Paper-14: ADVANCED FINANCIAL MANAGEMENT

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

The figures in the margin on the right side indicate full marks.
Answer Question No. 1 which is compulsory.
From Section A: Answer any two questions.
From Section B: Answer any one question.
From Section C: Answer any one question.
From Section D: Answer any one question.

Working Notes should form part of the answer.
"Whenever necessary, suitable assumptions should be made and indicated in answer by the candidates."

1. (a) Write down the features of a well developed money market?   [2]

    (b) What are the requirements for registration of Non-Banking Financial Company (NBFC's) with RBI?   [2]

    (c) Considering the following quotes.

Spot (Euro/Pound)	= 1.6543/1.6557
Spot (Pound/NZ$)	= 0.2786/0.2800

    (i)   Calculate the % spread on the Euro/Pound Rate   [5]
    (ii) Calculate the % spread on the Pound/NZ$ Rate
    (iii) The maximum possible % spread on the cross rate between the Euro and the NZ$.

    (d) The stock of APTECH Ltd (FV ₹10) Quotes ₹ 920 today en NSE and the 3 month futures price quotes at ₹ 950. The one month borrowing rate is given as 8% and the expected annual dividend yield is 15% p. a. payable before expiry
    You are required to calculate the price of 3 month APTECH FUTURES.   [2]

    (e) The following quotes were observed by Mr Karuna on March 10, 2012 in the Economic Times:
    • SBI March 2012 Fut 1441
    • Nifty April 2012 Fut 4280.
     Required:
    (i) Explain what these quotes indicate?
    (ii) If the initial Margin is 10% and Mr. Karuna wants to buy 100 of each how much margin he has to deposit individually?   [2]

(f) Vatsan Ltd. is considering a project with the following expected cashflows: Initial investment ₹1 00,000

Year	1	2	3
Expected Cash Inflow (₹)	70,000	60,000	45,000

Due to uncertainty of future cash flows, the management decides to reduce the cash inflows to Certainty Equivalent (CE) by taking only 80% for 1st year, 70% for 2nd year and 60% for 3r year respectively.

Required:
Is it worthwhile to take up the project?   **[5]**

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

Answer: 1

(a) Features of a well developed Money Market:

(i)   Uses a broad range of financial instruments (treasury bills, bills of exchange etc).

(ii) Channelizes savings into productive investments.

(iii) Promote financial mobility in the form of inter sectoral flows of funds.

(iv) Facilitate the implementation of monetary policy by way of open market operations.

(b) A company incorporated under the Companies Act, 1956 and desirous of commencing business of non-banking financial institution as defined under Section 45 I (a) of the RBI Act, 1934 should comply with the following:

(i)   it should be a company registered under Section 3 of the companies Act, 1954

(ii) It should have a minimum net owned fund of ₹ 200 lakhs. (The minimum net owned fund (NOF) required for specialized NBFCs like NBFC-MFIs, NBFC-Factors, CICs.

(c) (i)   Bid quote = 1.6543, Ask quote = 1.6557

Spread quote = 1.6557 - 1.6543 = 0.0014 Euro per Pound

% Spread = 0.0014/1.6543 = 0.08%

(ii) Bid quote = 0.2786, Ask quote = 0.2800

Spread quote = 0.2800 - 0.2786 - 0.0014 Pound per Newzeland $

% Spread = 0.0014/0.2786 = 0.50%

(iii) Calculation of exchange rate between Euro and TMZ$

$\dfrac{\text{Euro}}{\text{NZ\$}}$ (Bid Rate) = 1.6543 x 0.2786 = 0.4609

$\dfrac{\text{Euro}}{\text{NZ\$}}$ (A Rate) = 1.6557 x 0.2800 = 0.4636

Spread = 0.4636 – 0.4609 = 0.0027

% Spread = 0.0027/0.4609 = 0.59%

(d) Future price of Aptech Ltd. would be:

Future price = Spot + cost of carry – Dividend

= 920 + 920 x 0.08 x 0.25 x -10 x 0.15

= 920 + 18.40 – 1.5

= ₹936.90

(e) (i) The first one indicates that SBI stock futures are traded now at ₹ 1441. They expire on the last Thursday of March, 2012. Mr. Karuna has to deposit 10% of 1441 x 100 = ₹ 14410 as initial margin.

(ii) The second one indicates that NIFTY Index futures are traded now at 4280. They expire on the Last Thursday of April 2012. Mr. Karuna has to deposit 10% of 4280 x 100 = ₹ 42800 as initial margin.

(f) Vatsan Ltd.

Calculation of Certainty Equivalents of Cash Inflow.

1st year 70,000x80/100 = ₹56,000

2nd Year 60,000 x 70/100 = ₹ 42,000

3rd Year 45,000 x 60/100 – ₹ 27,000

Calculation of Risk Adjusted NPV of the Project:

Year	Cashflow (₹)	P.V. factor (10%)	P.V.(₹)
0	(1,00,000)	1.000	(1,00,000)
1	56,000	0.909	50,904
2	42,000	0.826	34,692
3	27,000	0.751	20,277
			NPV = 5,873

Decision: The NPV of the project is positive and therefore, the project can be selected.

(g) Let the annual Recurring expenses be ₹X

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

$$16.5\% = \frac{13}{(00 - 7\%)} + X$$

$16.5\% = 13.97 + X$

$X = 16.5 - 13.97 = 2.53\%$

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

Distribution / Reinvestment of Mutual Fund Returns

SECTION A
(Answer any two of the following.)

Question 2.

(a) Define Non-Banking Financial Company (NBFC). Point out the main problems in the working of State Cooperative Banks?

(b) The following are the data on five mutual funds-

Fund	Return	Standard Deviation	Beta
Laheri	15	7	1.25
Mitra	1 8	10	0.75
Vredhi	14	5	1.40
Varsha	12	6	0.98
Raksha	16	9	1.50

What is the reward – to – variability ratio and the ranking, if the risk-free rate is 6%?

[(3+5)+(2+2)]

Answer: 2. (a)

Non-Banking Financial Company

A Non-Banking Financial Company (NBFC) is a company registered under the Companies Act, 1956 engaged in the business of loans and advances, acquisition of shares/stocks/bonds/debentures/securities issued by Government or local authority or other marketable securities of a like nature, leasing, hire-purchase, insurance business, chit business but does not include any institution whose principal business is that of agriculture activity, industrial activity, purchase or sale of any goods (other than securities) or providing any services and sale/purchase/construction of immovable property. A non-banking institution which is a company and has principal business of receiving deposits under any scheme or arrangement in one lump sum or in instalments by way of contributions or in any other manner, is also a non-banking financial company (Residuary non-banking company).

Problems in the working of State Cooperative Banks:-

(i) Poor deposits mobilisation: These banks have not been successful in raising deposits as, even now, individual deposits from less than 25 per cent in many States.

(ii) Undesirable investment of funds: These banks are not followed the guide of RBI about the matter of investment of fund. Despite the advice of the RBI, a cautious policy is not being followed in the matter of investment of the funds which agriculture even now utilised for the purchase of shares in other cooperative institutions; or in making huge advances to the primary cooperative societies; and by way of loans to individuals.

(iii) Failure to assess genuineness of borrowing: The banks have failed in assessing the genuineness of the borrowings of the Central Cooperative Banks. This is evidenced from the fact that the credit limits of such banks had been fixed on the basis of their owned funds without taking into account their past performance; and the bank's own financial position.

(iv) Ineffective supervision and inspection: Many of the Banks have not taken up this work in right way. Some of the banks have neither adequate nor separate staff for this work. Officers of these banks sometimes pay only ad-hoc and hurried visits.

(v) Book adjustment: Book adjustments are often made regarding repayment of loans. The State Cooperative Banks have failed to check the fictitious transactions of the Central cooperative Banks.

(vi) Increasing over dues: The over dues of the Banks have been showing a rising trend. This is due to the fact that these banks have not followed the prescribed loaning procedure.

(vii) They utilise their reserve funds as working capital.

Answer: 2. (b)

Formula for computing Reward – to – Volatility / Volatility Ratio is –
- Treynor's Ratio = $[(R_p – R_f) ÷ β_p]$
- Sharpe's Measure = $[(R_p – R_f) ÷ σ_p]$

Ranking based on Sharpe's Ratio and Treynor Method:

Portfolio	Under Sharpe's Method $[(R_p – R_f) ÷ σ_p]$	Ranking	Under Treynor Method $[(R_p – R_f) ÷ β_p]$	Ranking
Laheri	[(15 - 6) ÷ 7] = 1.29	2	[(15 - 6) ÷ 1.25] = 7.20	2
Mitra	[(18 - 6) ÷ 10] = 1.20	4	[(18 - 6) ÷ 0.75] = 16.00	1
Vredhi	[(14 - 6) ÷ 5] = 1.60	1	[(14 - 6) ÷ 1.40] = 5.71	5
Varsha	[(12 - 6) ÷ 6] = 1.00	5	[(12 - 6) ÷ 0.98] = 6.12	4
Raksha	[(16 - 6) ÷ 8] = 1.25	3	[(16 - 6) ÷ 1.50] = 6.67	3

Question 3.

What are the factors affecting fluctuation of call rate? Point out the measures adopted from time to time for stabilizing call rates?   **[7+5]**

Answer: 3.

After the removal of ceiling, the call rate has fluctuated widely. The call rate is volatile due to following reasons:

(i)   Large borrowings on certain dates by banks to meet the CRR requirements (then call rate rise sharply) and demand for call money falls when CRR needs are met.

(ii)   The credit operations of certain banks tend to be much in excess of their own resources.

(iii)   Disturbance in the banking industry.

(iv)   When liquid fund of an institution is very essential to repay the loan, advance tax, matured amount of security, and at the boom position of institution the call rates increase.

(v)   When call market is easy, Banks invest funds in govt. securities, bonds in order to maximise earnings. But with no buyers in the market, these securities are not cashed. Due to such liquidity crisis, call rate is high.

(vi)   The structural deficiencies in the banking system. The banking system tries to build up deposits in last week of end of the year.

(vii) Forex market turbulence.

(viii) Call market is over-the-telephone-market. Borrowers and lenders contact each other over telephone. In the absence of perfect communication they deal at different rates.

(ix)   In call market, main borrowers are commercial banks and lenders are UTI, LIC etc. In absence of lenders for few days, call rates rise up.

(x)   When Govt. securities mature and are encashed by the public, supply of call loans increases and call rates fall.

(xi)   Cyclical mass import payments reduce liquidity in the money market and hence call rates decreases.

Measures adopted from time to time for stabilizing call rates:

The volatility of call rate can be controlled to achieve a state of stability by the following ways:

(i) Intervention by the DFHI as market maker.

(ii) Channelization of more funds by the RBI through the DFHI, & STCI.

(iii) Channelization of more funds by certain financial institutions with surplus funds.

(iv) Introduction of new money market instruments and allowing large number of participants in call money market.

(v) Use of call loans for normal banking operation.

For this purpose, the RBI has been established different policy. The money market support by RBI and the reduction in CRR for credit expansion & for increase liquidity, and increasing Govt. securities refinancing had helped to moderate the call rate in 1995. The spot foreign exchange purchases by the RBI had helped to reduce the call rate in March 1996. The recommencement of repo auctions by RBI in November 1996 had provided a reasonable floor to call money rates.

It cannot be said that these measures have reduced the volatility in the call market in India.

Inter – Bank Money and its distinction from Call Money and Notice Money:

Inter Bank Market for deposits of maturity beyond 14 days is referred to as Inter-Bank Term Money. Term Money is accepted by the institutions at a discounted value, and on the due date payment will be made equal to the face value.

Question 4.
Ascertain the Time Weighted Rate of Return and annual Compounded Rupee Weighted Rate of return from the following information given relating to Subham Fund.

- **Fund value at the beginning is ₹ 6 Crores.**
- **3 months hence, the value had increased by 15% of the opening value.**
- **3 months hence, the value had increase by 12% of the value three months before. At that time there was an outflow of ₹ 1 Crore by way of dividends.**
- **3 months hence, the value had decreased by 10% of the value three months before.**
- **During the last three months of the year, value of the fund had increased by ₹ 1 Crores.**

[6+6]

Answer: 4.

1. **Computation of Closing Value (as at the yearend)**

Time	Opening Value	Additions / Appreciation	Distributions / Depreciation	Closing Value
Months 1-3	6.0000	[6.00 × 15 %] = 0.9000	-	6.9000
Months 4-6	6.9000	[6.90 × 12 %] = 0.8280	1.0000	6.7280
Months 7-9	6.7280	-	[6.7280 × 10 %] = 0.6728	6.0552
Months 10-12	6.0552	1.0000	-	**552.552**

2. Time Weighted Rate of Return:

(a) Computation of Closing Value ignoring cash flows in between

Particulars		₹ Crores
Add:	Opening Investment	**6.0000**
	Value Appreciation for first three months [₹ 6 Crores ×15%]	0.9000
Add:	Value at the end of 3rd month	6.9000
	Appreciation for Months 4 to 6 [₹ 6.9 Crores ×12%]	0.8280
Less:	Value at the end of 6th months	7.7280
	Depreciation for Months 7 to 9 [₹ 7.728 Crores ×10%]	(0.7728)
Add:	Value at the end of 9th month	6.9552
	Appreciation for Months 10 to 12	1.0000
Value at the end of the year		**7.9552**

(b) Computation of Return

Return in Value = Value at the end of the year – Value at the beginning of the year

= ₹ 7.9552 Crores - ₹ 6 Crores = ₹ 1.9552 Crores

Return in % (Annual Compounding)

= Return in Value ÷ Value at the beginning of the year

= ₹ 1.9552 Crores ÷ ₹ 6 Crores = 32.59% (Annual Compoundind)

Return in % (Quarterly Compounding) =

Product of each quarter's Closing value (before dividend) ÷ Opening Value for the Quarter) – 1

$$= \frac{6.9000}{6.0000} \times \frac{7.7280}{6.0000} \times \frac{6.0552}{6.7280} \times \frac{7.0552}{6.0552} - 1 = 1.3506 - 1 = 0.3506 \text{ or } 35.06\%$$

3. Rupee Weighted Rate of Return:

(Measured from the Investor's Perspective)

It is the rate at which the Net Present Value of Cash Flow will be equal to zero i.e. Internal Rate of Return presuming that the investor will receive equivalent to the closing value.

(a) Computation of Return in %

Return (Value) = Dividend + Capital Appreciation

= ₹ 1 Crore + [Closing Value of ₹ 7.0552 Crores **Less** Opening Value of ₹ 6 Crores]

= ₹ 1 Crore + ₹ 1.0552 Crores = 2.0552 Crores

Return in % = Return in Value ÷ Opening Value = ₹ 2.0552 Crores ÷ ₹ 6 Crores = **34.253 %**

Average Quarterly Discount Rate = 34.253 ÷ 4 = 8.56%

(b) Computation of Net Present Value

Note: Since cash flows occur on a quarterly basis, Present Value factor is based on quarterly discount rate. The First Discount Rate Chosen 9 % (average quarterly discount rate rounded off to nearest %).

Time Period (Quarters)	Nature	Cash Flow	Discount Factor @9%	Discounted Cash Flow	Discount Factor @ 8%	Discounted Cash Flow
0	Investment (Opening NAV)	(6.000)	1.000	(6.000)	1.000	(6.000)
1	-	-	0.917	-	0.926	-
2	Dividend Distribution	1.000	0.842	0.842	0.857	0.857
3	-	-	0.772	-	0.794	-
4	Closing NAV	7.0552	0.708	4.993	0.735	5.186
				(0.165)		0.043

Since the NPV using Rate 1 is negative, Rate 2 should be lower than Rate 1 to get a positive NPV.

(c) Computation of Internal Rate of Return

Computation of Rupee Weighted Rate of Return (RWRR) = Internal Rate of Return:
Internal Rate of Return [IRR]

$$= R_2 \left[\frac{V_2 - V_M}{V_2 - V_1} \right] \times \left[R_1 - R_2 \right]$$

$$= 8\% + \left[\frac{0.043 - V_M}{0.043 - (-0.165)} \right] \times \left[9\% - 8\% \right]$$

= 8% + [0.043/0.208] × 1% = 8.207 %
= 8.207 % per quarter
Therefore, RWRR per quarter is 8.207 % or 32.828 % p.a.

(d) Rupee Weighted Rate of Return
Risk Weighted Rate of Return = Internal Rate of Return = 32.828 %

SECTION B
(Answer any one of the following.)

Question 5.

(a) What is Arm's Length Principle? Why Arm's Length Pricing determine? What are the difficulties in applying the arm's length principle?

(b) Mr. Khan established the following spread on the Alpha Corporation's stock:

- **Purchased one 3-month call option with a premium of ₹20 and an exercise price of ₹550.**

- **Purchased one 3-month put option with a premium of ₹10 and an exercise price of ₹450. Alpha Corporation's stock is currently selling at ₹500. Determine profit or loss, if the price of Alpha Corporation's:**

(i) remains at ₹500 after 3 months.

(ii) falls at ₹350 after 3 months.

(iii) rises to ₹600.

Assume the size option is 100 shares of Alpha Corporation.

(c) MNC rolls over a $25 million loan priced at LIBOR on a three-month basis. The company feels that interest rates are rising and that rates will be higher at the next roll- over date in three months. Suppose the current LIBOR is 5.4375%. Explain how MNC can use FRA at 6% offered by a bank to reduce its interest rate its FRA? Assume the three month period as 90 days.

[(3+4+4)+(2+2+2)+3]

Answer: 5. (a)

Arm's Length Principle:

The arm's length principle seeks to ensure that transfer prices between members of an MNE ("controlled transactions"), which are the effect of special relationships between the enterprises, are either eliminated or reduced to a large extent. It requires that, for tax purposes, the transfer prices of controlled transactions should be similar to those of comparable transactions between independent parties in comparable circumstances ("uncontrolled transactions"). In other words, the arm's length principle is based on the concept that prices in uncontrolled transactions are determined by market forces and, therefore, these are, by definition, at arm's length. In practice, the "arm's-length price" is also called "market price". Consequently, it provides a benchmark against which the controlled transaction can be compared.

The Arm's Length Principle is currently the most widely accepted guiding principle in arriving at an acceptable transfer price. As circulated in 1995 OECD guidelines, it requires that a transaction between two related parties is priced just as it would have been if they were unrelated. The need for such a condition arises from the premise that intra-group transactions are not governed by the market forces like those between two unrelated entities. The principle simply attempts to place uncontrolled and controlled transactions on an equal footing.

Determining of Arm's Length Pricing:

The basic object of determining Arm's Length Price is to find out whether any addition to income is warranted or not, if the following situations arises:

I. Selling Price of the Goods < Arm's Length Price

II. Purchase Price > Arm's Length Price

Total Income as disclosed by an Assessee	XXXX
Add: Understatement of profit due to overstatement of purchase price Add: Understatement of profit due to understatement of selling price	XXX XXX
Total Income after Assessment	XXXX

Role of market forces in determining the "Arm's Length Price"

In case of transactions between Independent enterprises, the conditions of their commercial and financial relations (e.g. The price of goods transferred or services provided and the conditions of the transfer or provision) are, ordinarily, determined by the market force.

Whereas,

In case of transactions between MNEs (Multinational Enterprises), their commercial and financial relations may not be affected by the external forces in the same way, although associated enterprises often seek to replicate the dynamics of the market forces in their dealings with each other.

Difficulties in applying the arm's length principle

The arm's length principle, although survives upon the international consensus, does not necessarily mean that it is perfect. There are difficulties in applying this principle in a number of situations.

(i) The most serious problem is the need to find transactions between independent parties which can be said to be exact compared to the controlled transaction.

(ii) It is important to appreciate that in an MNE system, a group first identifies the goal and then goes on to create the associated enterprise and finally, the transactions entered into. This procedure obviously does not apply to independent enterprises. Due to these facts, there may be transactions within an MNE group which may not be between independent enterprises.

(iii) Further, the reductionist approach of splitting an MNE group into its component parts before evaluating transfer pricing may mean that the benefits of economies of scale, or integration between the parties, is not appropriately allocated between the MNE group.

(iv) The application of the arm's length principle also imposes a burden on business, as it may require the MNE to do things that it would otherwise not do (i.e. searching for comparable transactions, documenting transactions in detail, etc).

(v) Arm's length principle involves a lot of cost to the group.

Answer: 5. (b)

1. Pay off for Call Option

Spot Price (1)	Exercise Price (2)	Action (3)	Gross Value (4) = (2)-(1)	Net Pay-Off (5) = (4) — Premium of ₹30
350	550	Lapse	Nil	**(20)**
500	550	Lapse	Nil	**(20)**
600	550	Exercise	50	**30**

2. Pay off for Put Option

Spot Price (1)	Exercise Price (2)	Action (3)	Gross Value (4) = (2)-(1)	Net Pay-Off (5) =(4) — Premium of ₹10
350	450	Exercise	100	**90**
500	450	Lapse	Nil	**(10)**
600	450	Lapse	Nil	**(10)**

3. Net Payoff Table

Spot Price (1)	Net Payoff in Call Option (2)	Net Payoff in Put Option (3)	Total (4)	No. of Options (5)	Net Profit of Spread (6)=4X5
350	(20)	90	70	100	7,000
500	(20)	(10)	(30)	100	(3,000)
600	30	(10)	20	100	2,000

Answer: 5. (c)

MNC can use 3 x 6 FRA, if it expects that the rates would be higher at the next roll- over of three months, starting three months from today. In other words MNC would buy 3 x 6 FRA @6.25%, clearly with a view that higher rate would prevail on the settlement date i.e. 3 months from now.

Now if on the settlement date, the rate is 6.5%, then MNC's decision to buy 3 x 6 FRA has been proved right and it would receive the present value of the interst differentials on the loan amount i.e. it would receive:

Pay off = national amount x $\dfrac{(\text{reference Rate} - \text{Fixed rate})}{1 + \text{Re ference Rate} \times \alpha}$ (a is the day count function)

$= \$2,50,00,000 \times \dfrac{(0.065 - 0.0625) \times 90 / 360}{1 + 0.0625 \times 90 / 360} = \$15,385$

Question 6.

(a) Alert Ltd. is planning to import a multi-purpose machine from Japan at a cost of 3,400 lakhs yen. The company can avail loans at 18% interest per annum with quarterly rests with which it can import the machine. However, there is an offer from Tokyo branch of an India based bank extending credit of 180 days at 2% per annum against opening of an irrevocable letter of credit.

Other Information:

Present exchange rate	₹ 100 = 340 Yen.
180 days' forward rate	₹ 100 = 345 Yen.

Commission charges for letter of credit at 2% per 12 months.

Advise whether the offer from the foreign branch should be accepted?

(b) XYZ Ltd is considering a project in US, which will involve an initial investment of US $1,10,00,000. The project will have 5 years of life. Current spot exchange rate is ₹ 48 per US $. The risk free rate in US is 8% and the same in India is 12%. Cash inflows from the project are as follows —

Years	1	2	3	4	5
Cash Inflow (US $)	20,00,000	25,00,000	30,00,000	40,00,000	50,00,000

Calculate the NPV of the project using foreign currency approach. Required rate of return on this project is-14%.

(c) Following information relates to AKC Ltd. which manufactures some parts of an electronics device which are exported to USA, Japan and Europe on 90 days credit terms.

Cost and Sales information:

	Japan	USA	Europe
Variable cost per unit	₹225	₹395	₹510
Export sale price per unit	Yen 650	US$10.23	Euro 11.99
Receipts from sale due in 90 days	Yen 78,00,000	US$1,02,300	Euro 95,920

Foreign exchange rate information:

	Yen/₹	US$/₹	Euro/₹
Spot market	2.417-2.437	0.0214-0.0217	0.0177-0.0180
3 months forward	2.397-2.427	0.0213-0.0216	0.0176-0.0178
3 months spot	2.423-2.459	0.02144-0.02156	0.0177-0.0179

Advice AKC Ltd. by calculating average contribution to sales ratio whether it should hedge it's foreign currency risk or not. **[8+5+7]**

Answer: 6. (a)

Option I (To finance the purchase by availing loan at 18% per annum):

	₹ in lakhs
Cost of machine	
3,400 lakh yen as ₹ 100 = 340 yen =	1,000.00
Add: Interest at 4.5% I Quarter =	45.00
Add: Interest at 4.5% II Quarter =	47.03
(on ₹ 1045 lakhs)	
Total outflow in rupees =	1,092.03

Alternatively, interest may also be calculated on compounded basis, i.e.,

₹ 1,000 × [1.045]² = ₹ 1,092.03 lakhs.

Option II (To accept the offer from foreign branch):

	₹ in lakhs
Cost of letter of credit	
at 1% on 3,400 lakhs yen as ₹ 100 = 340 yen =	10.00
Add: Interest I Quarter =	0.45
Add: Interest II Quarter =	0.47
(A) =	10.92

Payment at the end of 180 days:

Cost	3,400.00 lakhs yen
Interest at 2% p.a. [3,400 × 2/100 × 180/365]	33.53 lakhs yen
	3,433.53 lakhs yen

Conversion at ₹ 100 = 345 yen [3,433.53/345 ×100} (B) = ₹ 995.23

Total Cost : A + B = 1,006.15 lakhs

Advice: Option No. 2 is cheaper. Hence, the offer can be accepted.

Answer: 6. (b)

1. Computation of Discount Rate

Note: It is assumed that the required rate of return of 14% (Risk Adjusted Rate) is for rupee inflows.

1 + Risk Adjusted Rate	= (1 + Risk Free Rate) X (1 + Risk Premium for the project)
1 + 14%	= (1 + 12%) x (1 + Risk Premium)
1.14	= 1.12 x (1 + Risk Premium)
1 + Risk Premium = 1.14 ÷ 1.12	= 1.01786
Risk Premium	= 0.01786 or 1.786%

Therefore, Risk Adjusted Discount Rate for Dollar Flows is

(1 + Risk Adjusted Discount Rate)	= (1 + USD Risk Free Rate) X (1 + Project Risk Premium)
	= (1 + 8%) x (1 + 1.786%)
	= 1.08 x 1.01786 = 1.09929
Risk Adjusted Discount Rate	= 1.09929 - 1 = 0.09929 or **9.93%**

2. **Computation of Net Present Value** **[USD in Lakhs]**

Particulars	Year	PV Factor @9.93%		Cash Flow	Disc. Cash Flow
Annual Cash Inflow	1	$1 \div 1.0993$	= 0.910	20.00	18.20
	2	$1 \div 1.0993^2$	= 0.827	25.00	20.68
	3	$1 \div 1.0993^3$	= 0.753	30.00	22.59
	4	$1 \div 1.0993^4$	= 0.685	40.00	27.40
	5	$1 \div 1.0993^5$	= 0.623	50.00	31.15
Present Value of Cash Inflows Less: Initial Investment					120.02 (110.00)
Net Present Value (in USD Lakhs)					10.02
NPV in ₹ Lakhs [USD 10.02 x Spot Rate 48.00 per USD]					480.96

Answer 6. (c)
If foreign exchange risk is hedged.

				Total (₹)
Sum due	Yen 78,00,000	US$1,02,300	Euro 95,920	
Unit input price	Yen 650	US$10.23	Euro11.99	
Unit sold	12000	10000	8000	
Variable cost per unit	₹225/-	395	510	
Variable cost	₹27,00,000	₹39,50,000	₹40,80,000	₹1,07,30,000
Three months forward rate for selling	2.427	0.0216	0.0178	
Rupee value of receipts	₹32,13,844	₹47,36,111	₹53,88,764	₹1,33,38,719
Contribution	₹5,13,844	₹7,86,111	₹13,08,764	₹26,08,719
Average contribution to sale ratio				19.56%

If risk is not hedged

Rupee value of receipt	₹31,72,021	₹47,44,898	₹53,58,659	₹1,32,75,578
Total contribution				₹25,45,578
Average contribution to sale ratio				19.17%

AKC Ltd. Is advised to hedge its foreign currency exchange risk.

SECTION C
(Answer any one of the following.)

Question 7.

(a) The returns on Stock B and Market Portfolio for a period of 6 Years are as follows —

Year	Return on B (%)	Return on Market Portfolio
1	12	8
2	15	12
3	11	11
4	2	-4
5	19	11
6	-10	-2

You are required to determine —

i) Characteristic line for Stock B

ii) The systematic and unsystematic risk of Stock B.

(b) ABC Ltd., is a consumer goods company which earns expected return of 14% on its existing operations subject to standard deviation of 20%. The company is owned by a family and the family has no other investment. New project is under consideration and the new project is expected to give a return of 18% subject to standard deviation of 32%. The new project has a correlation of 0.25 with ABC's existing operations.

The new project is likely to account for 25% of ABC's operations.

ABC is identified a utility function to apprise risky project.

The function is as under:-

Shareholder's utility = 100R - σ²; Where, R = Expected return (in %); σ² = Standard deviation of return (in %)

The project can be accepted only if total utility goes up. Evaluate the project.   [(7+3)+6]

Answer: 7. (a)

1.   Computation of Beta of Security

Period	Return of		Deviation from Mean		Variance of		Covariance of
	Mkt. (R_M)	B (R_B)	Mkt. $(R_M - \bar{R}_M)$ (D_M)	B $(R_B - \bar{R}_B)$ (D_B)	Mkt. (D_M^2)	S (D_B^2)	R_M & R_B $[D_M \times D_B]$
(1)	(2)	(3)	(4) [(2) − 6.00]	(5) [(3) − 7.00]	(6) $(4)^2$	(7) $(5)^2$	(8) $(4) \times (5)$
1	8	12	2	5	4	25	10
2	12	15	4	8	16	64	32
3	11	11	5	4	25	16	20
4	-4	2	(10)	(5)	100	25	50
5	11	19	5	12	25	144	60
6	-2	-10	(8)	(17)	64	289	136
	36	49			234	563	308

	Market Portfolio	Shares of Company (B)
Mean	$\bar{R}_M = \sum R_M \div n$ $= 36 \div 6$ $= 6$	$\bar{R}_B = \sum R_B \div n$ $= 49 \div 6$ $= 8.17$
Variance	$\sigma_M^2 = \sum D_M^2 \div n$ $= 234/6 = 39$	$\sigma_B^2 = \sum D_B^2 \div n$ $= 563/6 = 98.83$
Standard Deviation	$\sigma_M = \sqrt{39} = 6.24$	$\sigma_B = \sqrt{93.83} = 9.69$

Covariance and Correlation:

Combination	Market and Security B
Covariance	$Cov_{MB} = \sum [D_M \times D_B] \div n = 308 \div 6 = 51.33$
Beta	$\beta = Cov_{MB} \div \sigma_M^{\ 2} = 51.33 \div 39 = 1.32$
Correlation	$\rho_{MB} = \dfrac{Cov_{MB}}{\sigma_M \times \sigma_B} = \dfrac{51.33}{6.24 \times 9.69} = 0.8489$

2. **Computation of Characteristic Line for Security B**

Particulars	Value
$Y = \overline{R_B}$	8.17
β	1.32
$X = \overline{R_M}$ (Expected Return on Market Index)	6

Characteristic Line for Security B = y = α + βx

8.17 = α + 1.32 x 6

α = 8.17 – 7.92 = 0.25

Characteristic line for Security y = 0.25 + 1.32x

3. **Analysis of Risk into Systematic Risk and Unsystematic Risk**

Particulars	Variance Approach	Standard Deviation Approach
Total Risk	66.75%	8.17%
Systematic Risk	Total risk x ρ_{MA}^2 = 66.75 x 0.8489^2= 48.102%	Total risk x ρ_{MA} = 9.69 x 0.8489= 8.23%
Unsystematic Risk	Total risk x $(1 - \rho_{MB}^2)$ = 66.75 x $(1-0.8489^2)$=18.6479	Total risk x $(1 - \rho_{MB})$ = 9.69 X $(1 - 0.8489)$ = 1.4642

Answer: 7. (b)

We may treat the existing Co and new project as to two securities Portfolio since we are aware that original company has 0.75 share and new project 0.25 finally in overall operation.

1. Expected return = Proportion of Investment x Return

$$= (0.75 \times 14\%) + (0.25 \times 18\%) = 15\%$$

2. Covariance = ρAB (Correlation between old and new operations) X $\sigma_{old\ project}$ X $\sigma_{new\ project}$
= 0.25 x 20 x 32= 160

$$\sigma\rho = \sqrt{\left(\sigma A^2 \times W_A^2\right) + \left(\sigma B^2 \times W_B^2\right) + 2\left(\sigma A \times W_A \times \sigma B \times W_B \times \rho AB\right)}$$

Variance of the company with new project = $(0.75^2 \times 20^2) + (0.25^2 \times 32^2) + (2 \times 0.75 \times 0.25 \times 160)$
= 349

S.D. = σ = √349 =18.68%

3. Share holders utility without the project = $100 \times 12 - 20^2 = 800$ units

4. Shareholders utility with the project = $100 \times 13 - (18.68)^2 = 951$ units

Hence, project will increase the utility.

Question 8.

(a) The historical rates of return of two securities over the past ten years are given.

Calculate the Covariance and the Correlation coefficient of the two securities;

Years	1	2	3	4	5	6	7	8	9	10
Security A : (Return %)	12	8	7	14	16	15	18	20	16	22
Security B: (Return %)	20	22	24	18	15	20	24			

(b) Write down the objectives of portfolio management?

(c) A Ltd., and B Ltd., has the following risk and return estimates

R_A	R_B	σ_A	σ_B	(Correlation coefficient) = r_{AB}
20%	22%	18%	15%	-1.50

Calculate the proportion of investment in A Ltd., and B Ltd., to minimize the risk of Portfolio. **[7+4+5]**

Answer: 8. (a)

1. Computation of Factors

Year	Return of Security A (R_1)	Return of Security B (R_2)	Deviation from Mean SA $(R_1 - \bar{R}_1)$ (D_1)	Deviation from Mean SB $(R_2 - \bar{R}_2)$ (D_2)	Variance of (D_1^2)	Variance of (D_2^2)	Covariance of R_1 &R_2 [D_1 X D_2]
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	12	20	-2.8	-1	7.84	1	2.8
2	8	22	-6.8	1	46.24	1	-6.8
3	7	24	-7.8	3	60.84	9	-23.4
4	14	18	-0.8	-3	0.64	9	2.4
5	16	15	1.2	-6	1.44	36	-7.2
6	15	20	0.2	-1	0.04	1	-0.2
7	18	24	3.2	3	10.24	9	9.6
8	20	25	5.2	4	27.04	16	20.8
9	16	24	1.2	3	1.44	9	3.6
10	22	18	7.2	-3	51.84	9	-21.6
	$\sum R_1=148$	$\sum R_2 = 210$			207.6	100	-20

	Security A	Security B
Mean	$\bar{R}_1 = \sum R_1 \div n = 148 \div 10 = 14.8$	$\bar{R}_2 = \sum R_2 \div n = 210 \div 10 = 21$
Variance	$\sigma_1{}^2 = \sum D_1{}^2 \div n = 207.6/10 = 20.76$	$\sigma_2{}^2 = \sum D_2{}^2 \div n = 100/10 = 10$
Standard Deviation	$\sigma_1 = \sqrt{20.76} = 4.55$	$\sigma_2 = \sqrt{10} = 3.162$

1. Covariance and Correlation:

Combination	Security A and B
Covariance	$Cov_{AB} = \sum [D_1 \times D_2] \div n = -20 \div 10 = -2$
Correlation	$\rho_{AB} = Cov_{AB} /(\sigma_A \times \sigma_B) = -2 /(4.55 \times 3.162) = -0.1390$

Answer: 8. (b)

The objectives of Portfolio management are —

i) **Reduce Risk:** To reduce the risk of loss of capital / income, by investing in various types of securities and over a wide range of industries, i.e. diversification.

ii) **Safety of Principal:** To keep the capital / principal amount intact, in terms of value and in terms of purchasing power. The capital or the principal amount invested should not erode, either in value or in terms of purchasing power. By earning return, principal amount will not erode in nominal terms, by earning returns at a rate not lesser than the inflation rate; principal amount will be intact in present value terms.

iii) **Stability of Income:** To facilitate a more accurate and systematic re-investment of income, to ensure growth and stability in returns.

iv) **Capital Growth:** To enable attainment of capital growth by reinvesting in growth securities or through purchase of growth securities.

v) **Marketability:** To have an easily marketable investment portfolio, so that the investor is able to take advantage of attractive opportunities in the market.

vi) **Liquidity:** Some investors prefer that the portfolio should be such that whenever they need their money, they may get the same.

vii) **Maintaining the Purchasing Power**: Inflation eats the value of money, i.e., purchasing power. Hence, one object of the portfolio is that it must ensure maintaining the purchasing power of the investor intact besides providing the return.

viii) **Tax Savings:** To effectively plan for and reduce the tax burden on income, so that the investor gets maximum from his investment.

Answer: 8. (c)

Basic Values of Factors for Determination of Portfolio Risk

Standard Deviation of Security A	σ_A	18%
Standard Deviation of Security B	σ_B	15%
Correlation co-efficient of Securities A and B	ρ_{AB}	-1.50
Weight of Security A	W_A	a
Weight of Security B	W_B	1-a

Computation of Investment in Security A (W_A)

$$\text{Proportion or Investment in A Ltd., } W_A = \frac{\sigma B^2 - Cov_{AB}}{\sigma A^2 + \sigma B^2 - 2Cov_{AB}}$$

Proportion of Investment in B Ltd., $W_B = 1 - W_A$

(i) **Computation of Covariance**

$$Cov_{AB} = \rho AB \times \sigma A \times \sigma B$$

$$= -1.50 \times 18 \times 15 = -405$$

(ii) **Proportion of investment in A Ltd.**

$$W_A = \left[\sigma Y^2 - Cov_{XY} \right] \div \left[\sigma X^2 + \sigma Y^2 - 2Cov_{XY} \right]$$

$$W_A = [15^2 - (-405)] \div [18^2 + 15^2 - 2 \times (-405)]$$

$$W_A = [225 + 405] \div [324 + 225 + 810] = 630/1359 = 0.46$$

(iii) **Proportion of investment in B Ltd.**

$$W_B = 1 - 0.46 = 0.54$$

SECTION D
(Answer any one of the following.)

Question 9.

(a) **Excel Ltd. manufactures a special chemical for sale at ₹ 40 per kg. The variable cost of manufacture is ₹ 25 per kg. Fixed cost excluding depreciation is ₹ 2,50,000. Excel Ltd. is currently operating at 50% capacity. It can produce a maximum of 1,00,000 kgs at full capacity.**

The Production Manager suggests that if the existing machines are fully replaced the company can achieve maximum capacity in the next five years gradually increasing the production by 10% per year. The Finance Manager estimates that for each 10% increase in capacity, the additional increase in fixed cost will be ₹ 50,000. The existing machines with a current book value of ₹ 10,00,000 can be disposed of for ₹ 5,00,000. The Vice-President (finance) is willing to replace the existing machines provided the NPV on replacement is about ₹ 4,53,000 at 15% cost of capital after tax.

(i) You are required to compute the total value of machines necessary for replacement.

For your exercise you may assume the following:

I.   **The company follows the block assets concept and all the assets are in the same block. Depreciation will be on straight-line basis and the same basis is allowed for tax purposes.**

II. **There will be no salvage value for the machines newly purchased. The entire cost of the assets will be depreciated over five year period.**

III. **Tax rate is at 40%.**

IV. Cash inflows will arise at the end of the year.

V. Replacement outflow will be at the beginning of the year (year 0).

VI. Discounting Factor.

Year	0	1	2	3	4	5
Discount Factor at 15%	1	0.87	0.76	0.66	0.57	0.49

(ii) On the basis of data given above, the managing director feels that the replacement, if carried out, would at least yield post tax return of 15% in the three years provided the capacity build up is 60%, 80% and 100% respectively. Do you agree?

(b) Elite Builders has been approached by a foreign embassy to build for it a block of six flats to be used as guest houses. As per the terms of the contract, the foreign embassy would provide Elite Builders the plans and the land costing ₹25 lakhs. Elite Builders would build the flats at their own cost and lease them to the foreign embassy for 15years. At the end of which the flats will be transferred tot the foreign embassy for a nominal value of ₹ 8 lakh. Elite Builders estimates the cost of constructions as follows:

Area per flat, 1,000 sq. feet ; Construction cost, ₹400 per sq. feet ; Registration and other costs, 2.5 per cent of cost of construction; Elite Builders will also incur ₹4 lakhs each in years 14 and 15 towards repairs.

Elite Builders proposes to charge the lease rentals as follows:

Years	Rentals
1 - 5	Normal
6 – 10	120 per cent of normal
11 - 15	150 per cent of normal

Elite builders present tax rate averages at 35 per cent which is likely to be the same in future. The full cost of construction and registration will be written off over 15 years at a uniform rate and will be allowed for tax purposes.

You are required to calculate the normal lease rental per annum per flat. For your exercise you may assume: (a) Minimum desired return of 10 per cent, (b) Rentals and repairs will arise on the last day of the year, and, (c) Construction, registration and other costs will be incurred at time= 0. **[(6+6)+8]**

Answer: 9. (a)

(i) Computation of the total replacement value of machine. (Assuming that existing machines also have valid life for 5 years

Step 1: Incremental Cash Inflows

Year	1	2	3	4	5
Incremental Capacity	10%	20%	30%	40%	50%
Incremental production and sales (Kgs.)	10,000	0,000	30,000	40,000	50,000
	₹	₹	₹	₹	₹
Incremental contribution	1,50,000	3,00,000	4,50,000	6,00,000	7,50,000
Incremental Fixed cost	50,000	1,00,000	1,50,000	2,00,000	2,50,000
Incremental PBTD	1,00,000	2,00,000	3,00,000	4,00,000	5,00,000
Tax at 40%	40,000	80,000	1,20,000	1,60,000	2,00,000
Incremental PAT BD	60,000	1,20,000	1,80,000	2,40,000	3,00,000
Discount factors	0.87	0.76	0.66	0.57	0.49
Discounted value of PAT BD	52,200	91,200	1,18,800	1,36,800	1,47,000
Total for 5 years	5,46,000				

Step 2: Incremental Cash outflow

Let the total cost of replacement	X
Disposal value of existing machines	5,00,000
Incremental cash outflow	(X – 5,00,000)

Step 3: Tax savings on depreciation

= (Incremental block/5) x Tax rate x (Annuity factor of 15% for 5 years)

= [(X – 5,00,000)/5] x 40% x 3.35 = 0.268 x - 1,34,000

Step 4: Total Discounted cash inflows

Total incremental discounted cash inflows: 5,46,000 + .268X – 1,34,000 = 4,12,000 + .268 X

Step 5: Equation

NPV = Sum of discounted cash inflows – Sum of the discounted cash outflows

4, 53,000 = (4, 12,000 + .268 X) – (X – 5, 00,000)

4, 53,000 = 4, 12,000 + .268 X – X + 5,00,000

4, 53,000 - 4, 12,000 - 5, 00,000 = .268 X – X

- 4,59,000 = -0.732 X

Or 0.732 X = 4,59,000

Or X = 4,59,000/0.732 = ₹ 6,27,049

(ii) Evaluation whether replacement would yield post tax return of 15% in 3 years

	1	2	3
Incremental capacity	10%	30%	50%
Incremental PBTD	1,00,000	3,00,000	5,00,000
Depreciation (6,27,049 – 5,00,000)/5	25,410	25,410	25,410
Incremental PBT	74,590	2,74,590	4,74,590
Tax at 40%	29,836	1,09,836	1,89,836
Incremental PAT	44,754	1,64,754	2,84,754
PAT + Depreciation	70,164	1,90,164	3,10,164
Discount factors	0.87	0.76	0.66
Discounted cash inflows	61,043	1,44,525	2,04,708
Total discounted cash inflow	4,10,276		
Discounted incremental cash outflow	1,27,049		
NPV	2,83,227		

Conclusion: As the net present value is positive the view of the Managing Director is correct.

Answer: 9. (b)

Calculation of present value of Cash out flow: (₹)

Cost of construction 400x1,000x6		24,00,000
Registration and other costs @ 2.5%		60,000
Cost of Repairs	4,00,000	
(-) tax savings @ 35%	1,40,000	
	2,60,000	
At t_{14} = Present value = 2,60,000 x 0.26333 = 68466		
At t_{15} = present value = 2,60,000 x 0.23939 = 62241		

		1,30,707
		25,90,707 (Rounded of to 25,90,700)

Let 'X' be Normal lease rent per 6 flats per annum. P/V of Recurring Cash Inflow for 15 years

Particulars	1-5 years	6-10 years	11-15 years
Lease Rent p.a.	X	1.2 X	1.5 X
Depreciation	164,000	164,000	164,000
PBT 24,60,000/15	X-164,000	1.2X-164000	1.5X-164,000
PAT 65 %	0.65X-106600	0.78X-106600	0.975X-106600
CIAT = PAT + Dep.	0.65X + 57400	0.78X + 57400	0.975X + 57400
PVCF	3.7908	2.3538	1.4615
PV	2.4635X + 217592	1.836X + 135108	1.42X + 83890

Total = 5.7195 X + 436590

P/V of Terminal Cash Inflows: ₹

Nominal value of flats after 15 years	800,000
Less: Tax on Profit [800000x35%]	280,000
	520,000

P/V = 520,000 x 0.239 = ₹124,280

At 10% Rate of Return: P/V of Cash Inflows = P/V of Cash outflows

5.719X + 436,590 + 124,280 = 2590700

X = ₹3,54,896 .

Lease Rent per Flat = 354896/6 = ₹59,150.

Question 10.

(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 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 a 8% discount rate for this type of investment.

Required:

(i) Construct a decision tree for the proposed investment project and calculate the expected net present value (NPV).

(ii) What net present value will the project yield, if worst outcome is realized? What is the probability of occurrence of this NPV?

(iii) What will be the best outcome and the probability of that occurrence?

(iv) Will the project be accepted?

(Note: 8% discount factor 1 year 0.9259; 2 year 0.8573)   [5+4+4+2]

(b) Cyber Company is considering two mutually exclusive projects. Investment outlay of both the projects is ₹ 5,00,000 and each is expected to have a life of 5 years. Under three possible situations their annual cash flows and probabilities are as under:

₹

		Cash Flow	
Situation	Probabilities	Project A	Project B
Good	0.3	6,00,000	5,00,000
Normal	0.4	4,00,000	4,00,000
Worse	0.3	2,00,000	3,00,000

The cost of capital is 9 per cent, which project should be accepted? Explain with workings.   [5]

Answer: 10. (a)

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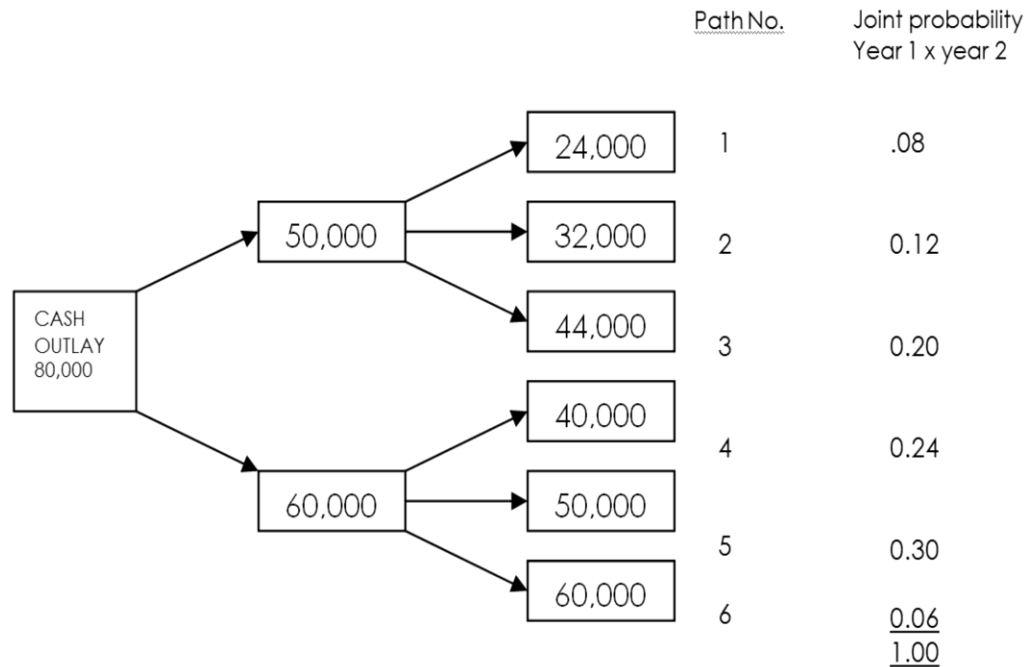
The Net Present Value (NPV) of each path at 8% discount rate is given below:

Path	Year 1 Cash Flows (₹)	Year 2 Cash Flows (₹)	Total Cash Inflows (PV) (₹)	Cash Inflows (₹)	NPV (₹)
1	50,000×0.9259= 46,295	24,000×0.8573= 20,575	66,870	80,000	(—) 13,130
2	46,295	32,000×0.8573= 27,434	73,729	80,000	(—) 6,271
3	46,295	44,000×0.8573= 37,721	84,016	80,000	4,016
4	60,000×0.9259= 55,554	40,000×0.8573= 34,292	89,846	80,000	9,846
5	55,554	50,000×0.8573= 42,865	98,419	80,000	18,419
6	55,554	60,000×0.8573= 51,438	1,06,992	80,000	26,992

Statement showing Expected Net Present Value

₹

z	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:

(ii) 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).

(iii) The best outcome will be path 5 when the NPV is at ₹ 18,419. The probability of occurrence of this NPV is 30% and a expected profit of ₹ 5,525.70.

(iv) The project should be accepted because the expected NPV is positive at ₹ 8,508.54 based on joint probability.

Answer: 10. (b)

Project A
Expected Net Cash flow (ENCF)
0.3 (6,00,000) + 0.4 (4,00,000) + 0.3 (2,00,000) = 4,00,000
σ^2 = 0.3 (6,00,000 − 4,00,000)^2 + 0.4 (4,00,000 − 4,00,000)^2 + 0.3 (2,00,000 − 4,00,000)^2
$\sigma = \sqrt{24,00,00,00,000}$
σ = 1,54,919.33
ENPV = 4,00,000 × 4.100 = 16,40,000
NPV = 16,40,000 − 5,00,000 = 11,40,000

Project B
ENCF = 0.3 (5,00,000) + 0.4 (4,00,000) + 0.3 (3,00,000) = 4,00,000
σ^2 = 0.3 (5,00,000 − 4,00,000)^2 + 0.4 (4,00,000 − 4,00,000)^2 + 0.3 (3,00,000 − 4,00,000)^2
$\sigma = \sqrt{6,00,00,00,000}$
σ = 77,459.66
ENPV = 4,00,000 × 4.100 = 16,40,000
NPV = 16,40,000 − 5,00,000 = 11,40,000

Recommendation:
NPV in both projects being the same, the project should be decided on the basis of standard deviation and hence project 'B' should be accepted having lower standard deviation, means less risky.