of investment that cannot be eliminated by an investor through diversification.
(iv) The risk of a bank which has given a car loan to a person who has no defaulted two instalments of EMIs.

Answer : 8(b)

(i) Liquidity Risk

(ii) Market Risk

(iii) Systematic Risk

(iv) Credit Risk

(c) Classify the following items under the appropriate category – whether Money Market (MM) or Capital Market (CM) : (You may choose to write only the Roman numeral under the appropriate head. Do not use brackets for the Roman numerals) **4**

i. Inter Bank Participation Certificate
ii. Equity Shares
iii. SWAPS
iv. REPOS
v. RBI and government are participants
vi. Commercial paper
vii. Global Depository Receipts (GDRs)
viii. Deep Discount Bonds (DDBs)

You may use the following format in your answer books :

MM	CM

Answer : 8 (c)

i. Money Market
ii. Capital Market
iii. Money Market
iv. Money Market
v. Money Market
vi. Money Market
vii. Capital Market
viii. Capital Market

(d) Write short notes on 'repo' and 'reverse repo'. **4**

Answer : 8(d)

Repo or ready forward contact is an instrument for borrowing funds by selling securities with an agreement to repurchase the said securities on a mutually agreed future date at an 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 the repo transaction is called 'reverse repo' which is lending of funds against buying of securities with an agreement to resell the said securities on a mutually agreed future date at an agreed price which includes interest for the funds lent. It can be seen from the definition above that there are two legs to the same transaction in a repo/reverse repo. The duration between the two legs is called the 'repo period'. Predominantly, repos and undertaken on overnight basis, i.e., for one day period. Settlement of repo transactions happens along with the outright trades in government securities.

(e) What is 'credit default risk' and 'counter party risk'? 4

Answer : 8(e)

i) Credit default risk : The risk of loss arising from a debtor being unlikely to pay its loan obligations in full or the debtor is more than 90 days past due on any material credit obligation ; default risk may impact all credit sensitive transactions, including loans, securities and derivatives.

ii) Counterparty risk : The risk of loss arising from non performance of counterparty in trading activities such as buying and selling of commodities, securities, derivatives and foreign exchange transactions. If inability to perform contractual obligations in such trading activities is communicated before the settlement date of the transaction, then counterparty risk is in the form of pre-settlement risk, while if one of the counterparty defaults in its obligations on the settlement date, the counterparty risk is in the form of settlement risk.

Values for use by candidates,

$e^{0.0225}$	**1.0228**
$e^{0.225}$	**1.2523**
$e^{.25}$	**1.2840**

PV factor table

End of Year / Rate	1	2	3	4	5
18%	**0.847**	**0.718**	**0.609**	**0.516**	**0.437**
9%	**0.917**	**0.842**	**0.772**	**0.708**	**0.650**
15%	**0.870**	**0.756**	**0.658**	**0.572**	**0.497**
14%	**0.877**	**0.769**	**0.675**	**0.592**	**0.519**
10%	**0.9091**	**0.8264**	**0.7513**	**0.6830**	**0.6209**
16%	**0.877**	**0.769**	**0.675**	**0.592**	**0.519**
17%	**0.855**	**0.731**	**0.624**	**0.534**	**0.456**
25%	**0.8**	**0.64**	**0.512**	**0.410**	**0.328**
26%	**0.794**	**0.630**	**0.500**	**0.397**	**0.315**
26.6%	**0.790**	**0.624**	**0.493**	**0.389**	**0.307**
26.65%	**0.790**	**0.623**	**0.492**	**0.389**	**0.307**
15.4%	**0.867**	**0.751**	**0.651**	**0.564**	**0.489**
12.6%	**0.888**	**0.789**	**0.700**	**0.622**	**0.552**

Annuity Factors

4 yrs	5 yrs
2.69	**3.127**
3.239	**3.889**
2.856	**3.353**
2.913	**3.432**