



CMA-SFM

Suggested Solution

Test-15



SECTION - A (Compulsory)

Q.1

MCQ	Answer	Hint
i.	A. 4	$\text{Beta} = \frac{\sigma_{mf} \times r_{m,mf}}{\sigma_m} = 12 \times 1.25 / 10 = 1.5$ Expected Return = $8\% + 1.5(10-8)\% = 11\%$ Actual return = Expected + Alpha = $11\% + 3\% = 14\%$ Treynor Ratio = $\frac{E(r) - R_f}{\beta} = (14\% - 8\%) / 1.5 = 4$
ii.	B. 3%	$F = S \times [(1 + r_{INR})^n / (1 + r_{USA})^n]$ Or, $F (\text{₹}/\\$)$ = $60.50 \times [1 + 0.08]^5 / (1 + r)^5$ $76.68 = 60.50 \times 1.4693 / (1 + r)^5$ Or, $(1 + r)^5 = 1.1593$ Or, $r = 3\%$
iii.	D.	Present spot rate = ₹90/£ i.e., $1\text{₹} = 1/90 \text{ £}$ if ₹ depreciates by 10%, $1\text{₹} = 1/90 \times 90\% = 1/100 \text{ £}$ Or, $1\text{£} = ₹100$. Increase in profit by $100 - 90 = ₹10$ per unit.
iv.	C.	Straddle: Involves buying a call option and a put option with the same strike price and expiration date. This strategy profits from significant price movements in either direction, making it suitable for situations where high volatility is expected.
v.	C.	Explanation: (a) ETFs allow investors to invest in broad market indexes as well as international indexes: This is a feature of both ETFs and mutual funds, so it's not a unique advantage of ETFs. (b) Investors can avoid incurring an expense in the form of a bid-ask spread by purchasing an ETF rather than investing in an open-end mutual fund: This statement is incorrect because ETFs, like individual stocks, do have bid-ask spreads while mutual funds always trade at NAV, without any bid/ask spreads. Thus, this option can't be the correct answer. (c) ETFs offer a potential tax advantage to investors who incur capital gains taxes only when they sell ETF shares: This is a true statement about ETFs and is indeed a unique advantage they offer compared to mutual funds. ETFs generally have a tax-efficient structure that allows investors to defer capital gains taxes until they sell their shares, whereas open-end mutual funds often distribute capital gains to investors annually, which can result in tax liabilities even if the investor has not sold any shares.



		(d) ETF prices cannot deviate from net asset value: This is incorrect because, while mechanisms help keep the ETF price close to its NAV, small deviations can and do occur. Given these points, (c) remains the correct option.										
vi.	A 0.47 & 0.40	First scenario: - Change in stock price: ₹265 - ₹250 = ₹15 - Change in call option price: ₹32 - ₹25 = ₹7 Delta = change in call option price/ change in stock price = 7/15 = 0.47 Second scenario: - Change in stock price: ₹240 - ₹250 = -₹10 - Change in call option price: ₹21-25 = -₹4 Delta = -4/-10 = 0.4 Note: Deltas of Call Option and put Option: (a) Delta of a Call Option is always positive. (b) Delta of a Put Option is always negative.										
vii.	D.	Characteristic Line is a graph depicting the relationship between Security Returns and Market Index Returns.										
viii.	In the asked MCQ, only three options were there. Among the given options, (A) is correct. A. Identification of anticipated changes in production, inflation, and term structure of interest rates as key factors explaining the risk return relationship. Explanation: This is because APT allows for multiple factors that can influence the returns on an asset, whereas CAPM relies on a single market factor (beta). This multifactor approach enables APT to potentially capture a more comprehensive picture of the risk-return relationship by considering various economic forces. Alternative MCQ Solution if following 4 options were given: <table border="1"><tr><td colspan="2">The feature of the general version of the arbitrage pricing theory (APT) that offers the greatest potential advantage over the simple CAPM is the:</td></tr><tr><td>A.</td><td>Identification of anticipated changes in production, inflation, and term structure of interest rates as key factors explaining the risk return relationship.</td></tr><tr><td>B.</td><td>Superior measurement of the risk-free rate of return over historical time periods.</td></tr><tr><td>C.</td><td>Variability of coefficients of sensitivity to the APT factors for a given asset over time.</td></tr><tr><td>D.</td><td>Use of several factors instead of a single market-index to explain the risk-return relationship.</td></tr></table> Answer: (D). Use of several factors instead of a single market-index to explain the risk-return relationship. Explanation: The APT allows for multiple factors to explain the returns on an asset, unlike the CAPM which relies on a single market factor. This multi-factor approach can provide a more comprehensive and potentially accurate explanation of the risk-return relationship by considering various economic, market, and firm-specific factors.		The feature of the general version of the arbitrage pricing theory (APT) that offers the greatest potential advantage over the simple CAPM is the:		A.	Identification of anticipated changes in production, inflation, and term structure of interest rates as key factors explaining the risk return relationship.	B.	Superior measurement of the risk-free rate of return over historical time periods.	C.	Variability of coefficients of sensitivity to the APT factors for a given asset over time.	D.	Use of several factors instead of a single market-index to explain the risk-return relationship.
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ix.	D.	1.275%	Risk free return = Real rate of return + Rate of inflation = 6.2 + 4.7 = 10.9 Risk Premium = $\beta (R_m - R_f) = 0.75 (12.6 - 10.9) = 1.275\%$								
x.	A.	₹156	As per MM model, the current market price of equity share is: $P_0 = \frac{1}{1+k_e} \times (D_1 + P_1)$ If the dividend is declared: $150 = \frac{1}{1+0.10} \times (9 + P_1)$ $150 = \frac{9 + P_1}{1.10}$ $165 = 9 + P_1$ $P_1 = 165 - 9 = ₹ 156$								
xi.	A.	₹5905	PV of certain cash flows = $70,000 \times 1/1.1 \times 80\% + 60,000 \times (1/1.1)^2 \times 70\% + 45,000 \times (1/1.1)^3 \times 60\%$ = 1,05,905 NPV = 1,05,905 -1,00,000 = 5,905								
xii.	C.		C. Penetration of the trend line. This typically refers to the price moving through and beyond the established trend line, indicating a potential change in the trend's direction.								
xiii.	C.		Digital Finance Business Functions; Digital Finance Technologies & Technological Concepts; and Digital Finance Institutions.								
xiv.	B.		<u>MWROR with reinvestment:</u> When you reinvest 20 p dividend at time 1, the no. of units you buy. = $[0.2 \times 2100] / 21 = 20$ Therefore, Total units at the beginning of the 2nd Year = 2100 +20 = 2120. The cash flow for computing the rupee-weighted return are then: <table><tr><th>Time</th><th>Return</th></tr><tr><td>0</td><td>-2100 × 19 = (-)39,900</td></tr><tr><td>1</td><td>0</td></tr><tr><td>2</td><td>2120 × [0.25+ 23] =49.290</td></tr></table> The rupee-weighted return is just the IRR, defined by: $(-) 39,900 + 49,290/ (1 + IRR)^2 = 0;$ Or, IRR = $[49,290/39,900]^{0.5} - 1 = 11.146\%$	Time	Return	0	-2100 × 19 = (-)39,900	1	0	2	2120 × [0.25+ 23] =49.290
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xv.	A.		Pass Through Certificates have a single maturity structure, while Pay Through Certificates have multiple maturity structures.								



SECTION - B

Question 2(a) Solution:

Given:

Years	Machine - A (Old)	Machine - B (New)
Book value/Cost	4,80,000	24,00,000
Remaining Life	6 Years	Same
Sale value	1,80,000	
Salvage	0	3,20,000
Installation & Testing	-	2,00,000
Subsidy	-	15%(i.e. 3,60,000)

(a) Initial increment Outflow:

Cost of New Machine	24,00,000
Installation & Testing	2,00,000
Total	26,00,000
Less: - Sale value of Old	(1,80,000)
(As specified ignored tax saving)	
Net initial Outflow	24,20,000

Subsidy at 1y end = $24,00,000 \times 15\% = ₹3,60,000$

PV of Subsidy = $3,60,000 \times 0.877 = ₹3,15,720$

Hence, PV of Incremental Outflow = $24,20,000 - 3,15,720 = ₹21,04,280$

Alternative:1 Depreciation calculated reducing subsidy amount:

(b) Annual incremental CFAT:

$$\begin{aligned} \text{Depreciation (New)} &= \frac{\text{COST} - \text{SALVAGE} - \text{SUBSIDY}}{6} \\ &= \frac{26,00,000 - 3,20,000 - 3,60,000}{6} = ₹3,20,000 \\ \text{Depreciation (Old)} &= \frac{4,80,000 - 0}{6} = ₹80,000 \end{aligned}$$

Incremental Depreciation = $3,20,000 - 80,000 = ₹2,40,000$

Incremental tax saving per year = $₹2,40,000 \times 30\% = ₹72,000$



Annual saving in Salary (1,68,000 × 3)	5,04,000
Saving due to reduced wastage	4,80,000
Saving in loss of sale	3,50,000
Total	13,34,000
Less: Salary of technician	3,90,000
Less: Annual Operation cost	1,54,000
Incremental EBDT	7,90,000
Less: tax @30%	2,37,000
	5,53,000
Add: tax saving on Dep	72,000
	6,25,000

(C)

Salvage (New)	= 3,20,000
Salvage (old)	= Nil
Incremental salvage	= 3,20,000 at 6y end

Requirement:

(i) NPV:

$$\begin{aligned}
 \text{PV of inflows} &= 6,25,000 \times \text{PVIFA}(14\%,6) + 3,20,000 \times \text{PVIF}(14\%,6) \\
 &= (6,25,000 \times 3.888) + (3,20,000 \times 0.456) \\
 &= 25,75,920
 \end{aligned}$$

$$\text{PV of outflow} = 21,04,280$$

$$\text{NPV} = 25,75,920 - 21,04,280 = 4,71,640$$

$$\text{PI} = \frac{25,75,920}{21,04,280} = 1.224$$

Advice: As NPV is positive and PI is greater than 1, it is beneficial to replace the old machine.



(ii) Discounted Payback Period:

Years	Cash flows	PVF	PV	Cumulative
1	6,25,000	0.877	5,48,125	5,48,125
2	6,25,000	0.769	4,80,625	10,28,750
3	6,25,000	0.675	4,21,875	14,50,625
4	6,25,000	0.592	3,70,000	18,20,625
5	6,25,000	0.519	3,24,375	21,45,000
6	9,45,000	0.456		

Receive in 4y = 18,20,625

Outflow = 21,04,280

Balance = 2,83,655

₹3,24,375 recovered in = 12 Months

∴ 2,83,655 recovered in = $\frac{12}{3,24,375} \times 2,83,655$

= 10.5 Months

Hence, Discounted Payback period = 4 years & 10.5 months.

Alternative-2:

Calculation of depreciation on Actual Cost of Assets without reducing Subsidy:

(b) Annual incremental CFAT:

$$\text{Depreciation (New)} = \frac{\text{COST} - \text{SALVAGE}}{6} = \frac{26,00,000 - 3,20,000}{6} = ₹3,80,000$$

$$\text{Depreciation (Old)} = \frac{4,80,000 - 0}{6} = ₹80,000$$

Incremental Depreciation = 3,80,000 - 80,000 = ₹3,00,000

Incremental tax saving per year = ₹3,00,000 × 30% = ₹90,000

Annual saving in Salary (1,68,000 × 3)	5,04,000
Saving due to reduced wastage	4,80,000
Saving in loss of sale	3,50,000



Total	13,34,000
Less: Salary of technician	3,90,000
Less: Annual Operation cost	1,54,000
Incremental EBDT	7,90,000
Less: tax @30%	2,37,000
	5,53,000
Add: tax saving on Dep	90,000
	6,43,000

(C)

Salvage (New)	= 3,20,000
Salvage (old)	= Nil
Incremental salvage	= 3,20,000 at 6y end

Requirement:

(i) **NPV:**

$$\begin{aligned}
 \text{PV of inflows} &= 6,43,000 \times \text{PVIFA}(14\%,6) + 3,20,000 \times \text{PVIF}(14\%,6) \\
 &= (6,43,000 \times 3.888) + (3,20,000 \times 0.456) \\
 &= 26,45,904
 \end{aligned}$$

$$\text{PV of outflow} = 21,04,280$$

$$\text{NPV} = 26,45,904 - 21,04,280 = 5,41,624$$

$$\text{PI} = \frac{25,75,920}{21,04,280} = 1.26$$

Advice: As NPV is positive and PI is greater than 1, it is beneficial to replace the old machine.

(ii) **Discounted Payback Period:**

Years	Cash flows	PVF	PV	Cumulative
1	6,43,000	0.877	5,63,911	5,63,911
2	6,43,000	0.769	4,94,467	10,58,378
3	6,43,000	0.675	4,34,025	14,92,403
4	6,43,000	0.592	3,80,656	18,73,059
5	6,43,000	0.519	3,33,717	22,06,776
6	9,63,000	0.456		



Receive in 4y = 18,73,056

Outflow = 21,04,280

Balance = 2,31,224

₹3,33,717 recovered in = 12 Months

∴ 2,31,224 recovered in $= \frac{12}{3,33,717} \times 2,31,224$

= 8.31 Months

Hence, Discounted Payback period = 4 years & 8.31 months.

Question-2(b) Solution:

Note: On first day both SMA & EMA are same.

Calculate the first EMA using a simple moving average (SMA) of the first 7 days:

$$SMA_7 = \frac{25+26+25+24+26+26+28}{7} = ₹25.71$$

$$\text{Exponent} = \left[\frac{2}{\text{No. of period in MA} + 1} \right] = \left[\frac{2}{7+1} \right] = \frac{2}{8} = 0.25$$

Day	EMA = Prev day EMA/SMA + (Closing price - Prev day EMA) × Exponent	
7 th		= 25.71
8 th	= 25.71 + (26-25.71) × 0.25	= 25.78
9 th	= 25.78 + (25 - 25.78) × 0.25	= 25.59
10 th	= 25.59 + (27 - 25.59) × 0.25	= 25.94

Comments on Short-term Trend

- The 7-day EMA indicates that the stock price is experiencing slight fluctuations around a stable value.
- The slight increase in the EMA on the 10th day suggests a potential short-term upward trend.



QUESTION - 3(a):

(i) Calculation of Expected Return (ER):

$$A \text{ Ltd.} = \frac{2+6+13+7}{4} = 7\%$$

$$B \text{ Ltd.} = \frac{3+8+14+9}{4} = 8.5\%$$

$$C \text{ Ltd.} = \frac{5+7+15+11}{4} = 9.5\%$$

No. of Portfolios:

Portfolio I: 65% in A & 35% in B

$$ERP = (7 \times 0.65) + (8.5 \times 0.35) = 7.525\%$$

Portfolio II: 35% in A & 65% in B

$$ERP = (7 \times 0.35) + (8.5 \times 0.65) = 7.975\%$$

Portfolio III: 65% in A & 35% in C

$$ERP = (7 \times 0.65) + (9.5 \times 0.35) = 7.875\%$$

Portfolio IV: 35% in A & 65% in C

$$ERP = (7 \times 0.35) + (9.5 \times 0.65) = 8.625\%$$

Portfolio V: 65% in B & 35% in C

$$ERP = (8.5 \times 0.65) + (9.5 \times 0.35) = 8.85\%$$

Portfolio VI: 35% in B & 65% in C

$$ERP = (8.5 \times 0.35) + (9.5 \times 0.65) = 9.15\%$$

Portfolio VI (35% in B & 65% in C) provides highest return i.e., 9.15%.

(ii) If Mr. X invest 65000 in A, 20000 in B & 15000 in C:

$$\text{Portfolio Return} = \frac{(65,000 \times 7) + (20,000 \times 8.5) + (15,000 \times 9.5)}{1,00,000} = 7.675\%$$

$$\text{Portfolio Beta} = \frac{(65,000 \times 0.45) + (20,000 \times 1.15) + (15,000 \times 1.80)}{1,00,000} = 0.7925$$



QUESTION – 3(b):

Using Put-Call Parity,

$$\begin{aligned} C_0 (\text{Fair}) &= (\text{Spot price} - \text{PV of strike}) + \text{Put option (Actual)} \\ &= (31 - 30 \times \text{PVIF}(10\%, 0.25)) + 2 \\ &= 31 - (30 \times 0.9756) + 2 \\ &= 3.73 (\text{Fair Call Premium}) \end{aligned}$$

- As the actual premium (i.e., 3) is lesser than fair premium (i.e., 3.73), we can say there is mispricing in call option (undervalued) & Put Option (overvalued). There is an arbitrage opportunity.

(i) If the investor is devising a strategy of buying a call and selling the share and a put option.

Action:

- Buy Call Option @ ₹3 premium (inflow).
- Write Put Option @ ₹2 premium (outflow).
- Sale share @ ₹31

Calculation of arbitrage:

As on today:

- Net inflow = Sell Share + Sell Put - Buy Call = 31 + 2 - 3 = ₹30
- Deposit ₹ 30 @10% for 3 months

On Expiry:

- Withdraw Deposit:

$$\text{Amount} = 30 / 0.9756 = 30.75$$

- Buy share. Outflow should be Strike Price (i.e., 30)
- Arbitrage = 30.75 - 30 = ₹0.75 (Gain)

(ii) Calculation of Profit/loss (if the strategy adopted is selling a call option & buying the share & a put option).

As on Today:

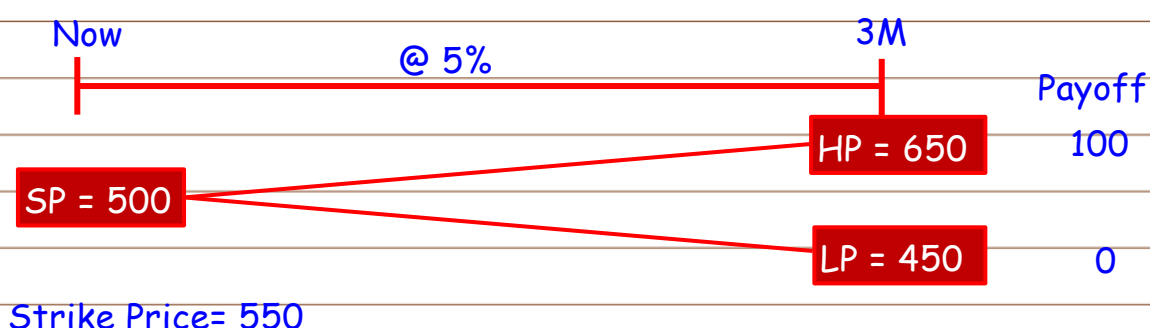
- Net cashflow = (-31+3-2) = -30 (outflow)
- Borrow ₹30 @ 9% p.a.



On Expiry:

- (c) Repayment amount = ₹32/0.9756 = ₹30.75
- (d) Sale share. Inflow should be strike price (i.e., 30)
- (e) Arbitrage = ₹30 - 30.75 = -₹0.75 Loss

QUESTION - 4(a):



(i) Combination of Share and Option

$$\text{Option Delta (Hedge Ratio)} = \frac{\text{Difference in Payoff}}{\text{Difference in Share price}}$$

$$= \frac{100 - 0}{650 - 450} = 0.50$$

Investor has to buy 0.50 share for each call option (i.e. 1 Share for 2 call option)

(ii) Identical Position on expiry

	HP = 650	LP = 450
Value of 0.50 Share	650 X 0.50 = 325	450 X 0.50 = 225
Less: Payoff	-100	-0
Value of Portfolio	225	225

From above calculation it is observed that investor can maintain identical position on expiry if he/she buy 0.50 Share.

(iii) Option Value



$$(a) \text{ PV of Hedge Portfolio} = \frac{225}{(1+0.05)} = 214.29$$

$$(b) \text{ Amount required to buy 0.50 Share} = 500 \times 0.50 = 250$$

$$(c) \text{ Value of Call Option} = 250 - 214.29 = 35.71$$

Alternatively, we may assume interest rate as annual rate. In this case our Answer will differ.

(iv) Return from Option:

$$\text{- Investment} = 35.71$$

$$\text{- Expected Payoff at expiry} = 100 \times 70\% + 0 = 70$$

$$\text{- Net Profit} = 70 - 35.71 = 34.29$$

$$\text{- Return} = \frac{34.29}{35.71} \times 100 = 96.02\%$$

QUESTION-4(b):

(i) If the projects are divisible Projects are ranked according to PI and arranged in descending order.

Proposal	Investment	NPV	PV of Inflows	PI	Rank
I	85,00,000	50,00,000	135,00,000	1.59	4
II	35,00,000	26,00,000	61,00,000	1.74	2
III	60,00,000	20,00,000	80,00,000	1.33	5
IV	40,00,000	25,00,000	65,00,000	1.63	3
V	60,00,000	50,00,000	110,00,000	1.83	1

Proposal	Investment	Cum Investment
V	60,00,000	60,00,000
II	35,00,000	95,00,000
IV	40,00,000	135,00,000
I	85,00,000	220,00,000
III	60,00,000	280,00,000

Only 65,00,000 can be invested in project I. NPV of the project = $65/85 \times 50,00,000 = 38,23,529$
So the selected projects are V, II, IV and part of I.

NPV Calculation:

Rank	Project	₹
1	Project V	50,00,000
2	Project II	26,00,000
3	Project IV	25,00,000
4	Project I	38,23,529
		139,23,529



(ii) If the projects are indivisible (by trial-and-error method):

Feasible Sets	Investments	NPV
V, II, I	180,00,000	126,00,000
V, IV, I	185,00,000	125,00,000
V, II, IV, III	195,00,000	121,00,000
I, II, IV	160,00,000	101,00,000
V, IV, III	160,00,000	95,00,000

Project V, II and I provides the maximum NPV may be undertaken.

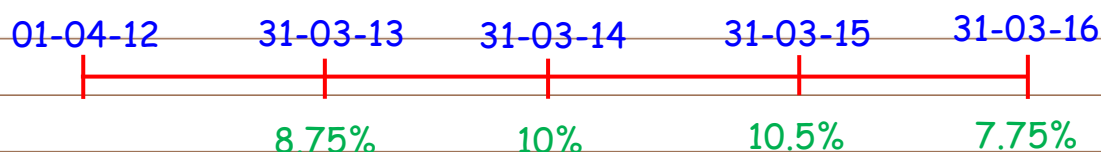
QUESTION - 5(a):

Loan = ₹ 40,00,000

Life = 4 Years

Interest Rate = 8.5%

Projected Rate:



(i) **Action to hedge risk:**

- Manufacturer wants to peg interest cost at 8.5% [i.e. max interest cost 8.5%]. Hence, He/she can buy Interest Rate Cap at Strike rate 8.5% for notional principal ₹ 40,00,000.
- When actual interest rate moves above 8.5%, then differential amount will be received from counter party as settlement of Cap Option / Payoff of Cap:

Projected Rate	Strike	Action	Payoff Receipt
8.75%	8.5%	Exercise	0.25%
10%	8.5%	Exercise	1.5%
10.5%	8.5%	Exercise	2%

Note:

Projected rate of 31-03-2016 is irrelevant as it is applicable for the period 31-03-2016 to 31-03-2017 but loan expires on 31-03-2016.



(ii) **Settlement of Cap Option:**

Premium payable = ₹ 40,00,000 × 0.75% = ₹ 30000

Period	Actual Interest Rate	Strike Rate	Action	Settlement Rate	Settlement Amount
2013-14	10.2%	8.5%	Exercise	1.7%	40,00,000 × 1.7% = 68,000
2014-15	11.5%	8.5%	Exercise	3%	40,00,000 × 3% = 1,20,000
2015-16	9.25%	8.5%	Exercise	0.75%	40,00,000 × 0.75% = 30,000

Note:

Ignore actual rate of 31-Mar-2016 as it is applicable for period 2016-17 but loan expires on 31-03-2016.

Disclaimer:

- ICAI Solution is not appropriate as it settles contract on beginning of period.
- We Know, Interest rate is fixed at beginning of the period but interest due at end of the period.

For Example:

For period 2013 to 2014

Interest Fixed at 31-03-2013

Interest due at 31-03-2014

Hence, Settlement of payoff is made on 31-03-2014.

Question 5(b):

(i) **Money market hedge:**

For money market hedge Indian Firm shall borrow in US\$ and then translate them to Indian Rupee and shall make deposit in Indian Rupee.

For receipt of US\$ 50,000 in 3 months (@ 1.5% interest) amount required to be borrowed now (US\$ 50,000 ÷ 1.015) = US\$ 49,261.08

With spot rate of 72.65 the Rupee deposit will be = ₹ 35,78,817.46



Deposit amount will increase over 3 months (@2.25% interest) will be = ₹ 36,59,340.85

Forward market hedge:

Sell 3 months' forward contract accordingly, amount receivable after 3 months will be

$$(\text{US\$ } 50,000 \times 72.95) = ₹ 36,47,500$$

In this case, more will be received under the money market hedge hence it is better option.

(ii) Exchange Exposure to H Ltd:

Expected Realisation as per Forward Rate (US\$ 50,000 × 72.95)	₹ 36,47,500
Actual Realisation as per actual Spot Rate (US\$ 50,000 × 73.00)	₹ 36,50,000
Gain	₹ 2,500

Question 6(a)

0	1	2	3	4
1000	1100	1200	1300	1500
	100	150	80	
	<u>1200</u>	<u>1350</u>	<u>1380</u>	

(i) money weighted rate of return (MWROR):

Rough work: Total Investment = 1330
Total ending val = 1500
Return = $\frac{1500 - 1330}{1330} \times 100 = 12.78\%$ (i.e. 3.2% pa.)
for 4y

Assume, compounded return = $i\%$.

$$1000 \times (1+i)^4 + 100 \times (1+i)^3 + 150 \times (1+i)^2 + 80 \times (1+i) = 1500$$

Assume, $i = 4\%$

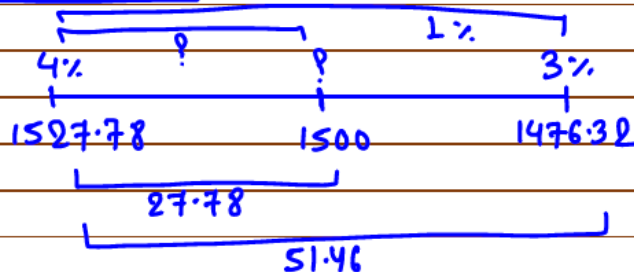
$$1000 \times (1.04)^4 + 100 \times (1.04)^3 + 150 \times (1.04)^2 + 80 \times (1.04) = 1527.78$$

Again assume, $i = 3\%$

$$1000 \times (1.03)^4 + 100 \times (1.03)^3 + 150 \times (1.03)^2 + 80 \times (1.03) = 1476.32$$



using interpolation:



$$51.46 \Rightarrow 1\%$$

$$27.78 \Rightarrow \frac{1}{51.46} \times 27.78 = .54\%$$

$$\therefore i = 4\% - .54\% = 3.46\%$$

Hence money weighted rate of return = **3.46%**

(i) Time weighted rate of return (TWROR):

$$(1+i) = \frac{1100}{1000} \times \frac{1200}{1200} \times \frac{1300}{1350} \times \frac{1500}{1380}$$

$$\therefore i = 1.1514 - 1 = .1514 \text{ (i.e. 15.14\%)} \text{ Ans}$$

Question 6(b):

(i) **Computation of lease rental:**

$$= \frac{\text{Cost of Machine}}{1 + \text{PVAF}(10\%, 9\text{Yrs})} = \frac{5,00,000}{1 + 5.761} = ₹73,954$$

(ii) **Financial Advantage:**

	(₹)
Present value of loan payment	5,00,000
Present value of lease payment discounted at 15%	
₹ 73,954 x (1 + 4.773)	(4,26,936)
	73,064

(iii) **Computation of tax shield on borrowing:**



$$\text{Annual Repayment of Loan} = \frac{\text{₹ } 5,00,000}{5.773} = \text{₹ } 86,610$$

Year	Installment (Interest + Principal)	Principal Amount	Annual Interest	Principal component
	(₹)	(₹)	(₹)	(₹)
0	86,610	4,13,390	-	86,610
1	86,610	3,88,789	62,009	24,601
2	86,610	3,60,497	58,318	28,292
3	86,610	3,27,962	54,075	32,535
4	86,610	2,90,546	49,194	37,416
5	86,610	2,47,518	43,582	43,028
6	86,610	1,98,036	37,128	49,482
7	86,610	1,41,131	29,705	56,905
8	86,610	75,691	21,170	65,440
9	86,610	-	10,919*	75,691

* Balancing Figure

Tax benefit on interest and depreciation

Year	Interest	Depreciation	Total	Tax Shield
	(₹)	(₹)	(₹)	(₹)
0	-	-	-	-
1	62,009	50,000	1,12,009	33,603
2	58,318	50,000	1,08,318	32,495
3	54,075	50,000	1,04,075	31,223
4	49,194	50,000	99,194	29,758
5	43,582	50,000	93,582	28,075
6	37,128	50,000	87,128	26,138
7	29,705	50,000	79,705	23,912
8	21,170	50,000	71,170	21,351
9	10,919	50,000	60,919	18,276
10	-	50,000	50,000	15,000

(iv) The present value of comparative tax benefits i.e. the operating advantage/disadvantage is calculated below:



End of Year	Tax shield on lease	Tax shield on borrowing	Incremental savings	PVF @ 12%	PV
	(₹)	(₹)	(₹)		(₹)
1	22,186	33,603	(11,417)	0.893	(10,195)
2	22,186	32,495	(10,309)	0.797	(8,216)
3	22,186	31,223	(9,037)	0.712	(6,434)
4	22,186	29,758	(7,572)	0.636	(4,816)
5	22,186	28,075	(5,889)	0.568	(3,345)
6	22,186	26,138	(3,952)	0.507	(2,004)
7	22,186	23,912	(1,726)	0.453	(782)
8	22,186	21,351	835	0.404	337
9	22,186	18,276	3,910	0.361	1,412
10	22,186	15,000	7,186	0.322	2,314
					(31,729)

Since the financial advantage (i.e., ₹73,064) exceeds the operating advantage (i.e., ₹31,729), it is advisable to go for **leasing**.

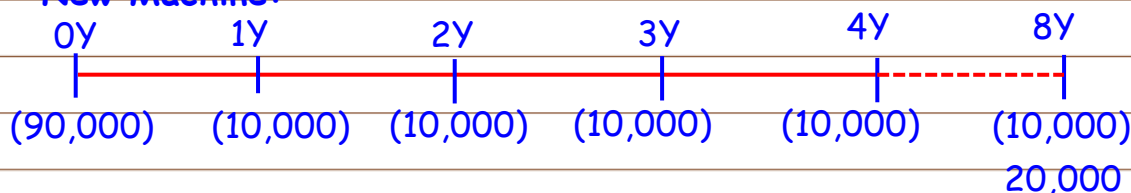
Question 7(a):

Solution:

Particulars	
(a) Amount invested by Mr. Optimistic as on 01/04/2016	₹ 16,00,000
(b) Gain during 5 years (16,00,000 x 17.5% x 5 years)	₹ 14,00,000
(c) Value of investment as on 31/03/2021 (a + b)	₹ 30,00,000
(d) NAV as on 31/03/2021	₹ 100 per Unit
(e) Total number of units as on 31/03/2021 (c / d)	30000 Units
Total units before second bonus = 30,000 x 4/5	24000 Units
Total units before first bonus = 24,000 x 5/6	20000 Units
NAV as on 01/04/2016 = 16,00,000/ 20000	₹ 80 per Unit

Question 7(b):

(i) New Machine:





Calculation of equivalent annual equal outflow [i.e., Annual outflow to work on new Machine]

PV of Outflow

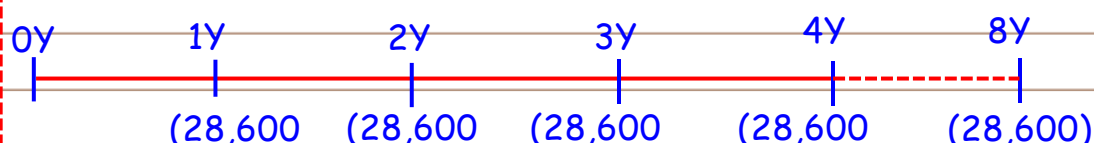
$$\begin{aligned}
 &= 90,000 + 10,000 \times \text{PVIFA} (15\%, 8) - 20,000 \times \text{PVIF} (15\%, 8) \\
 &= 90,000 + (10,000 \times 4.4873) - (20,000 \times 0.3269) \\
 &= 1,28,335
 \end{aligned}$$

Assume, Annual equal cash outflow = x

$$x \times \text{PVIFA} (15\%, 8) = 1,28,335$$

$$\therefore x = \frac{1,28,335}{4.4873} = 28,600$$

Interpretation (Note for exam):



This cashflows and above timeline cash flows are same.

(ii) Annual cost to work on old machine:

year	1	2	3	4
Maintenance	10,000	20,000	30,000	40,000
Decrease in salvage	40,000 - 15,000 = 15,000	40,000 - 15,000 = 15,000	40,000 - 15,000 = 15,000	40,000 - 15,000 = 15,000
Opportunity Loss of int	40,000 × 15% = 6,000	25,000 × 15% = 3750	15,000 × 15% = 2250	10,000 × 15% = 1500
Total cost to work on old m. (Annual)	31,000	33,750	37,250	51,500

Advice: - Annual equivalent outflow when work on new machine is 28,600 which is lesser than outflow of old machine from first year itself. So, replace the machine immediately.

Analysis (Not for exam):

- Suppose, annual equal outflow of new machine is 32,000. In this case, old machine cost is lesser is first year. Hence replace machine at end of 1st year.



Question 8(a):

Aspect	Traditional Finance	Digital Finance
Reach	Limited to physical locations	Extends to remote areas via digital platforms
Access	Requires physical presence	Accessible through internet and smartphones
Affordability	Costlier due to physical infrastructure	More affordable due to reduced operational costs
User Experience	May vary, often reliant on in-person interactions	Improved, simple interfaces for easier usage
Business Opportunities	Limited by geographical constraints	Expanded due to digital reach
Employment Generation	Moderate due to traditional setup	Significant due to digital expansion
Asset Innovation (Digital Assets)	Limited to traditional financial instruments	Introduces new assets like NFTs and cryptocurrencies
Central Bank Digital Currency (CBDC)	Not applicable	Potential to replace physical currency
Economic Impact	Conventional; with slower adaptation to innovation	Revolutionary; transforming financial landscapes; Eliminate issues like counterfeit money, black money, and terror financing etc.

Question 8(b):

Types of securities issued by a SPV

1. Pass Through Certificates	In case of a pass-through certificate, payments to investors depend upon the cash flow from the assets backing such certificates. That is to say, as and when cash (principal and interest) is received from the original borrower by the SPV, it is passed on to the holders of certificates at regular intervals and the entire principal is returned with the retirement of the assets packed in the pool.
2. Pay Through Certificates	Pay through certificates has a multiple maturity structure depending upon the maturity pattern of underlying assets. Thus, the SPV can issue two or three different types of securities with different maturity patterns like short term, medium term and long term. Thus, these have a greater flexibility with varying maturity pattern needed by the investors.



3. Preferred Stock Certificates	These are issued by a subsidiary company against the trade debts and consumer receivables of its parent company. In other words, subsidiary companies buy the trade debts and receivables of parent companies to enjoy liquidity. Generally, these stocks are backed by guarantees given by highly rated merchant banks and hence they are also attractive from the investor's point of view. These instruments are generally short term in nature.
4. Asset Backed Commercial Papers:	This type of structure is mostly prevalent in mortgage-backed securities. Under this the SPV purchases portfolio of mortgages from different sources (various lending institution) and they are combined into a single group on the basis of interest rate, maturity dates and underlying collaterals. They are then transferred to a Trust which in turn issued mortgage-backed certificate to the investors. These are also of short term in nature.
5. Interest Only Certificates	In case of these certificates, payments are made to investors only from the interest incomes earned from the assets securitized.
6. Principal Only Certificates	As the very name suggest payment are made to the investors only from the repayment of principal by the original borrower. These certificates enable speculative dealings since the speculators know well that the interest rate movements would affect the bond value immediately. When interest rate increases, the bond value will decline and vice-versa.

Question 8(c)

- (a) Availability of timely and accurate information.
- (b) Liquidity - quick buying/selling without significant price changes.
- (c) Low transaction costs.
- (d) Quick adjustment of security prices to new information.