

# Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

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## 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 objectives of inter bank participation certificate? [2]
- (b) An investor has a cash of \$10,000,000 at disposal. He wants to invest in a bond with \$1,000 nominal value and whose dirty price is equal to 107.457%.
- (i) What is the number of bonds he will buy?
- (ii) Same question if the nominal value and the dirty price of the bond are respectively \$100 and 98.453%.
- [Note: Dirty Price = Clean Price + Accrued Interest] [2+2]
- (c) You are given the middle rates as under:
- ₹ 80/£ 1 in London,  
₹ 47/US \$ in Delhi, and  
US \$ 1.58/£ 1 in New York.  
Compute the Arbitrage gain on ₹ 8,00,000. [5]
- (d) MR.ADHIRAJ is planning to construct a minimum risk portfolio by investing in the shares of ARIHANT LTD. and SUZLON LTD. The risks associated with the returns of Arihant Ltd. and Suzlon Ltd. are 23% and 25% respectively. If the co-efficient of correlation between the returns of shares of both companies is “0”, what proportion of funds to be invested in the shares of ARIHANT LTD? [2]
- (e) What types of risk is involved in Investment in Government Securities? [2]
- (f) What do you mean by risk adjusted discount rate method? [2]
- (g) Write down the advantages of securitisation to the Originator. [3]

**Answer: 1**

- (a) Inter Bank Participation Certificates (IBPC) are short-term instruments to even out the short term liquidity within the Banking system particularly when there are imbalances affecting the maturity mix of assets in Banking Book.  
It provides a degree of flexibility in the credit-portfolio of Banks. It can be issued by Scheduled Commercial Bank and can be subscribed by any Commercial Bank.

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

---

**(b)**

(i) The number of bonds he will buy is given by the following formula

$$\text{Number of bonds bought} = \frac{\text{Cash}}{\text{Nominal Value of the bond} \times \text{dirty price}}$$

Here, the number of bonds is equal to 9,306

$$n = \frac{10,000,000}{1,000 \times 107.457\%} = 9,306.048$$

(ii)  $n$  is equal to 101,562

$$n = \frac{10,000,000}{100 \times 98.453\%} = 101,571.31$$

**(c)** The following sequential will serve the purpose:

(i) Buy US \$ in Delhi and get 17,021.277 US \$ for ₹ 8L

(ii) Sell the above US \$ in N.Y for £ and get (£ 17,021.277 ÷ 1.58) = £ 10,772.96

(iii) Sell the £ obtained in (ii) for INR in London

$$£ 10,772.96 \times 80 = ₹ 8,61,836.80$$

$$\text{Arbitrage gain will be ₹ } (8,61,836.80 - 8,00,000)$$

$$= ₹ 61,836.80$$

**(d)** Let the proportion of investment to be made in the shares of ARIHANT LTD be  $W_A$

For constructing a minimum risk portfolio the condition to be satisfied is

$$\begin{aligned} W_A &= \frac{\sigma_S^2 - \text{COV}(A,S)}{\sigma_A^2 + \sigma_S^2 - 2\text{COV}(A,S)} \\ &= \frac{0.25^2 - 0}{0.23^2 + 0.25^2 - 2 \times 0} \\ &= \frac{0.0625}{0.1154} = 0.5416 \text{ i.e. } 54.16\% \end{aligned}$$

$$\text{Where } \text{COV}(A,S) = \rho_{AS} \sigma_A \sigma_S$$

$$\rho_{AS} = \text{Correlation Coefficient}$$

$$\text{COV}(A,S) = 0 \times 0.23 \times 0.25 = 0$$

**(e)** Government Securities are usually referred to as risk free securities. However, these securities are subject to only one type of risk, i.e. interest rate risk. Subject to changes in the overall interest rate scenario, the price of these securities may appreciate or depreciate.

**(f)** The risk adjusted discount rate method (RADR) is similar to the NPV. It is defined as the present value of the expected or mean value of future cash flow distributions discounted at a discount rate,  $k$ , which includes a risk premium for the riskiness of the cash flows from the project. It is defined by the following equation:

$$\text{NPV} = \sum_{t=1}^N \frac{\bar{X}_t}{(1+k)^t} - I_0$$

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

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(g) Advantages of securitisation to the Originator:

- (i) The assets are shifted off the Balance sheet, thus giving the Originator recourse to off Balance Sheet funding.
- (ii) It converts illiquid assets to liquid portfolio.
- (iii) It facilitates better Balance Sheet management as assets are transferred off Balance Sheet facilitating satisfaction of capital adequacy norms.
- (iv) The Originator's credit rating enhances.

### SECTION A

(Answer any two of the following.)

2. (a) Write down the objective and functions of State Cooperative Banks.

(b) Two funds are available for investment. Fund X is being launched i.e. 31.12.2012 and available for investment at ₹ 10 per unit. A similar Fund Y (same risk profile like Fund X) is also available for investment at ₹ 19.45 per unit. The information of quarterly NAV for the next three quarters are available as given below. Investor Mr. A prefers Fund X and Investor Mr. B prefers Fund Y for investment through SIP (Systematic Investment Plan) each installment entailing ₹ 2,000 for four quarters including initial investment:

Closing NAV	Fund X ₹	Fund Y ₹
31.12.2012	10.00	19.45
31.03.2013	11.1567	21.50
30.06.2013	14.7680	27.15
30.09.2013	12.8554	23.69

Which investor (Mr. A or B) would clock a higher return on investment as on 30.09.2013? (Ignore Time Value of Money). [6+6]

**Answer: (a)**

### Objective and functions of State Cooperative Banks

The chief objectives of State Cooperative Bank are to coordinate the work of the Central Banks, and to link Cooperative Credit Societies with the general money market and the Reserve Bank of India.

These banks work as real pivots of the Cooperative movement in the state. They act as initial source of credit for seasonal and urgent needs of their members. Their main functions are:-

- (1) They act as banker's bank to the Central Cooperative Banks in the districts. These banks not only mobilise the financial resources needed by the societies, but they also deploy them properly among the various sectors of the movement.
- (2) They coordinate their own policies with those of the cooperative movement and the government.

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

- (3) They form a connecting link between the cooperative credit societies and the commercial money market and the RBI.
- (4) They formulate and execute uniform credit policies for the cooperative movement as a whole.
- (5) They promote the wise of cooperation in general by granting subsidiaries to the Central Cooperative Banks for the development of cooperative activities.
- (6) They act as a clearing house for capital i.e., money flows from, the Apex Banks to the Central Banks and from the Central Banks to the rural societies and from them to individual borrowers.
- (7) They supervise, control and guide the activities of the Central Bank through regular inspections by their inspection staff and rectify the defects in their work. Thus, they act as their friend, philosopher and guide.
- (8) They also perform general utility functions such as issuing drafts, cheques and letters of credit on various centres and thereby help remittance of funds.
- (9) They collect and discount bills with the permission of the Registrar.
- (10) In certain place they also provide safe deposit locker and facilities for safe custody of valuables.
- (11) They help the State Governments in drawing up Cooperative development and other development plans and in their implementation.

**Answer: (b)**

Amount (₹)	FUND X		FUND Y	
	NAV	Units	NAV	Units
31.12.2012	10.0000	200.0000	19.45	102.8278
31.03.2013	11.1567	179.2645	21.50	93.0233
30.06.2013	14.7680	135.4280	27.15	73.6648
30.09.2013	12.8554	155.5766	23.69	84.4238
Total		670.2691		353.9397
Value of Investment	$670.269 \times 12.8554 = ₹ 8,616.58$		$353.9397 \times 23.69 = ₹ 8,384.83$	
Return	$= (8,000.00)$		$= (8,000.00)$	
Return	$616.58/8,000 = 7.71\%$		$384.83/8,000 = 4.81\%$	

Mr. A has fetched a higher return from Fund X.

**3. (a) State the limitations of taking the mutual fund route for investment?**

**(b) The following are the data on six portfolios.**

Portfolio	Average annual return	Standard Deviation	Correlation with market
P	18.6	27.0	0.81
Q	14.8	18.0	0.65
R	15.1	8.0	0.98
S	22.0	21.2	0.75
T	-9.0	4.0	0.45

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

<b>U</b>	<b>26.5</b>	<b>19.3</b>	<b>0.63</b>
<b>Market Risk</b>	<b>12.0</b>	<b>12.0</b>	
<b>Risk Free Rate</b>	<b>9.0</b>		

(i) Rank these Portfolios using —

- Sharpe's method, and
- Treynor's Method.

(ii) Compare the ranking in part (i) and explain the reasons behind the differences.

[4+ (6+2)]

**Answer:**

**(a) Limitations of taking the Mutual Fund route for investment:**

**(i) No Choice of Securities:** Investors cannot choose the securities which they want to invest in.

**(ii) Relying on Other's Performance:**

- Investors face the risk of Fund Manager not performing well. Investors in Mutual Fund have to rely on the Fund Manager for receiving any earning made by the fund, i.e. they are not automatic.
- If Fund Manager's pay is linked to performance of the fund, he may be tempted to perform only on short-term and neglect long-term performance of the fund.

**(iii) High Management Fee:** The Management Fees charged by the fund reduces the return available to the investors.

**(iv) Diversification:** Diversification minimizes risk but does not guarantee higher return.

**(v) Diversion of Funds:** There may be unethical practices e.g. diversion of Mutual Fund amounts by Mutual Fund /s to their sister concerns for making gains for them.

**(vi) Lock-In Period:** Many MF schemes are subject to lock in period and therefore, deny the investors market drawn benefits.

**Answer: (b)**

Portfolio	Sharpe's Method $[(R_P - R_F) \div \sigma_P]$	Ranking	$\beta = \rho_{sm} \times \frac{\sigma_s}{\sigma_m}$	Treynor Method $[(R_P - R_F) \div \beta_P]$	Ranking
<b>P</b>	$[(18.6 - 9) \div 27] = 0.3555$	<b>4</b>	$[27 \times 0.81 \div 12] = 1.823$	$[(18.6 - 9) \div 1.823] = 5.266$	<b>5</b>
<b>Q</b>	$[(14.8 - 9) \div 18] = 0.3222$	<b>5</b>	$[18 \times 0.65 \div 12] = 0.975$	$[(14.8 - 9) \div 0.975] = 5.95$	<b>4</b>
<b>R</b>	$[(15.1 - 9) \div 8] = 0.7625$	<b>2</b>	$[8 \times 0.98 \div 12] = 0.653$	$[(15.1 - 9) \div 0.653] = 9.342$	<b>3</b>
<b>S</b>	$[(22 - 9) \div 21.2] = 0.6132$	<b>3</b>	$[21.2 \times 0.75 \div 12] = 1.325$	$[(22 - 9) \div 1.325] = 9.811$	<b>2</b>

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

<b>T</b>	$[(-9 - 9) \div 4] = -4.5$	6	$[4 \times 0.45 \div 12] = 0.15$	$[(-9 - 9) \div 0.15] = -120$	6
<b>U</b>	$[(26.5 - 9) \div 19.3] = 0.9067$	1	$[19.3 \times 0.63 \div 12] = 1.013$	$[(26.5 - 9) \div 1.013] = 17.27$	1

### Reasons for Difference between Sharpe and Treynor's method:

- (a) Sharpe Index considers only the Standard Deviation and leaves market Standard Deviation and the Correlation whereas Treynor considers market Standard Deviation and Correlation.
- (b) Greater correlation result in greater value of Beta. This would reduce the points in Treynor.
- (c) Portfolio R which is ranked '2' in Sharpe is pushed a position back in Treynor owing to the correlation effect. Also evident in Portfolio P and Q.

### 4. (a) Write down the other risks to which the derivatives clearing houses may be exposed.

(b) Today is 24th March. A refinery needs 1,050 barrels of crude oil in the month of September. The current price of crude oil is ₹ 3,000 per barrel. September futures contract at Multi Commodity Exchange (MCX) is trading at ₹ 3,200. The firm expects the price to go up further and beyond ₹ 3,200 in September. It has the option of buying the stock now. Alternatively it can hedge through futures contract.

- (i) If the cost of capital, insurance, and storage is 15% per annum, examine if it is beneficial for the firm to buy now?
- (ii) Instead, if the upper limit to buying price is ₹ 3,200 what strategy can the firm adopt?
- (iii) If the firm decides to hedge through futures, find out the effective price it would pay for crude oil if at the time of lifting the hedge (a) the spot and futures price are ₹ 2,900 and ₹ 2,910 respectively, (b) the spot and futures price are ₹ 3,300 and ₹ 3,315 respectively. [4+(2+2+4)]

### Answer:

#### (a) Other Risks to which the Derivatives Clearing Houses may be exposed:

- (i) **Market Risk:** A clearing house may be subject to market risk if it accepts securities as margin. Clearing houses usually address this market risk by discounting the value of non-domestic currencies and securities posted as margin (i.e. by subjecting them to "haircuts") and by marking them to market daily.
- (ii) **Currency Exchange Risk:** If the clearing house accepts non-domestic currency as margin or if it clears contracts that are denominated and settled in a non-domestic currency, but that are collateralized with domestic currency or assets denominated in domestic currency. Clearing houses usually address this risk by subjecting non-domestic currency and assets denominated in non-domestic currency to haircuts and by marking all
- (iii) **Operational risk:** Any operational problem that delays settlement or prevents the clearing house from resolving a default could increase counterparty exposures. In addition, an operational breakdown might prevent a clearing house from monitoring its exposures.
- (iv) **Legal risks:** The enforceability of netting arrangements, the ability to realize a defaulting member's assets, the finality of payments and securities transfers, the enforceability of the clearing house's internal rules and the general legal framework applicable in the jurisdiction in which the clearing house operates must be subject to a high degree of legal certainty.

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

**Answer: (b)**

- (i) If cost of carry (including interest, insurance, and storage) is 15%, the fair price of the futures contract is  $S_0 \times e^{-rt} = 3,000 \times e^{-6/12 \times 0.15} = ₹ 3,233.65$ .

It implies that if the firm buys crude oil today to be used after six months it would effectively cost ₹ 3,233.65 per barrel.

- (ii) Since futures are trading at ₹ 3,200 it can lock-in the price of around ₹ 3,200 through a long hedge. Under long hedge the firm would buy the futures on crude oil today and sell it six months later while simultaneously meeting the physical requirements from the market at the price prevailing at that time. Irrespective of price six months later, the firm would end up paying a price of around ₹ 3,200.
- (iii) If the firm adopts the strategy as mentioned in (ii), the effective price to be paid by the firm in cases of rise and fall in spot values is shown below:-

Quantity of crude oil to be hedged	=1,075 barrels
Size of one futures contract	= 100 barrels
No. of futures contracts bought $1,075/100$	= 11 contracts (Rounded)
Futures price	= ₹ 3,200
Exposure in futures $3,200 \times 11 \times 100$	= ₹ 35,20,000

Six months later the firm would unwind its futures position and buy the requirement from the spot market.

	₹	₹
Futures sold at price	2910	3315
Amount of futures sold	32,01,000	36,46,500
Gain/Loss on futures (11 contracts)	(3,19,000)	1,26,500
Spot Price	2,900	3,300
Actual Cost of buying(1075 barrels)	31,17,500	35,47,500
Effective cost of buying	34,36,500	34,21,000
<b>Effective Price</b>	<b>3,197</b>	<b>3,182</b>

### SECTION B

(Answer any one of the following.)

5. (a) Who can invest in P-Notes?

(b) Your Company has to make a US \$ 1 Million payment in three month's time. The dollars are available now. You decide to invest them for three months and you are given the following information.

- The US deposit rate is 8% p.a.
- The sterling deposit rate is 10% p.a.

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

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- The spot exchange rate is \$ 1.80 / pound.
- The three month forward rate is \$ 1.78/ pound.
- (i) Where should your company invest for better results?
- (ii) Assuming that the interest rates and the spot exchange rate remain as above, what forward rate would yield an equilibrium situation?
- (iii) Assuming that the US interest rate and the spot and forward rates remain as in the original question, where would you invest if the sterling deposit rate were 14% per annum?
- (iv) With the originally stated spot and forward rates and the same dollar deposit rate, what is the equilibrium sterling deposit rate?

(c) Prabir has ₹60 Lakhs in hand. He is contemplating investment in the shares of Super Star Accessories Ltd (VAL) which is being traded at ₹ 200 per share.

Prabir expects a dividend declaration of ₹37 per share 3 months hence and a market price of ₹185 per share at the end of the year, at which Prabir plans to sell of all his holdings.

If the discount rate is 12% p.a., what will be the course of action if Prabir discounts his cash flows under continuous compounding approach and monthly discounting approach?  
[6+(3+1+2+2)+6]

**Answer: (a)**

- a) 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;
- b) Any entity that is regulated, authorised 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 authorised but also be regulated by the aforesaid regulatory bodies;
- c) Any entity that is regulated, authorised or supervised by a 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;
- d) 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), NASD (Sub-account) or other similar self-regulatory securities or futures authority or commission within any country, state or territory provided that the aforesaid organizations which are in the nature of self regulatory organizations are ultimately accountable to the respective securities / financial market regulators.
- e) 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.

**Answer: (b)**

**(i) Invest for better results**

Since the US \$ are available now, amount can be invested in

- a. US \$ Deposits @ 8% p.a. or

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

b. Converted into Sterling Currency at the Spot Rate and invested in UK Deposits.

### Alternative 1

Particulars	Value
Invest in \$ deposits @ 8% p.a. for 3 months.	
Income = \$ 10,00,000 x 8/100x3/12	\$ 20,000

### Alternative 2

Particulars		Value
1.	Convert Dollars into Pounds at Spot Rate (US \$ 10,00,000 ÷ 1.80)	£5,55,556
2.	Invest £5,55,556 in Sterling Deposits at the rate of 10% p.a. for 3 months interest on £5,55,556 @ 10% for 3 months = £5,55,556 10% × 3/12	£13,889
3.	Total Cash Inflow at the end of 3 months [(2)+(3)]	£5,69,445
4.	Amount earned in US \$ = [(4) × 1.78 (Forward Rate)]	US \$ 10,13,612
5.	Gain in US \$ [10,13,612 – 10,00,000]	US \$13,612

Gain in **Alternative 1** is higher. Hence, company should invest in US Deposits.

### (ii) Equilibrium Forward Rate 3 Months Forward; (for 1 £)

= Spot Rate X [(1 + US Interest Rate for 3 Months) / (1 + Sterling Interest Rate for 3 Months)]

= \$ 1.8 X [(1 + 8%/4) / (1 + 10%/4)] = **\$1.7912 / £ [Interest Rate Parity Method]**

Equilibrium 3 months Forward Rate = \$ 1.7912 / £

### (iii) Investment if Sterling Deposit: Rate is 14%

Particulars	Amount
1. Amount invested in Sterling Deposit Rate	£ 5,55,556
2. Interest Income @ 14% for 3 months £ 5,55,556 x 14 % x 3 / 12	£ 19,444
3. Total Cash Inflow at the end of 3 months [(2)+ (3)]	£ 5,75,000
4. Amount earned in US \$ = [(4) x 1.78 (Forward Rate) ]	US \$ 10,23,500
5. Gain in US \$ [10,23,500 - 10,00,000]	US \$ 23,500

**Conclusion:** Gain is highest of all the considered alternatives, therefore amount should be invested in Sterling Deposits @ 14%.

**(iv) Equilibrium Sterling Deposit Rate Franc Interest Rate [6 Months]** = Assuming Sterling Interest Rate = x, applying the same in Interest Rate Parity Formula for determining Forward Rate —

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

$$£1 = \text{Spot Rate} \times \frac{(+\text{USRate for 3 Months})}{(+\text{SterlingRate for 3 Months})}$$

$$1 \text{ £} = \$1.80 \times (1 + 8\%/4) / (1 + x/4)$$

$$1 \text{ £} = \$1.80 \times (1 + 0.02) / (1 + x/4);$$

$$\Rightarrow \$1.78 = \$1.80 \times (1 + 0.02) / (1 + x/4):$$

$$\Rightarrow 1 + x/4 = \$1.80 \times 1.02 / \$1.78$$

$$\Rightarrow x/4 = 1.03146 - 1 = 0.03146 \text{ or } 3.146\%$$

$$\Rightarrow \mathbf{x = 12.58\%}$$

Equilibrium Sterling Interest Rate = 12.58%

**Answer: (c)**

Time	Nature of Cash Flow	Cash Flow	Continuous Compounding		Monthly Discounting	
			PV Factor at 12%	Discounted Cash Flow	PV Factor at 12%	Discounted Cash Flow
(1)	(2)	(3)	(4) = $[1 \div e^{0.12 \times (n)/12}]$	(5) = (3) x (4)	(6) = $[1 \div (1 + 12\%/12)]^{(n)}$	(7) = (3) x (6)
0	Investment (Outflow)	(60,00,000)	1 $[1 \div e^{0.12 \times 0/12}]$	(60,00,000)	1	(60,00,000)
3	Dividend Inflow)	11,10,000	0.9704 $[1 \div e^{0.12 \times 3/12}]$	10,77,144	0.9706 $[1 \div 1.01]^3$	10,77,366
12	Sale (Inflow)	55,50,000	0.8869 $[1 \div e^{0.12 \times 12/12}]$	49,22,295	0.8874 $[1 \div 1.01]^{12}$	49,25,070
<b>Net Present Value</b>				<b>(561)</b>		<b>2,436</b>

**Conclusion:** If Pranab follows monthly discounting option, he will buy the shares of Vignette Accessories Ltd.

**Note:** No. of share  $60,00,000/200 = 30,000$  Shares.

6. (a) Explain the major sources for raising foreign currency finances?

(b) Given the following information—

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

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 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.

(c) State the measures of the potential loss amount due to market risk?

**[6+(3+6)+5]**

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

**Answer:**

**(a) Major sources for raising foreign currency finances are as follows:**

- (i) Foreign Currency Term Loan:** Financial Institutions provide Foreign Currency Term Loan for meeting the foreign currency expenditures towards —
- Import of Plant, Machinery and Equipment, and
  - Payment of Foreign Technical Know How Fees.
- (ii) Export Credit Schemes:** Export Credit Agencies finance exports of capital goods and related technical services.

**Types of Export Credit:**

- Buyer's Credit:** Credit is provided directly to the Indian buyer, for purchase of capital goods and / or technical service from the overseas exporter.
- Supplier's Credit:** Credit is provided to the overseas exporters, so that they can make available medium-term finance to Indian importers.

**Regulatory:** These agencies are formed by the Governments of the respective countries and follow certain consensus guidelines for supporting exports, under a convention known as the Berne Union.

- (iii) External Commercial Borrowings (ECB):** These include raising finance from international markets for plant and machinery imports. Funds can be raised subject to the terms and conditions stipulated by the Government of India, which imposes restrictions on the amount raised under automatic route. Funds raised above the stipulated limit would require the prior approval of the Ministry of Finance.

**Types of ECB:** External Commercial Borrowings include Bank Loans, Supplier's and Buyer's credit, fixed and floating rate bonds and Borrowing from private sector windows of Multilateral Financial Institutions such as International Finance Corporation.

- (iv) Euro Issues:** Subscription can come from any part of the world except India. This takes the following forms —

- Depository Receipts Mechanism:** An indirect equity investment, these are issued through Overseas Depository Banks, on behalf of the issuing Company.
- Foreign Currency/ Euro Convertible Issues:** Euro Convertible Issues is a debt with 'an option to convert it into equity.
- Debt Route:** Funds can also be raised by way of pure Debt Bonds.

- (v) Issues in Foreign Domestic Markets:** Capital can also be raised by issuing Exchange Traded instruments in Foreign Markets. These include ADRs, GDRs, etc.

**Answer: (b)**

### (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

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

Risk Free Interest Rate [r]	9% or 0.09
Price of Futures Contract [TFP <sub>X</sub> ] TFP <sub>X</sub> = S <sub>X</sub> × e <sup>(r-y)×t</sup>	$= ₹ 50,000 \times e^{(0.09 - 0.06) \times 0.3333}$ $= ₹ 50,000 \times e^{0.03 \times 0.3333}$ $= ₹ 50,000 \times e^{0.01} = ₹ 50,000 \times 1.0101 = ₹ 50,505$

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

### (ii) Gain on Short Futures Position

#### (a) Computation of No. of Contracts to be entered into:

Particulars	Value
Portfolio Value	₹ 101,00,000
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 X ₹50,500 per Unit]	₹ 25,25,000
No. of Contract to be entered [Portfolio Value X Beta of Portfolio w.r.t Index ÷ Value per BSE Index Futures Contract] = [₹101,00,000 X 2.0 ÷ ₹25,25,000]	8 Contracts

#### (b) Computation of Gain on Short Futures Position

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

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

### Answer: (c)

#### Measuring the potential loss amount due to market risk:

- ❖ As with other forms of risk, the potential loss amount due to market risk may be measured in a number of ways or conventions. Traditionally, one convention is to use Value at Risk. The conventions of using Value at risk are well established and accepted in the short-term risk management practice.
- ❖ However, it contains a number of limiting assumptions that constrain its accuracy. The first assumption is that the composition of the portfolio measured remains unchanged over the

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

specified period. Over short time horizons, this limiting assumption is often regarded as reasonable. However, over longer time horizons, many of the positions in the portfolio may have been changed. The Value at Risk of the unchanged portfolio is no longer relevant.

- ❖ The Variance Covariance and Historical Simulation approach to calculating Value at Risk also assumes that historical correlations are stable and will not change in the future or breakdown under times of market stress.
- ❖ In addition, care has to be taken regarding the intervening cash flow, embedded options, changes in floating rate interest rates of the financial positions in the portfolio. They cannot be ignored if their impact can be large.

### SECTION C

(Answer any one of the following.)

7. (a) State the objectives of portfolio Management.  
(b) A Study by a Mutual Fund has revealed the following data in respect of the three securities:

Security	$\sigma$ (%)	Correlation with Index, $\rho_{sm}$
P	20	0.66
Q	18	0.95
R	12	0.75

The Standard Deviation of the Market Portfolio (BSE Sensex) is observed to be 18%.

- (i) What is the sensitivity of returns of each stock with respect to the market?
- (ii) What are the Co-variances among the various stocks?
- (iii) What would be the risk of portfolio consisting of all the three stocks equally?
- (iv) What is the beta of the portfolio consisting of equal investment in each stock?
- (v) What is the total systematic and unsystematic risk of the portfolio? [6+(1+2+4+1+2)]

**Answer: (a)**

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.

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

- (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: (b)**

### (i) Sensitivity

Security	P	Q	R
Standard Deviation [A]	20.00	18.00	12.00
Correlation to Market Portfolio [B]	0.66	0.95	0.75
<b>Beta (Sensitivity) = [A] X [B] / <math>\sigma_M</math></b>	<b>0.73</b>	<b>0.95</b>	<b>0.50</b>

### (ii) Covariance between the securities

Covariance of Returns between the securities P and Q =  $\text{Cov}_{PQ} = \beta_P \times \beta_Q \times \sigma_M^2$

Securities		P	Q	R
	<b>Beta</b>	0.73	0.95	0.50
P	0.73	—	$0.73 \times 0.95 \times 324$	$0.73 \times 0.50 \times 324$
Q	0.95	$0.73 \times 0.95 \times 324$	—	$0.50 \times 0.95 \times 324$
R	0.50	$0.73 \times 0.50 \times 324$	$0.50 \times 0.95 \times 324$	—
<b>Covariance Between</b>		<b>Computation</b>		
P and Q		$\beta_P \times \beta_Q \times \sigma_M^2 = 0.73 \times 0.95 \times 324 = 224.69$		
P and R		$\beta_P \times \beta_R \times \sigma_M^2 = 0.73 \times 0.50 \times 324 = 118.26$		
Q and R		$\beta_Q \times \beta_R \times \sigma_M^2 = 0.95 \times 0.50 \times 324 = 153.90$		

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

### (iii) Risk of the Portfolio consisting of Equal Investment in each stock Matrix

Securities		P	Q	R
	<b>Weights</b>	1/3 $W_P$	1/3 $W_Q$	1/3 $W_R$
P	1/3 $W_P$	400 ( $\sigma_P^2$ )	224.69 ( $COV_{PQ}$ )	118.26 ( $COV_{PR}$ )
Q	1/3 $W_Q$	224.69 ( $COV_{PQ}$ )	324 ( $\sigma_Q^2$ )	153.90 ( $COV_{QR}$ )
R	1/3 $W_R$	118.26 ( $COV_{PR}$ )	153.90 ( $COV_{QR}$ )	144 ( $\sigma_R^2$ )

### Computation of Portfolio Variance ( $\sigma_{PQR}^2$ )

	Description	Computation ( $W \times W \times Cov$ ) or ( $W \times W \times \sigma^2$ )	Product
1	$W_P \times W_P \times \sigma_P^2$	$1/3 \times 1/3 \times 400$	44.44
2	$W_P \times W_Q \times COV_{PQ}$	$1/3 \times 1/3 \times 224.69$	24.97
3	$W_P \times W_R \times COV_{PR}$	$1/3 \times 1/3 \times 118.26$	13.14
4	$W_Q \times W_P \times COV_{PQ}$	$1/3 \times 1/3 \times 224.69$	24.97
5	$W_Q \times W_Q \times \sigma_Q^2$	$1/3 \times 1/3 \times 324$	36.00
6	$W_Q \times W_R \times COV_{QR}$	$1/3 \times 1/3 \times 153.90$	17.10
7	$W_R \times W_P \times COV_{PR}$	$1/3 \times 1/3 \times 118.26$	13.14
8	$W_R \times W_Q \times COV_{QR}$	$1/3 \times 1/3 \times 153.90$	17.10
9	$W_R \times W_R \times \sigma_R^2$	$1/3 \times 1/3 \times 144$	16
	<b>Variance of the Portfolio (<math>\sigma_{PQR}^2</math>)</b>		<b>206.86</b>
	<b>Standard Deviation (Risk) of the Portfolio (<math>\sigma_{PQR}</math>)</b>		<b>14%</b>

### (iv) Beta of the Portfolio consisting of equal investment in each stock

Security	P	Q	R
a) Beta	0.73	0.95	0.50
b) Weight	1/3	1/3	1/3

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

c) Product	0.243	0.317	0.167
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Portfolio Beta =  $0.243 + 0.317 + 0.167 = 0.727$

**(v) Systematic and Unsystematic Risk of the Portfolio**

Total Risk = Systematic Risk + Unsystematic Risk

Variance Approach - Total Risk of the Portfolio = Variance of the Portfolio = 206.86

Systematic Risk =  $[\beta_P^2 \times \sigma_M^2] = 0.727 \times 0.727 \times 324 = 171.24$

Unsystematic Risk =  $206.86 - 171.24 = 35.62$

**8. (a) (i) Calculate the market sensitivity index and the expected return on the Portfolio from the following data;**

Standard deviation of an asset	4.5%
Market standard deviation	4.0%
Risk – free rate of return	15.0%
Expected return on market Portfolio	17.0%
Correlation coefficient of Portfolio with market	0.89

(ii) What will be the expected return on the Portfolio, if Portfolio beta is 0.5 and the risk free return is 10%.

(b) Write down the relationship between correlation and diversification.

(c) Securities X and Y have standard deviations of 3% and 9%. Nitin is having a surplus of ₹20 Lakhs for investment in these two securities. How much should he invest in each of these securities to minimize risk, if the correlation co-efficient for X and Y is — (i) -1; (ii) -0.30; (iii) 0; (iv) 0.60 [[3+2)+5+6]

**Answer: (a)**

**Basic Data for computation of Expected Return**

Notation	Particulars	Case (a)	Case(b)
$\sigma_P$	Standard Deviation of asset	4.5%	4.5%
$\sigma_M$	Market Standard Deviation	4.0%	4.0%
$\rho_{MP}$	Correlation co-efficient of portfolio with market	0.89	0.89
$R_F$	Risk free rate of return	15%	10%
$R_M$	Expected return on market Portfolio	17%	17%
$\beta_P$	Portfolio Beta	To be ascertained	0.5

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

### (i) & (ii) Computation of Expected Return

	Case (a)	Case (b)
Portfolio Beta $\beta_P = \sigma_P \div \sigma_M \times \rho_{MP}$	$4.5 \div 4 \times 0.89 = 1.001$	0.5
Expected Return = $R_F + \beta_P \times (R_M - R_F)$	$0.15 + [1.001 \times (0.17 - 0.15)]$ $= 17.002\%$	$0.10 + [0.5 \times (0.17 - 0.15)] = 13.5\%$

**Answer: (b)**

#### Relationship between Correlation and Diversification:

**Relationship between Securities:** The level of diversification of a Portfolio depends on how the investments (in the Portfolio) react with one another. If they offset each other properly, then the value of Portfolio is well protected.

**Examination of Correlation:** The interaction among the investments can be determined by examining the correlation coefficient between pairs of investments.

**Inference from Correlation:** The relationship between Correlation and Diversification can be described as follows —

Correlation coefficient	Nature	Diversification
$\rho = +1$	Perfectly positively correlated	<b>(a)</b> Investments do not offset each other and they move in tandem. <b>(b)</b> No diversification.
$\rho = -1$	Perfectly negatively correlated	<b>(a)</b> Investments offset each other totally and they move in opposite direction. <b>(b)</b> Full diversification achieved.
$\rho = 0$	No correlation	<b>(a)</b> No predictability of movement of investments. <b>(b)</b> Not a good diversification.

**Answer: (c)**

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

Standard Deviation of Security X	$\sigma_X$	3%
Standard Deviation of Security Y	$\sigma_Y$	9%
Correlation co-efficient of Securities X and Y	$\rho_{XY}$	-1, -0.30, 0, 0.60
Weight of Security X	$W_X$	$\alpha$
Weight of Security Y	$W_Y$	$1-\alpha$

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

### (ii) Computation of Investment in Securities

$$\text{Proportion of Investment in Security X, } W_X = \frac{\sigma_Y^2 - \text{Cov}_{XY}}{\sigma_X^2 + \sigma_Y^2 - 2\text{Cov}_{XY}}$$

$$\text{Proportion of Investment in Security Y, } W_Y = 1 - W_X$$

$$\text{Cov}_{XY} = \rho_{XY} \times \sigma_X \times \sigma_Y$$

If $\rho_{XY}$ is	$\text{Cov}_{XY}$ is	Computation	Investment
-1	-27 (-1x3x9)	$W_X = [\sigma_Y^2 - \text{Cov}_{XY}] / [\sigma_X^2 + \sigma_Y^2 - 2\text{Cov}_{XY}]$ $W_X = [92 - (-27)] / [32 + 92 - 2 \times (-27)]$ $W_X = [81 + 27] / [9 + 81 + 54]$ $W_X = 108/144 = 0.75$	0.750 in X 0.250 in Y ₹15,00,000 in X ₹5,00,000 in Y
-0.3	-8.1 (-0.3x3x9)	$W_X = [\sigma_Y^2 - \text{Cov}_{XY}] / [\sigma_X^2 + \sigma_Y^2 - 2\text{Cov}_{XY}]$ $W_X = [92 - (-8.1)] / [32 + 92 - 2 \times (-8.1)]$ $W_X = [81 + 8.1] / [9 + 81 + 16.2]$ $W_X = 89.1 / 106.2 = 0.839$	0.839 in X 0.161 in Y ₹16,78,000 in X ₹3,22,000 in Y
0	0 (0x3x9)	$W_X = [\sigma_Y^2 - \text{Cov}_{XY}] / [\sigma_X^2 + \sigma_Y^2 - 2\text{Cov}_{XY}]$ $W_X = [92 - 0] / [32 + 92 - 2 \times 0]$ $W_X = [81 - 0] / [9 + 81 - 0]$ $W_X = 81/90 = 0.90$	0.900 in X 0.100 in Y ₹ 18,00,000 in X ₹ 2,00,000 in Y
0.60	16.2 (0.6 x 3 x 9)	$W_X = [\sigma_Y^2 - \text{Cov}_{XY}] / [\sigma_X^2 + \sigma_Y^2 - 2\text{Cov}_{XY}]$ $W_X = [92 - 16.2] / [32 + 92 - 2 \times 16.2]$ $W_X = [81 - 16.2] / [9 + 81 - 32.4]$ $W_X = 64.8 / 57.60 = 1.125 > 1$ At this correlation level, risk reduction is not possible.	Reducing Risk below 3% is not possible.

### SECTION D

(Answer any one of the following.)

9. (a) A company is considering two mutually exclusive projects X and Y. Project X costs ₹ 3,00,000 and Project Y ₹ 3,60,000. You have been given below the net present value, probability distribution for each project:

Project X		Project Y	
NPV Estimate	Probability	NPV Estimate	Probability
₹		₹	
30,000	0.1	30,000	0.2
60,000	0.4	60,000	0.3

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

1,20,000	0.4	1,20,000	0.3
1,50,000	0.1	1,50,000	0.2

- (i) Compute the expected net present value of Projects X and Y.
- (ii) Compute the risk attached to each project i.e., Standard Deviation of each probability distribution.
- (iii) Which project do you consider more risky and why?
- (iv) Compute the profitability index of each project.

(b) Determine the risk adjusted net present value of the following projects:

	A	B	C
Net cash outlays (₹)	1,00,000	1,20,000	2,10,000
Project life	5 years	5 years	5 years
Annual cash inflow (₹)	30,000	42,000	70,000
Coefficient of variation	0.4	0.8	1.2

The company selects the risk-adjusted rate of discount on the basis of the co-efficient of variation:

Coefficient of variation	Risk adjusted rate of discount	Present value factor 1 to 5 years at risk adjusted rate of discount
0.0	10%	3.791
0.4	12%	3.605
0.8	14%	3.433
1.2	16%	3.274
1.6	18%	3.127
2.0	22%	2.864
More than 2.0	25%	2.689

- (c) Explain the influences of corporate taxation on corporate financing?
- (d) 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

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

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. [(1+2+2+2)+3+5+5]

Answer: (a)

### Project X

NPV Estimate	Probability	NPV Estimate x Probability	Deviation from Expected NPV i.e. ₹ 90,000	Square of the deviation	Square of the deviation x Probability
₹		₹		₹	₹
30,000	0.1	3,000	-60,000	36,00,000,000	3,60,000,000
60,000	0.4	24,000	-30,000	9,00,000,000	3,60,000,000
1,20,000	0.4	48,000	30,000	9,00,000,000	3,60,000,000
1,50,000	0.1	15,000	60,000	36,00,000,000	3,60,000,000
Expected NPV		90,000			14,40,000,000

### Project Y

NPV Estimate	Probability	NPV Estimate x Probability	Deviation from Expected NPV i.e. ₹ 90,000	Square of the deviation	Square of the deviation x Probability
₹		₹		₹	₹
30,000	0.2	6,000	-60,000	36,00,000,000	7,20,000,000
60,000	0.3	18,000	-30,000	9,00,000,000	2,70,000,000
1,20,000	0.3	36,000	30,000	9,00,000,000	2,70,000,000
1,50,000	0.2	30,000	60,000	36,00,000,000	7,20,000,000
Expected NPV		90,000			19,80,000,000

(i) The expected net present value of Projects X and Y is ₹ 90,000 each.

(ii) Standard Deviation =  $\sqrt{\text{Square of the deviation} \times \text{Probability}}$

In case of Project X: Standard Deviation =  $\sqrt{\text{₹}14,40,000,000}$

= ₹ 37,947

In case of Project Y: Standard Deviation =  $\sqrt{\text{₹}19,80,000,000}$

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

$$= ₹ 44,497$$

$$(iii) \text{ Coefficient of variation} = \frac{\text{Standard deviation}}{\text{Expected net present value}}$$

$$\text{In case of Project X : Coefficient of variation} = \frac{37,947}{90,000} = 0.42$$

$$\text{In case of Project Y : Coefficient of variation} = \frac{44,497}{90,000} = 0.4944 \text{ or } 0.50$$

Project Y is riskier since it has a higher coefficient of variation.

$$(iv) \text{ Profitability index} = \frac{\text{Discounted cash inflow}}{\text{Discounted cash outflow}}$$

$$\text{In case of Project X : Profitability Index} = \frac{90,000 + 3,00,000}{3,00,000} = 1.30$$

$$\text{In case of Project Y : Profitability Index} = \frac{90,000 + 3,60,000}{3,60,000} = \frac{4,50,000}{3,60,000} = 1.25$$

**Answer: (b)**

**Statement showing the determination of the risk adjusted net present value**

Projects	Net cash outlays	Coefficient of variation	Risk adjusted discount rate	Annual cash inflow	PV factor 1-5 years at risk adjusted rate of discount	Discounted cash inflow	Net present value
	₹			₹	₹	₹	₹
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii) = (v) x (vi)	(viii) = (vii) - (ii)
A	1,00,000	0.4	12%	30,000	3.605	1,08,150	8,150
B	1,20,000	0.8	14%	42,000	3.433	1,44,186	24,186
C	2,10,000	1.20	16%	70,000	3.274	2,29,180	19,180

**Answer: (c)**

The influence of corporate taxation on corporate financing can be analysed in the following areas—

**(a) Financing Decisions — Cost of Capital:** Debt is cheaper than Equity since interest payable on loan is a charge on profit and will reduce the tax payable by the company. The use of cheaper cost debt funds has a leverage effect and increases the EPS of the company.

**(b) Investment Decisions — Capital Budgeting:** For project evaluation, the Cash Flows after Taxes (CFAT) are relevant for discounting purposes. Cash Outflows may also be reduced due to various deductions and allowances. The incidence of tax on income and on capital gains affects cash flows and investment decisions.

**(c) Dividend Decisions — Retention vs. Payment:** Tax is one of the major considerations in taking decisions on the amount and rate of dividend. Whether the company should retain all its

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

earnings or distribute all earnings as dividend, also depends on tax incidence on the Company and its shareholders. The levy of taxes on dividends pushes the cost of equity capital of the company.

- (d) Evaluation of Cash Flows:** Depreciation is not an outgo in cash but it is deductible in computing the income subject in tax. There will be saving in tax on depreciation, and such savings could be profitably employed. Thus, both interest and depreciation provide tax shield and have a tendency to increase EPS.
- (e) Rehabilitation of Sick Units:** Unabsorbed Depreciation can be carried forward for 8 years, and this can be carried for set off in another Company's profit in case of amalgamations in specified circumstances. Such a provision will help in the growth of Companies and rehabilitation of sick units.
- (f) Protection of Internal Funds:** Tax implications should be taken care off in choosing the size and nature of industry and incentives are given for backward areas. Tax considerations are relevant for purpose of preserving and protecting internal funds.

**Answer: (d)**

### Project A

Expected Net Cash flow (ENCF)

$$0.3 (6,00,000) + 0.4 (4,00,000) + 0.3 (2,00,000) = 4,00,000$$

$$\sigma^2 = 0.3 (6,00,000 - 4,00,000)^2 + 0.4 (4,00,000 - 4,00,000)^2 + 0.3 (2,00,000 - 4,00,000)^2$$

$$\sigma = \sqrt{24,00,00,00,000}$$

$$\sigma = 1,54,919.33$$

$$\text{ENPV} = 4,00,000 \times 4.100 = 16,40,000$$

$$\text{NPV} = 16,40,000 - 5,00,000 = 11,40,000$$

### Project B

$$\text{ENCF} = 0.3 (5,00,000) + 0.4 (4,00,000) + 0.3 (3,00,000) = 4,00,000$$

$$\sigma^2 = 0.3 (5,00,000 - 4,00,000)^2 + 0.4 (4,00,000 - 4,00,000)^2 + 0.3 (3,00,000 - 4,00,000)^2$$

$$\sigma = \sqrt{6,00,00,00,000}$$

$$\sigma = 77,459.66$$

$$\text{ENPV} = 4,00,000 \times 4.100 = 16,40,000$$

$$\text{NPV} = 16,40,000 - 5,00,000 = 11,40,000$$

### 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.

**10. (a) A company is considering Projects X and Y with following information:**

Project	Expected NPV (₹)	Standard deviation
X	1,06,000	75,000

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

Y	2,40,000	1,35,000
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- (i) Which project will you recommend based on the above data?  
 (ii) Explain whether your opinion will change, if you use coefficient of variation as a measure of risk.  
 (iii) Which measure is more appropriate in this situation and why?  
 (b) A Company requires ₹15 Lakhs for the installation of a new unit, which would yield an annual EBIT of ₹ 2,50,000. The Company's objective is to maximise EPS. It is considering the possibility of Issuing Equity Shares plus raising a debt of ₹3,00,000, ₹6,00,000 and ₹9,00,000. The current Market Price per Share is ₹50 which is expected to ₹40 per share if the market borrowings were to exceed ₹7,00,000. The cost of borrowing are indicated as follows:

Level of Borrowing	Upto ₹2,00,000	₹2,00,000 to ₹6,00,000	₹6,00,000 to ₹9,00,000
Cost of Borrowing	12% p.a.	15% p.a.	17% p.a.

Assuming a tax rate of 50%, work out the EPS and the scheme, which you would recommended to the Company.

- (c) Distinguish between NPV and IRR? [(1+3+1)+8+7]

**Answer: (a)**

- (i) On the basis of standard deviation project X be chosen because it is less risky than Project Y having higher standard deviation.

$$(ii) CV_x = \frac{SD}{ENPV} = \frac{75,000}{1,06,000} = 0.71$$

$$CV_y = \frac{SD}{ENPV} = \frac{1,35,000}{2,40,000} = 0.5626$$

On the basis of Co-efficient of Variation (C.V.) Project X appears to be more risky and Y should be accepted.

- (iii) However, the NPV method in such conflicting situation is best because the NPV method is in compatibility of the objective of wealth maximisation in terms of time value.

**Answer: (b)**

**Statement showing EPS under the different schemes**

(Amount in ₹)

Particulars	Scheme I	Scheme II	Scheme III
Capital Required	15,00,000	15,00,000	15,00,000
Less : Debt Content	3,00,000	6,00,000	9,00,000
<b>Balance Equity Capital required</b>	<b>12,00,000</b>	<b>9,00,000</b>	<b>6,00,000</b>
Market Price per Share	₹50	₹50	₹40
Number of Equity Shares to be issued (Equity Capital ÷ MPS)	24,000	18,000	15,000

## Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

### Profitability Statement

EBIT	2,50,000	2,50,000	2,50,000
Less: Interest on Debt: First ₹2,00,000 at 12%	24,000	24,000	24,000
Next ₹4,00,000 at 15%	15,000	60,000	60,000
Balance at 17%			51,000
Total Interest	39,000	84,000	1,35,000
EBIT	2,11,000	1,66,000	1,15,000
Less : Tax at 50%	1,05,500	83,000	57,500
EAT	1,05,500	83,000	57,500
Earning Per Share (EPS) = EAI ÷ No. of shares	<b>4.40%</b>	<b>4.61%</b>	<b>3.83%</b>
Average Interest Rate = Total Interest ÷ Debt	<b>12%</b>	<b>14%</b>	<b>15%</b>
ROCE = EBIT ÷ Capital Employed	<b>16.67%</b>	<b>16.67%</b>	<b>16.67%</b>

**Conclusion:** EPS is maximum under Scheme II and is hence preferable.

**Leverage Effect:** Use of Debt Funds and Financial Leverage will have a favourable effect only if  $ROCE > \text{Interest rate}$ . ROCE is 16.67% and hence upto 15% interest rate, i.e. Scheme II, use of debt will have favourable impact on EPS and ROE. However, when interest rate is higher at 17%, financial leverage will have negative impact and hence EPS falls from ₹4.61 to ₹3.83.

**Answer: (c)**

### Difference between NPV and IRR

(a) Causes for Conflict: Higher the NPV, higher will be the IRR. However, NPV and IRR may give conflicting results in the evaluation of different projects, in the following situations -

- (i) Initial Investment Disparity - i.e. Different Project Sizes,
- (ii) Project Life Disparity - i.e. Difference in Project Lives,
- (iii) Outflow Patterns - i.e. when Cash Outflows arise at different points of time during the Project Life, rather than as Initial Investment (Time 0) only.
- (iv) Cash Flow Disparity - when there is a huge difference between initial CFAT and later years' CFAT. A project with heavy initial CFAT than compared to later years will have higher IRR and vice-versa.

(b) Superiority of NPV: In case of conflicting decisions based on NPV and IRR, the NPV method must prevail. Decisions are based on NPV, due to the comparative superiority of NPV, as given from the following points -

- (i) NPV represents the surplus from the project but IRR represents the point of no surplus-no deficit.
- (ii) NPV considers Cost of Capital as constant. Under IRR, the Discount Rate is determined by reverse working, by setting  $NPV = 0$ .
- (iii) NPV aids decision-making by itself i.e. projects with positive NPV are accepted. IRR by itself does not aid decision-making. For example, a project with  $IRR = 18\%$  will be accepted if  $K_0 < 18\%$ . However, the project will be rejected if  $K_0 = 21\%$  (say  $> 18\%$ ).

## **Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1**

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- (iv) NPV method considers the timing differences in Cash Flows at the appropriate discount rate. IRR is greatly affected by the volatility / variance in Cash Flow patterns.
- (v) IRR presumes that intermediate cash inflows will be reinvested at that rate (IRR), whereas in the case of NPV method, intermediate cash inflows are presumed to be reinvested at the cut-off rate. The latter presumption viz. Reinvestment at the Cut-Off Rate, is more realistic than reinvestment at IRR.
- (vi) There may be projects with negative IRR/ Multiple IRR etc. if cash outflows arise at different points of time. This leads to difficulty in interpretation. NPV does not pose such interpretation problems.