



STRATEGIC FINANCIAL MANAGEMENT

Time Allowed: 3 Hours

Full Marks: 100

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

SECTION – A

1. Choose the correct alternative.

[15 x 2 =30]

- (i) Which of the following techniques is the most suitable, when NPV and IRR lead to inconsistent ranking due to life disparity between two or more projects?
- Modified Net Present Value.
 - Modified Internal Rate of Return.
 - Uniform Annual Equivalent Cost/Benefit.
 - Discounted Payback Period.

- (ii) The Profitability Index of a project is 1.28 and its cost of investment is ₹ 2,50,000. The NPV of the project is _____.
- ₹ 75,000
 - ₹ 80,000
 - ₹ 70,000
 - ₹ 65,000

- (iii) The following information is available with respect to Project X:

NPV Estimate (₹)	30,000	60,000	1,20,000	1,50,000
Probability	0.1	0.4	0.4	0.1

The expected NPV will be _____

- ₹ 1,00,000
 - ₹ 75,000
 - ₹ 90,000
 - ₹ 1,20,000
- (iv) The major advantage of leasing is that it _____.
- provides flexible financing
 - provides lower payments
 - avoids risks of obsolescence.
 - All of the above
- (v) It was observed that in a certain month, 6 out of 10 leading indicators moved up as compared to 4 indicators in the previous month. The diffusion index for the months was:
- 20%
 - 40%
 - 60%
 - 80%



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- (vi) Bond volatility is inversely related to:
- Term to maturity
 - Yield to maturity
 - Coupon rate
 - Both (b) and (c)
- (vii) Mr. X expects 20% return from his investment. The dividend from the stock is ₹2.0 and the present price is ₹50. What should be the future price of the stock?
- ₹ 56.39
 - ₹ 58.00
 - ₹ 60.00
 - ₹ 62.30
- (viii) According to the constant growth model, the next year's dividend is ₹2.00, required rate of return is 15% and the growth rate is 10%, the market price would be:
- ₹ 50
 - ₹45
 - ₹ 40
 - ₹ 48
- (ix) Which among the following increases the NAV of a mutual fund scheme?
- Value of investments
 - Receivables
 - Accrued income
 - All of (a), (b) and (c)
- (x) A portfolio comprises two securities and the expected return on them is 12% and 16% respectively. Determine return of portfolio if first security constitutes 40% of total portfolio.
- 12.4%
 - 13.4%
 - 14.4%
 - 15.4%
- (xi) Plain vanilla interest rate swaps involved:
- Fixed to fixed rate swap
 - Fixed to floating rate swap
 - Floating to floating rate swap
 - Currency swap
- (xii) An investor writes a three-month put on the stock of an oil company at an exercise price of ₹275 per share at a premium of ₹34. If the expiration date price is ₹280, calculate the gain/loss of put writer.
- ₹5
 - ₹ 5
 - ₹34
 - None of the above



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- (xiii) The 6-month forward rate for US dollar against Rupee is quoted as ₹49.50 as opposed to a spot price of ₹48.85. The forward premium on US dollar is:
- 1.50 %
 - 3.08 %
 - 3.05 %
 - None of the above.
- (xiv) The sterling is trading at \$1.6400 today. Inflation U.K. is 3.8% and that in U.S.A. is 2.9%. What would be the spot rate (\$/£) after 2 years?
- \$1.6117
 - \$1.615
 - \$1.625
 - None of the above
- (xv) Sharpe's measure of the portfolio performance is based on:
- Systematic risk of the portfolio
 - Unsystematic risk of the portfolio
 - Total risk of the portfolio
 - Market risk of the portfolio

Answer:

(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)	(xv)
c	c	c	d	c	d	b	c	d	c	b	c	b	a	c

SECTION – B

(Answer any five questions out of seven questions given. Each question carries 14 Marks)

2. (a) Nine Gems Ltd. has just installed Machine – R at a cost of ₹2,00,000. The machine has a five-year life with no residual value. The annual volume of production is estimated at 1,50,000 units, which can be sold at ₹6 per unit. Annual operating costs are estimated at ₹2,00,000 (excluding depreciation) at this output level. Fixed costs are estimated at ₹3 per unit for the same level of production.

Nine Gems Ltd. has just come across another model called Machine – S capable of giving the same output at an annual operating cost of ₹1,80,000 (exclusive of depreciation). There will be no change in fixed costs. Capital cost of this machine is ₹2,50,000 and the estimated life is for five years with nil residual value.

The company has an offer for sale of Machine – R at ₹1,00,000, but the cost of dismantling and removal will amount to ₹30,000. As the company has not yet commenced operations, it wants to sell Machine – R and purchase Machine – S.

Nine Gems Ltd. will be a zero-tax company for seven years in view of several incentives and allowances available. The cost of capital may be assumed at 15%. P.V. factors for five years are as follows:



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Year	P.V. Factors
1	0.8696
2	0.7561
3	0.6575
4	0.5717
5	0.4972

- (i) Advise whether the company should opt for the replacement.
(ii) Suggest if there be any change in your view, if Machine-R has not been installed but the company is in the process of selecting one or the other machine?

Support your view with necessary workings.

[7]

- (b) Fair finance, a leasing company, has been approached by a prospective customer intending to acquire a machine whose Cash Down price is ₹3 crores. The customer, in order to leverage his tax position, has requested a quote for a three-year lease with rentals payable at the end of each year but in a diminishing manner such that they are in the ratio of 3: 2: 1. Depreciation can be assumed to be on straight line basis and Fair Finance's marginal tax rate is 35%. The target rate of return for Fair Finance on the transaction is 12%.

Calculate the lease rents to be quoted for the lease for three years.

[7]

Answer:

- (a) (i) **Replacement of Machine – R:**

Incremental cash out flow

Particulars	₹	₹
Cash outflow on Machine – S		2,50,000
Less: Sale value of Machine – R	1,00,000	
Less: Cost of dismantling and removal	30,000	70,000
Net outflow		1,80,000
Incremental cash flow from Machine –S		
Annual cash flow from Machine – S		2,70,000
[(1,50,000×₹6)–(1,50,000×₹3) – 1,80,000]		
Annual cash flow from Machine – R		2,50,000
[(1,50,000×₹6)– (1,50,000×₹3) – 2,00,000]		
Net incremental cash in flow		20,000

$$\begin{aligned}\text{Present value of incremental cash inflows} &= ₹20,000 \times (0.8696 + 0.7561 + 0.6575 + 0.5717 + 0.4972) \\ &= ₹20,000 \times 3.3523 \\ &= ₹67,046\end{aligned}$$

$$\text{NPV of Machine – S} = ₹67,046 - ₹1,80,000 = (-) ₹1,12,954.$$

₹2,00,000 spent on Machine – R is a sunk cost and hence it is not relevant for deciding the replacement.

Decision: Since Net present value of Machine –S is in the negative, replacement is not advised.

If the company is in the process of selecting one of the two machines, the decision is to be made on the basis of independent evaluation of two machines by comparing their Net present values.



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(ii) Independent evaluation of Machine– R and Machine –S

Particulars	Machine– R	Machine– S
Units produced	1,50,000	1,50,000
Selling price per unit (₹)	6	6
Sale value	9,00,000	9,00,000
Less: Operating Cost (exclusive of depreciation)	2,00,000	1,80,000
Contribution	7,00,000	7,20,000
Less: Fixed cost	4,50,000	4,50,000
Annual Cash flow	2,50,000	2,70,000
Present value of cash flows for 5 years	8,38,075	9,05,121
Cash outflow	2,00,000	2,50,000
Net Present Value	6,38,075	6,55,121

As the NPV of Cash in flow of Machine-S is higher than that of Machine-R, the choice should fall on Machine-S.

Note: As the company is a zero tax company for seven years (Machine life in both cases is only for five years), depreciation and the tax effect on the same are not relevant for consideration.

(b) Capital sum to be placed under Lease

Particulars	₹ in lakhs
Cash Down price of machine	300.00
Less: PV of depreciation tax shield [$100 \times 0.35 \times \text{PVIFA}(12\%, 3 \text{ years}) = 35 \times 2.4018$]	84.06
	215.94

If the normal annual lease rent per annum is x, then cash flow will be:

Year	Post-tax cash flow	P.V. of post-tax cash flow
1	$3x \times (1 - .35) = 1.95x$	$1.95 \times (1/1.12) = 1.7411x$
2	$2x \times (1 - .35) = 1.3x$	$1.30 \times [(1/(1.12)^2)] = 1.0364x$
3	$x \times (1 - .35) = 0.65x$	$0.65 \times [1/(1.12)^3] = 0.4626x$
		$= 3.2401x$

Therefore $3.2401 x = 215.94$

or, $x = ₹66.6409$ lakhs

Year-wise rentals are as follows: (₹ in lakhs)

Year 1	3×66.6409 lakhs	199.9227
Year 2	2×66.6409 lakhs	133.2818
Year 3	1×66.6409 lakhs	66.6409

3. (a) A firm has an investment proposal, requiring an outlay of ₹80,000. The investment proposal is expected to have two years economic life with no salvage value. In year 1, there is a 0.4 probability



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that cash inflow after tax will be ₹50,000 and 0.6 probability that cash inflow after tax will be ₹60,000. The probability assigned to cash inflow after tax for the year 2 are as follows:

The cash inflow year 1	₹ 50,000	₹60,000
The cash inflow year 2	Probability	Probability
	₹ 24,000 0.2	₹ 40,000 0.4
	₹ 32,000 0.3	₹ 50,000 0.5
	₹ 44,000 0.5	₹ 60,000 0.1

The firm uses 8% discount rate for this type of investment.

Required:

- (i) Develop a decision tree for the proposed investment project and calculate the expected net present value (NPV).
- (ii) Calculate net present value will the project yield, if worst outcome is realized and also calculate the probability of occurrence of this NPV.
- (iii) Suggest what will be the best outcome and the probability of that occurrence?
- (iv) Recommend whether the project be accepted.

(Note: 8% discount factor 1 year 0.9259; 2 year 0.8573)

[7]

- (b) Consider the equity share of India Incorporated

D_0 = Current dividend per share ₹3.00

n = Duration of the period of super normal growth = 5 years

g_a = Growth rate during the period of super normal growth = 25%

g_n = Normal growth rate after super normal growth period is over = 7%

k = Investor's required rate of return = 14%

Calculate the price of the Equity Share under Multiple Growth Rate Model.

[7]

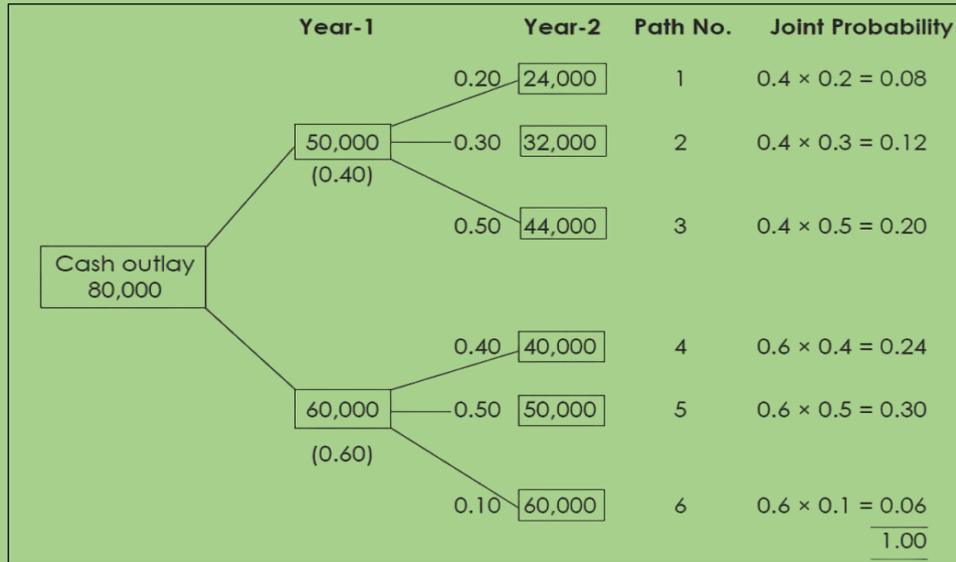
Answer:

- (a) The decision tree diagram is presented in the chart, identifying various paths and outcomes, and the computation of various paths/outcomes and NPV of each path are presented in the following tables:

- (i) The Net Present Value (NPV) of each path at 8% discount rate is given below:



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The Net Present Value (NPV) of each path at 8% discount rate is given below:

Path	Year 1 Cash Flows (₹)	Year 2 Cash Flows (₹)	Total Cash Inflows (PV) (₹)	Cash Outflows (₹)	NPV (₹)
1	$50,000 \times .9259 = 46,295$	$24,000 \times .8573 = 20,575$	66,870	80,000	(-) 13,130
2	$50,000 \times .9259 = 46,295$	$32,000 \times .8573 = 27,434$	73,729	80,000	(-) 6,271
3	$50,000 \times .9259 = 46,295$	$44,000 \times .8573 = 37,721$	84,016	80,000	4,016
4	$60,000 \times .9259 = 55,554$	$40,000 \times .8573 = 34,292$	89,846	80,000	9,846
5	$60,000 \times .9259 = 55,554$	$50,000 \times .8573 = 42,865$	98,419	80,000	18,419
6	$60,000 \times .9259 = 55,554$	$60,000 \times .8573 = 51,438$	1,06,992	80,000	26,992

Statement showing Expected Net Present Value

Path	NPV (₹)	Joint Probability	Expected NPV (₹)
1	(-) 13,130	0.08	(-)1,050.40
2	(-) 6,271	0.12	(-)752.52
3	4,016	0.20	803.20
4	9,846	0.24	2,363.04
5	18,419	0.30	5,525.70
6	26,992	0.06	1,619.52
			8,508.54

Conclusions:

- (i) If the worst outcome is realized the project will yield NPV of (-) ₹13,130. The probability of occurrence of this NPV is 8% and a loss of (-) ₹ 1,050.40 (path 1).
- (ii) The best outcome will be path 5 when the NPV is at ₹18,419. The probability of occurrence of this NPV is 30% and an expected profit of ₹5,525.70.
- (iii) The project should be accepted because the expected NPV is positive at ₹8,508.54 based on joint probability.



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- (b) The following are the steps involved:

Step I. Dividend stream during super normal growth period.

$$D_1 = ₹3.00 (1.25); \quad D_2 = ₹3.00 (1.25)^2, \quad D_3 = ₹3.00 (1.25)^3$$

$$D_4 = ₹3.00(1.25)^4 \text{ and } D_5 = ₹3.00(1.25)^5$$

The present value of the above stream of dividends is

$$\begin{aligned} & \frac{3.00(1.25)}{(1.14)} + \frac{3.00(1.25)^2}{(1.14)^2} + \frac{3.00(1.25)^3}{(1.14)^3} + \frac{3.00(1.25)^4}{(1.14)^4} + \frac{3.00(1.25)^5}{(1.14)^5} \\ &= ₹(3.29 + 3.61 + 3.96 + 4.34 + 4.76) \\ &= ₹19.96 \end{aligned}$$

Step II. The price of the shares at the end of 5 years, applying the constant growth model at that point of time will be

$$P_5 = \frac{D_6}{k-g} = \frac{D_5(1+g_n)}{k-g_n} = \frac{3.00(1.25)^5(1.07)}{0.14-0.07} = ₹140$$

$$\text{Discounted value of this price} = \frac{₹140}{(1.14)^5} = ₹72.71$$

Step III. The sum of Steps I and II is

$$₹19.96 + ₹72.71 = ₹92.67$$

4. (a) AB Ltd. is expected to pay a dividend of ₹4.00 at the end of first year, a dividend of ₹7.00 at the end of second year, a dividend of ₹11.00 at the end of 3rd year. From 4th year onwards, the dividends are expected to grow at a constant growth rate of 4%. If the required rate of return is 14%, compute the present value of the stock. [7]
- (b) Four friends S, T, U, and V have invested equivalent amount of money in four different funds in tune with their attitude to risk, S prefers to play aggressive and is keen on equity-funds, T is moderately aggressive with a desire to invest upto 50% of his funds in Equity, whereas U does not invest anything beyond 20% in Equity. V, however, relies more on movement of market, and prefers any fund which replicates the market portfolio.

Their investment particulars, returns therefrom and Beta of the fund are given below —

Fund Invested	Return for the year	Beta Factor
Money Multiplier Fund (100% Equity)	23.50%	1.80
Balanced Growth Fund (50% Equity - 50% Debt)	16.50%	1.25
Safe Money Fund (20% Equity and 80% Debt Funds)	12.50%	0.60



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If the Market Return was 16% and the Risk Free Return is measured at 7%, suggest which of the four friends were rewarded better per unit of risk taken? [7]

Answer:

$$(a) \quad P_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \frac{D_3(1+g)}{(1+k)^3(k-g)}$$

Substituting these values:

$$\begin{aligned} P_0 &= \frac{4}{(1.14)} + \frac{7}{(1.14)^2} + \frac{11}{(1.14)^3} + \frac{11.44}{(1.14)^3(0.14-0.04)} \\ &= 3.509 + 5.39 + 7.415 + 77.22 \\ &= ₹ 93.54 \end{aligned}$$

Therefore, the price of the share is ₹ 93.54 through DDM (dividend discount model)

(b)

Particulars	S	T	U	V
Risk Free Return [R _F]	7%	7%	7%	7%
Fund Invested	Money Multiplier Fund	Balanced Growth Fund	Safe Money Fund	Market Portfolio
Beta of the Portfolio [β _P]	1.80	1.25	0.60	1.00
Return on Portfolio [R _P]	23.50%	16.50%	12.50%	16.00%
Treynor Measure [(R _P -R _F) ÷ β _P]	9.17 [23.50-7] ÷ 1.80	7.60 [16.50-7] ÷ 1.25	9.17 [12.50-7] ÷ 0.60	9.00 [16-7] ÷ 1
Ranking	1	3	1	2

Evaluation: Both S and U have earned the same Reward per unit of risk taken, which is more than the Market Reward to Risk of 9.00

5. (a) The beta coefficient of M Ltd. is 1.40. The company has been maintaining 8% rate of growth in dividends and earnings. The last dividend paid was ₹4.00 per share. Return on government securities is 12% and return on market portfolio is 18%. The current market price of the share of M Ltd. is ₹32.00. Calculate the equilibrium price per share of M Ltd. [7]

(b) From the following information, ascertain the risk of the portfolio — [7]

Securities	Standard Deviation	Proportion in Portfolio
A	8%	0.30
B	12%	0.50
C	6%	0.20

Correlation Co-efficient

AB = 0.50



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$$AC = - 0.40$$

$$BC = + 0.75$$

Answer:

- (a) Required rate of return as per CAPM = $R_f + (R_m - R_f) \times \beta_1 = 12 + (18-12) \times 1.40 = 20.40\%$.
Equilibrium price $D_1 = 4 \times (1+0.08) = 4 \times 1.08 = ₹ 4.32$ and $G = 0.08$ [E.P. = Equilibrium price].

$$\begin{aligned} \text{Expected return} &= [D_1/\text{E.P.}] + g \text{ or } 20.40 = 4.32/\text{E.P.} + 0.08 \\ &\text{or } (0.2040 - 0.08) \text{ E.P.} = 4.32 \\ &\text{or } 0.124 \text{ E.P.} = 4.32 \\ &\text{or E.P.} = 4.32 / 0.124 \\ &\text{or } ₹34.84. \\ &\text{or equilibrium price} = ₹34.84 \end{aligned}$$

- (b) **Formula Approach (Alternative 1)**

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

Standard Deviation of Security A	σ_A	8%
Standard Deviation of Security B	σ_B	12%
Standard Deviation of Security C	σ_C	6%
Correlation co-efficient of Securities A and B		0.50
Correlation co-efficient of Securities A and C		-0.40
Correlation co-efficient of Securities B and C		0.75
Weight of Security A	W_A	0.30
Weight of Security B	W_B	0.50
Weight of Security C	W_C	0.20

(ii) Computation of Portfolio Risk (σ_{ABC})

$$\begin{aligned} &= \sqrt{(\sigma_A^2 \times W_A^2) + (\sigma_B^2 \times W_B^2) + (\sigma_C^2 \times W_C^2) + 2(\sigma_A \times W_A \times \sigma_B \times W_B \times \rho_{AB}) + 2(\sigma_A \times W_A \times \sigma_C \times W_C \times \rho_{AC}) + 2(\sigma_B \times W_B \times \sigma_C \times W_C \times \rho_{BC})} \\ &= \sqrt{(8^2 \times 0.3^2) + (12^2 \times 0.5^2) + (6^2 \times 0.2^2) + (2 \times 8 \times 0.3 \times 12 \times 0.5 \times 0.5) + (2 \times 8 \times 0.3 \times 6 \times 0.2 \times (-0.4)) + (2 \times 12 \times 0.5 \times 6 \times 0.2 \times 0.75)} \\ &= \sqrt{(64 \times 0.09) + (144 \times 0.25) + (36 \times 0.04) + (14.4) + (-2.304) + (10.8)} \\ &= \sqrt{5.76 + 36 + 1.44 + 14.4 - 2.304 + 10.8} \\ &= \sqrt{66.096} \\ &= 8.13\% \end{aligned}$$

Formula Approach (Alternative 1)



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

Variance of Security A	σ_A^2	$8^2 = 64$
Variance of Security B	σ_B^2	$12^2 = 144$
Variance of Security C	σ_C^2	$6^2 = 36$
Covariance of Securities A and B [$P_{AB} \times \sigma_A \times \sigma_B$]	COV_{AB}	$0.50 \times 8 \times 12 = 48$
Covariance of Securities A and C [$P_{AC} \times \sigma_A \times \sigma_C$]	COV_{AC}	$-0.40 \times 8 \times 6 = -19.2$
Covariance of Securities B and C [$P_{BC} \times \sigma_B \times \sigma_C$]	COV_{BC}	$0.75 \times 12 \times 6 = 54$
Weight of Security A	W_A	0.30
Weight of Security B	W_B	0.50
Weight of Security C	W_C	0.20

(c) Matrix

Securities		A	B	C
	Weights	0.30 W_A	0.50 W_B	0.20 W_C
A	0.30 W_A	64 (σ_A^2)	48 (Cov_{AB})	-19.2 (Cov_{AC})
B	0.50 W_B	48 (Cov_{AB})	144 (σ_B^2)	54 (Cov_{BC})
C	0.20 W_C	-19.2 (Cov_{AC})	54 (Cov_{BC})	36 (σ_C^2)

Computation of Portfolio Variance (σ_{ABC}^2)

	Description	Computation ($W \times W \times Cov$) or ($W \times W \times \sigma^2$)	Product
1	$W_A \times W_A \times (\sigma_A^2)$	$0.30 \times 0.30 \times 64$	5.76
2	$W_A \times W_B \times COV_{AB}$	$0.30 \times 0.50 \times 48$	7.20
3	$W_A \times W_C \times COV_{AC}$	$0.30 \times 0.20 \times (19.2)$	(1.15)
4	$W_B \times W_A \times COV_{AB}$	$0.50 \times 0.30 \times 48$	7.20
5	$W_B \times W_B \times (\sigma_B^2)$	$0.50 \times 0.50 \times 144$	36
6	$W_B \times W_C \times COV_{BC}$	$0.50 \times 0.20 \times 54$	5.40
7	$W_C \times W_A \times COV_{AC}$	$0.20 \times 0.30 \times (19.2)$	(1.15)
8	$W_C \times W_B \times COV_{BC}$	$0.20 \times 0.50 \times 54$	5.40
9	$W_C \times W_C \times (\sigma_C^2)$	$0.20 \times 0.20 \times 36$	1.44
	Variance of the Portfolio (σ_{ABC})		66.10
	Standard Deviation (Risk) of the Portfolio (σ_{ABC})		8.13%



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6. (a) Given the following information

BSE Index	50,000
Value of Portfolio	₹1,01,00,000
Risk Free Interest Rate	9% p.a.
Dividend Yield on Index	6% p.a.
Beta of Portfolio	2.0

We assume that a futures contract on the BSE index with 4 months maturity is used to hedge the value of portfolio over next 3 months. One future contract is for delivery of 50 times the index. Based on the information, calculate:

- (i) Price of future contract,
(ii) The gain on short futures position if index turns out to be 45,000 in 3 months [7]
- (b) Calculate the price of a European put option on a non-dividend-paying stock when the stock price is ₹ 69, the strike price is ₹ 70, the risk-free interest rate is 5% per annum, the volatility is 35% per annum, and the time to maturity is six months. [7]

Answer:

- (a) (i) Computation of price of Futures Contract

Securities of	R Ltd.
Spot price [S_x]	₹50,000
Dividend yield Expected [Y]	6% or 0.06
Tenor / Time period [t] in Years	4 Months or 0.3333 Year
Risk Free interest Rate [r]	9% or 0.09
Price of Futures Contract [TFP_x] $TFP_x = S_x \times e^{(r-y) \times t}$	$= ₹50,000 \times e^{(0.09 - 0.06) \times 0.3333}$ $= ₹50,000 \times e^{0.03 \times 0.3333}$ $= ₹50,000 \times e^{0.01}$ $= ₹50,000 \times 1.0101$ $= ₹50,505$

Therefore, price of the Futures Contract is ₹50,505 or ₹50,500 (Approx)

- (ii) Gain on short Futures Position

Computation of No. of Contracts to be entered into:

Particulars	Value
Portfolio Value	₹1,01,00,000
4-Month's futures Price per Unit of BSE Index	₹50,500
No. of Units per BSE Index Futures Contract	50
Value per BSE Index futures Contract [50 Units × 50,500 per unit]	₹25,25,000
No. of Contract to be entered [Portfolio Value × Beta of Portfolio w.r.t Index ÷ Value per BSE Index futures Contract] = [₹1,01,00,000 × 2.0 ÷ ₹25,25,000]	8 Contracts

Computation of Gain on Short Futures Position



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Particulars	Value
Position	SELL
Contracted Sale Price per Unit of BSE Index	₹50,500
Less: Index Position in 3-Months	₹45,000
Gain per Unit of BSE Index Future	₹5,500
No. of Units per Contract	50
Gain per Contract [₹5,500 × 50 Units]	₹2,75,500
No. of Contract entered into	8
Total Gain [8 Contracts × ₹2,75,000 per contract]	₹22,00,000

Total Gain on Short Futures Position in 3 Months is ₹22,00,000.

(b) In this case,

$$S_0 = 69, K = 70, r = 0.05, \sigma = 0.35 \text{ and } T = 0.5$$

$$d_1 = \frac{\ln(69 / 70) + (0.05 + 0.35^2 / 2) \times 0.5}{0.35\sqrt{0.5}} = 0.166$$

$$d_2 = d_1 - 0.35\sqrt{0.5} = -0.0809$$

The price of the European put is

$$70e^{-0.05 \times 0.5} N(0.0809) - 69 N(-0.1666)$$

$$= 70e^{-0.05 \times 0.5} \times 0.5323 - 69 \times 0.4338$$

$$= 6.40.$$

7. (a) On 25th March 2023, a customer requested his bank to remit DG 12,50,000 to Netherlands in payment of import of diamonds under an irrevocable LC. However due to bank strikes, the bank could affect the remittance only on 2nd April 2023. The inter-bank market rates were as follows:

Date	25.03.2023	02.04.2023
Bombay [\$ / ₹100]	2.2873 - 2.2962	2.3063 - 2.3159
London [US\$/Pound]	1.9120 - 1.9135	1.9050 - 1.9070
DG /Pound	4.1125 - 4.1140	4.0120 - 4.0130

The bank wishes to retain an exchange margin of 0.25%. Calculate how much does the customer stand to gain or lose due to the delay? [7]

- (b) Exchange rate between Rupee and Swiss franc is ₹33/SFr at the reference period and the forward rate is found to be ₹33.40/SFr after 9 months. Nine-month interest rate on Rupee is 8% p.a. Recommend what should have been corresponding interest rate on Swiss franc. Show that interest rate differential is equal to forward premium or discount. [7]

Answer:

- (a) 1. Determination of Rupee Value of DG 1 on 25.03.2021

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Process: Buy US \$ at Ask Rate at Bombay => Buy Pound (using US \$) at Ask Rate at London
=> Sell Pound at Bid Rate for DG

Therefore, ₹ / DG = Ask Rate at Bombay (for Purchase of Dollar) × Ask Rate for Pound at London (for Purchase of Pound) × Bid Rate for DG (for conversion of Pound into DG)
= $100/2.2873 \times 1.9135 \times (1/4.1125)$
= ₹20.34 per DG

2. Determination of Rupee Value of DG 1 on 02.04.2021

Process: Buy US \$ at Ask Rate at Bombay => Buy Pound (using US \$) at Ask Rate at London
=> Sell Pound at Bid Rate for DG

Therefore, ₹/DG = Ask Rate at Bombay (for Purchase of Dollar) × Ask Rate for Pound at London (for Purchase of Pound) × Bid Rate for DG (for conversion of Pound into DG)
= $100/2.3063 \times 1.9070 \times (1/4.0120)$
= ₹20.61 per DG

3. Loss because of Delay

- a) Loss without considering Banker's Margin (Extra Money payable by the Company)
= Amount Payable × (Exchange Rate on the date of a ctual payment – Exchange Rate on the date on which payable)
= $DG 12,50,000 \times (\text{₹}20.61 - \text{₹}20.34)$
= ₹3,37,500
- b) Banker's Margin on Loss
= ₹3,37,500 × 0.25%
= ₹ 844
- c) Total Loss to the Company
= ₹3,37,500 + ₹844
= ₹3,38,344

(b) Given, $e_0 = \text{₹}33/\text{SFr}$

$f_1 = \text{₹}33.40/\text{SFr}$

Interest rate in home country (India) = $r_h = 8\%$ p.a. (for 9 months)

Interest rate in foreign country (USA) = $r_f = x\%$ p.a. (for 9 months)

Since, as per IPR, $f = e_0 \frac{1 + r_h}{1 + r_f}$

Conditionally, $33.40 = 33 \times \frac{1 + 0.08 \times \frac{9}{12}}{1 + X \times \frac{9}{12}}$

or, $x = 0.063$ or 6.3%



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So, the interest rate on Swiss franc is 6.3% p.a.

$$\text{Interest rate differential} = \frac{r_h + r_f}{1 + r_f} = \frac{0.08 \times \frac{9}{12} - 0.063 \times \frac{9}{12}}{1 + 0.063 \times \frac{9}{12}} = 1.21\%$$

$$\text{Forward Premium or discount} = \frac{f_1 - e_0}{e_0} = (33.40 - 33.00)/33.00 = 1.21\%$$

So, interest rate differential is equal to forward premium or discount.

8. (a) Prepare a short note on Digital Infra Structure. [5]
(b) Discuss who can invest in participatory notes. [5]
(c) Discuss the benefits of Securitization. [4]

Answer:

- (a) Digital infrastructure refers to the digital technologies that bring together and interconnect physical and virtual technologies such as computer, storage, network, applications etc. to provide the foundation for an organisation's digital operations. Businesses use this foundation to re-architect their services for global digital delivery and to access the ecosystems and capabilities they need to rapidly build products and services and deliver them at scale.

Components of digital infrastructure include:

- 1) Internet: The Internet is the global system of interconnected computer networks that uses the Internet protocol suite (TCP/IP) to communicate between networks and devices. It is a network of networks that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing. Internet acts as the prime enabler or connecting force that integrates the digital world including digital finance.
- 2) Mobile telecom and digital communication suites, including applications: These components connect various organisations to a common network and enables communication for digital transactions.
- 3) Data centers and networks: A data center is a physical facility that organisations use to house their critical applications and data. A data center's design is based on a network of computing and storage resources that enable the delivery of shared applications and data. The key components of a data center design include routers, switches, firewalls, storage systems, servers, and application-delivery controllers.
- 4) Enterprise portals, platforms, systems, and software: An enterprise portal, also known as an enterprise information portal (EIP), is a framework for integrating information, people and processes across organizational boundaries in a manner similar to the more general web portals. Enterprise portals provide a secure unified access point, often in the form of a web-based user interface, and are designed to aggregate and personalize information through application-specific portlets. The portal integrated with required systems and applications

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delivers the required service.

- 5) Cloud services: The term “cloud services” refers to a wide range of services delivered on demand to companies and customers over the internet. These services are designed to provide easy, affordable access to applications and resources, without the need for internal infrastructure or hardware. These are infrastructure, platforms, or software that are hosted by third-party providers and made available to users through the internet. Cloud services can be of three types – (i) Infrastructure-as-a-service (IaaS) where the cloud service provider manages the infrastructure for the firm through an internet connection; (ii) Platforms-as-a-Service (PaaS) where the hardware and an application-software platform are provided and managed by an outside cloud service provider, but the user handles the apps running on top of the platform and the data the app relies on and (iii) Software- as-a-Solution (SaaS) where the service provider delivers a software application—which the cloud service provider manages—to its users.
- 6) Operational security, user identity and data encryption: Operational security is a security and risk management process that prevents sensitive information from getting into the wrong hands. It applies specific authentication process to verify user identity and also systems and software to ensure data encryption apart from advanced data security through antivirus and antimalware.
- 7) APIs and integrations: An application programming interface (API) is a messenger that processes request and ensures seamless functioning of enterprise systems. An API integration is the connection between two or more applications, via their APIs, that lets those systems exchange data. API integrations power processes throughout many high-performing businesses that keep data in sync, enhance productivity, and drive revenue.

The above elements are the generic components of a digital infrastructure. In addition, digital finance infrastructure will include the digital payment system infrastructure of the country, blockchain enabled distributed ledger system under a broader Decentralized Finance (DeFi) system.

- (b) Following entities are eligible to invest in Participatory Notes:
- (i) Any entity incorporated in a jurisdiction that requires filing of constitutional and/or other documents with a registrar of companies or comparable regulatory agency or body under the applicable companies’ legislation in that jurisdiction;
 - (ii) Any entity that is regulated, authorized or supervised by a central bank, such as the Bank of England, the Federal Reserve, the Hong Kong Monetary Authority, the Monetary Authority of Singapore or any other similar body provided that the entity must not only be authorized but also be regulated by the aforesaid regulatory bodies;
 - (iii) Any entity that is regulated, authorized or supervised by securities or futures commission, such as the Financial Services Authority (UK), the Securities and Exchange Commission, the Commodities Futures Trading Commission, the Securities and Futures Commission (Hong Kong or Taiwan), Australia Securities and Investments Commission (Australia) or other securities or futures authority or commission in any country, state or territory;
 - (iv) Any entity that is a member of securities or futures exchanges such as the New York Stock Exchange (Sub- account), London Stock Exchange (UK), Tokyo Stock Exchange (Japan),

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NASD (Sub-account) or other similar self-regulatory securities or futures authority or commission within any country, state or territory provided that the aforesaid organisations which are in the nature of self-regulatory organisations are ultimately accountable to the respective securities / financial market regulators.

- (v) Any individual or entity (such as fund, trust, collective investment scheme, Investment Company or limited partnership) whose investment advisory function is managed by an entity satisfying the criteria of (a), (b), (c) or (d) above.

- (c) The driving force behind securitization has been the need for banks to realize value from the assets they hold on their balance sheet. Typically, these assets are residential mortgages, corporate loans, and retail loans such as credit card loans. A financial institution securitizes part of its balance sheet for three main reasons:

- a. Funding the assets that it owns
- b. Balance sheet capital management
- c. Risk management and credit risk transfer.

These are discussed below.

a. Funding the assets that is owns

Banks can use securitization to (1) support rapid asset growth, (2) diversify their funding mix and reduce cost of funding, and (3) reduce maturity mismatches. Banks aim to optimize their funding between a mix of retail, interbank, and wholesale sources. Securitization is a prime component in this mix. Securitization also helps a bank to reduce its funding costs. This is because the securitization process separates the credit rating of the originating institution from the credit rating of the issued notes. Typically, most of the notes issued by special purpose vehicles (SPVs) will be more highly rated than the bonds issued by the originating bank directly. Finally, bank often funds long-term assets, such as residential mortgages, with short-asset liabilities, such as bank account deposits or interbank funding. This funding “gap” can be mitigated via securitization, as the originating bank receives funding from the sale of the assets, and the economic maturity of the issued notes frequently matches that of the assets.

b. Balance sheet capital management

Banks use securitization to improve balance sheet capital management. Securitization provides (1) regulatory capital relief, in some cases (depending on the form of the transaction), (2) “economic” capital relief, and (3) diversified sources of funding.

c. Risk Management and Credit risk transfer

Once assets have been securitized, the credit risk exposure on these assets for the originating bank is reduced considerably. This is because assets have been sold to the SPV. Securitization can also be used to remove nonperforming assets from banks’ balance sheets. This will remove credit risk as well as a potentially negative sentiment from the balance sheet apart from freeing up regulatory capital as before. Further, if any of the securitized NPA starts performing again, or there is a recovery value obtained from defaulted assets, the originator will receive any surplus profit made by the SPV.



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Securitization is beneficial from the view point of investors also. The potential attractions include:

- a. Ability to diversify into sectors of exposure that might not be available in the regular bond markets (for example, residential mortgages or project finance loans).
- b. Access to different (and sometimes superior) risk-reward profiles.
- c. Access to sectors that are otherwise not open to them.