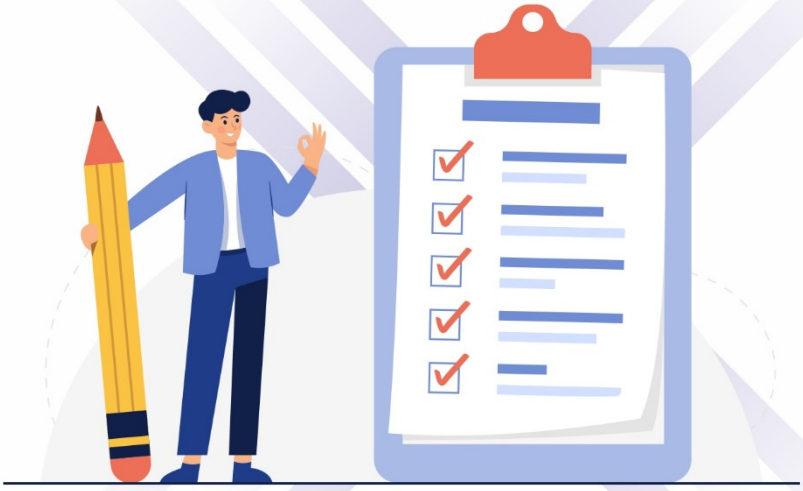
ARIHANT CA

CA FINAL SFM

LIST OF IMPORTANT QUESTIONS

NOV 2022



CA GAURAV JAIN

Security Valuation

Study Session 2

QUESTION NO. 1

In December, 2011 AB Co.'s share was sold for ₹ 146 per share. A long term earnings growth rate of 7.5% is anticipated. AB Co. is expected to pay dividend of ₹ 3.36 per Share.

a) What rate of return an investor can expect to earn assuming that dividends are expected to grow along with earnings at 7.5% per year in perpetuity?

b) It is expected that AB Co. will earn about 10%on book Equity and shall retain 60% of earnings. In this case, whether, there would be any change in growth rate and Cost of Equity?

QUESTION NO. 2

Seawell Corporation, a manufacturer of do-it-yourself hardware and housewares, reported earnings per share of € 2.10 in 2003, on which it paid dividends per share of €0.69. Earnings are expected to grow 15% a year from 2004 to 2008, during this period the dividend payout ratio is expected to remain unchanged. After 2008, the earnings growth rate is expected to drop to a stable rate of 6%, and the payout ratio is expected to increase to 65% of earnings. The firm has a beta of 1.40 currently, and is expected to have a beta of 1.10 after 2008. The market risk premium is 5.5%. The Treasury bond rate is 6.25%.

(a) What is the expected price of the stock at the end of 2008?

(b) What is the value of the stock, using the two-stage dividend discount model?

QUESTION NO. 3

SAM Ltd. has just paid a dividend of ₹ 2 per share and it is expected to grow @ 6% p.a. After paying dividend, the Board declared to take up a project by retaining the next three annual dividends. It is expected that this project is of same risk as the existing projects.

The results of this project will start coming from the 4th year onward from now. The dividends will then be ₹ 2.50 per share and will grow @ 7% p.a.

An investor has 1,000 shares in SAM Ltd. and wants a receipt of at least ₹ 2,000 p.a. from this investment.

Show that the market value of the share is affected by the decision of the Board. Also show as to how the investor can maintain his target receipt from the investment for first 3 years and improved income thereafter, given that the cost of capital of the firm is 8%.

QUESTION NO. 4

The current EPS of M/s VEE Ltd. is ₹ 4. The company has shown an extraordinary growth of 40% in its earnings in the last few year This high growth rate is likely to continue for the next 5 years after which growth rate in earnings will decline from 40% to 10% during the next 5 years and remain stable at 10% thereafter. The decline in the growth rate during the five year transition period will be equal and linear. Currently, the company' s pay-out ratio is 10%. It is likely to remain the same for the next five years and from the beginning of the sixth year till the end of the 10th year, the pay-out will linearly increase and stabilize at 50% at the end of the 10th year. The post tax cost of capital is 17% and the PV factors are given below:

Years	1	2	3	4	5	6	7	8	9	10
PVIF @17%	0.855	0.731	0.625	0.534	0.456	0.390	0.333	0.285	0.244	0.209

You are required to calculate the intrinsic value of the company's stock based on expected dividend. If the current market price of the stock is ₹ 125, suggest if it is advisable for the investor to invest in the company's stock or not.

QUESTION NO. 5

Anson Ford, CFA, is analysing the financial statements of Sting's Delicatessen. He has a 2009 income statement and balance sheet, as well as 2010 income statement & balance sheet (as shown in the tables below). Assume there will be no sales of long-term assets in 2010. Calculate forecasted free cash flow to the firm (FCFF) and free cash flow to equity (FCFE) for 2010.

Sting's Income Statement

Income Statement	2010 Forecast	2009 Actual
Sales	$300	$250
Cost of goods sold	120	100
Gross profit	180	150
SG&A	35	30
Depreciation	50	40
EBIT	95	80
Interest expense	15	10
Pre-tax earnings	80	70
Taxes (at 30%)	24	21
Net income	56	49

Sting's Balance Sheet

Balance Sheet	2010 Forecast	2009 Actual
Cash	$10	$5
Account Receivable	30	15
Inventory	40	30
Current Assets	$80	$50
Gross property, plant and equipment	400	300
Accumulated depreciation	190	140
Total Assets	$290	$210
Account Payable	$20	$20
Short Term Debt	20	10
Current Liabilities	$40	$30
Long Term Debt	114	100
Common Stock	50	50
Retained earnings	86	30
Total liabilities and owners' equity	$290	$210

Corporate Valuation

Study Session 3

QUESTION NO. 1

Following information's are available in respect of XYZ Ltd. which is expected to grow at a higher rate for 4 years after which growth rate will stabilize at a lower level:

Base year information:

Revenue	₹ 2,000 crores
EBIT	₹ 300 crores
Capital expenditure	₹ 280 crores
Depreciation	₹ 200 crores

Information for high growth and stable growth period are as follows:

	High Growth	Stable Growth
Growth in Revenue & EBIT	20%	10%
Growth in capital expenditure and depreciation	20%	Capital Expenditure are offset by depreciation
Risk Free Rate	10%	9%
Equity Beta	1.15	1
Market Risk Premium	6%	5%
Pre Tax Cost of debt	13%	12.86%
Debt equity ratio	1:1	2:3

For all time, working capital is 25% of revenue and corporate tax rate is 30%. What is the value of the firm?

QUESTION NO. 2

Following details are available for X Ltd.

Income Statement for the year ended 31st March, 2018

Particulars	Amount
Sales	40,000
Gross Profit	12,000
Administrative Expenses	6,000
Profit Before tax	6,000
Tax @ 30%	1,800
Profit After Tax	4,200

Balance sheet as on 31st March, 2018

Particulars	Amount
Fixed Assets	10,000
Current Assets	6,000
Total Assets	16,000
Equity Share Capital	15,000
Sundry Creditors	1,000
Total Liabilities	16,000

The Company is contemplating for new sales strategy as follows :

(i) Sales to grow at 30% per year for next four years.

(ii) Assets turnover ratio, net profit ratio and tax rate will remain the same.

(iii) Depreciation will be 15% of value of net fixed assets at the beginning of the year.
(iv) Required rate of return for the company is 15%
Evaluate the viability of new strategy.

QUESTION NO. 3

Calculate the value of share of Avenger Ltd. from the following information:

Equity capital of company	₹ 1,200 crores
Profit of the company	₹ 300 crores
Par value of share	₹ 40 each
Debt ratio of company	25
Long run growth rate of the company	8%
Beta 0.1; risk free interest rate	8.7%
Market returns	10.3%
Change in working capital per share	₹ 4
Depreciation per share	₹ 40
Capital expenditure per share	₹ 48

QUESTION NO. 4

Rahim Enterprises is a manufacturer and exporter of woollen garments to European countries. Their business is expanding day by day and in the previous financial year the company has registered a 25% growth in export business. The company is in the process of considering a new investment project. It is an all equity financed company with 10,00,000 equity shares of face value of ₹ 50 per share. The current issue price of this share is ₹ 125 ex-divided. Annual earning are ₹ 25 per share and in the absence of new investments will remain constant in perpetuity. All earnings are distributed at present. A new investment is available which will cost ₹ 1,75,00,000 in one year's time and will produce annual cash inflows thereafter of ₹ 50,00,000. Analyse the effect of the new project on dividend payments and the share price.

QUESTION NO. 5

The valuation of Hansel Limited has been done by an investment analyst. Based on an expected free cash flow of ₹ 54 lakhs for the following year and an expected growth rate of 9 percent, the analyst has estimated the value of Hansel Limited to be ₹ 1800 lakhs. However, he committed a mistake of using the book values of debt and equity.

The book value weights employed by the analyst are not known, but you know that Hansel Limited has a cost of equity of 20 percent and post-tax cost of debt of 10 percent.

The value of equity is thrice its book value, whereas the market value of its debt is nine-tenths of its book value. What is the correct value of Hansel Ltd?

QUESTION NO. 6

Capital structure of Sun Ltd., as at 31.3.2003 was as under: (₹ in Lacs)

Equity share capital	80
8% Preference share capital	40
12% Debentures	64
Reserves	32

Sun Ltd., earns a profit of ₹ 32 Lacs annually on an average before deduction of income-tax, which works out to 35%, and interest on debentures.

Normal return on equity shares of companies similarly placed is 9.6% provided:

a) Profit after tax covers fixed interest and fixed dividends at least 3 times.
b) Capital gearing ratio is 0.75.
c) Yield on share is calculated at 50% of profits distributed and at 5% on undistributed profits.

Sun Ltd., has been regularly paying equity dividend of 8%.
Compute the value per equity share of the company, taken
(i) 1 % for every one time of difference for Interest and Fixed Dividend Coverage Ratio,
(ii) 2% for every one time of difference for Capital Gearing Ratio.

QUESTION NO. 7

The directors of Implant Inc. wishes to make an equity issue to finance a $10 m (million) expansion scheme which has an excepted Net Present Value of $2.2m and to re-finance an existing $6 m 15% Bonds due for maturity in 5 year's time. For early redemption of these bonds there is a $3,50,000 penalty charges. The Co. has also obtained approval to suspend these pre-emptive rights and make a $15 m placement of shares which will be at a price of $0.5 per share. The floatation cost of issue will be 4% of Gross proceeds. Any surplus funds from issue will be invested in IDRs which is currently yielding 10% per year.
The Present capital structure of Co. is as under:

	'000
Ordinary Share ($1 per share)	7,000
Share Premium	10,500
Free Reserves	25,500
	43,000
15% Term Bonds	6,000
11% Debenture (2012-2020)	8,000
	57,000

Current share price is $2 per share and debenture price is $ 103 per debenture. Cost of capital of Co. is 10%. It may be further presumed that stock market is semi-strong form efficient and no information about the proposed use of funds from the issue has been made available to the public. You are required to calculate expected share price of company once full details of the placement and to which the finance is to be put, are announced.

QUESTION NO. 8

You are interested in buying some equity stocks of RK Ltd. The company has 3 divisions operating in different industries. Division A captures 10% of its industries sales which is forecasted to be ₹ 50 crore for the industry. Division B and C captures 30% and 2% of their respective industry's sales, which are expected to be ₹ 20 crore and ₹ 8.5 crore respectively. Division A traditionally had a 5% net income margin, whereas divisions B and C had 8% and 10% net income margin respectively. RK Ltd. has 3,00,000 shares of equity stock outstanding, which sell at ₹ 250.
The company has not paid dividend since it started its business 10 years ago. However from the market sources you come to know that RK Ltd. will start paying dividend in 3 years' time and the pay-out ratio is 30%. Expecting this dividend, you would like to hold the stock for 5 year. By analysing the past financial statements, you have determined that RK Ltd.'s required rate of return is 18% and that P/E ratio of 10 for the next year and on ending P/E ratio of 20 at the end of the fifth year are appropriate.

Required:

(i) Would you purchase RK Ltd. equity at this time based on your one year forecast?
(ii) If you expect earnings to grow @ 15% continuously, how much are you willing to pay for the stock of RK Ltd ?

Ignore taxation.
PV factors are given below :

Years	1	2	3	4	5
PVIF@ 18%	0.847	0.718	0.609	0.516	0.437

QUESTION NO. 9

There are two companies ABC Ltd. and XYZ Ltd. are in same in industry. On order to increase its size ABC Ltd. made a takeover bid for XYZ Ltd.

Equity beta of ABC and XYZ is 1.2 and 1.05 respectively. Risk Free Rate of Return is 10% and Market Rate of Return is 16%. The growth rate of earnings after tax of ABC Ltd. in recent years has been 15% and XYZ's is 12%. Further both companies had continuously followed constant dividend policy.

Mr. V, the CEO of ABC requires information about how much premium above the current market price to offer for XYZ's shares.

Two suggestions have forwarded by merchant bankers.

(i) Price based on XYZ's net worth as per B/S, adjusted in light of current value of assets and estimated after tax profit for the next 5 years.

(ii) Price based on Dividend Valuation Model, using existing growth rate estimates. Summarised Balance Sheet of both companies is as follows.

(₹ In lacs)

	ABC Ltd.	XYZ Ltd.		ABC Ltd.	XYZ Ltd.
Equity Share Capital	2,000	1,000	Land & Building	5,600	1,500
General Reserves	4,000	3,000	Plant & Machinery	7,200	2,800
Share Premium	4,200	2,200			
Long Term Loans	5,200	1,000			
Current Liabilities			Current Assets		
Sundry Creditors	2,000	1,100	Accounts Receivable	3,400	2,400
Bank Overdraft	300	100	Stock	3,000	2,100
Tax Payable	1,200	400	Bank/Cash	200	400
Dividend Payable	500	400		-	-
	19,400	**9,200**		**19,400**	**9,200**

Profit & Loss A/c

(₹ In lacs)

	ABC Ltd.	XYZ Ltd.		ABC Ltd.	XYZ Ltd.
To Net Interest	1,200	220	By Net Profit	7,000	2,550
To Taxation	2,030	820			
To Distributable Profit	3,770	1,510		-	-
	7,000	2,550		7,000	2,550
To Dividend	1,130	760	By Distributable Profit	3,770	1,510
To Balance c/d	2,640	750		-	-
	3,770	1,510		3,770	1,510

Additional information

(1) ABC Ltd.'s land & building have been recently revalued. XYZ Ltd.'s have not been revalued for 4 years, and during this period the average value of land & building have increased by 25% p.a.

(2) The face value of share of ABC Ltd. is ₹ 10 and of XYZ Ltd. is ₹ 25 per share.

(3) The current market price of shares of ABC Ltd. is ₹ 310 and of XYZ Ltd.'s ₹ 470 per share.

With the help of above data and given information you are required to calculate the premium per share above XYZ's current share price by two suggested valuation methods. Discuss which of these two values should be used for bidding the XYZ's shares.

QUESTION NO. 10

XY Ltd., a Cement manufacturing Company has hired you as a financial consultant of the company. The Cement Industry has been very stable for some time and the cement companies SK Ltd. & AS Ltd. are similar in size and have similar product market mix characteristic. Use comparable method to value the equity of XY Ltd. In performing analysis, use the following ratios:

(i) Market to book value
(ii) Market to replacement cost
(iii) Market to sales
(iv) Market to Net Income

The following data are available for your analysis:

(Amount in ₹)

	SK Ltd.	AS Ltd.	XY Ltd.
Market Value	450	400	
Book Value	400	300	250
Replacement Cost	600	550	500
Sales	550	450	500
Net Income	18	16	14

QUESTION NO. 11

Following is the information of M/s. DY Ltd. for the year ending 31/03/2021:

Particulars	
Sales	₹ 1000 Lakh
Operating Expenses Including Interest	₹ 620 Lakh
8% Debentures	₹ 250 Lakh
Equity Share Capital (Face value of ₹ 10 each)	₹ 250 Lakh
Reserves and Surplus	₹ 250 Lakh
Market Value of DY Ltd	₹ 900 Lakh
Corporate Tax Rate	30%
Risk free Rate of Return	7%
Market Rate of Return	12%
Equity Beta	1.4

You are required to-

(i) Calculate Weighted Average Cost of Capital of DY Ltd.
(ii) Calculate Economic Value Added
(iii) Calculate Market Value Added

Mergers, Acquisition & Corporate Restructuring

Study Session 4

QUESTION NO. 1

XYZ Ltd. wants to purchase ABC Ltd. by exchanging 0.7 of its share for each share of ABC Ltd. Relevant financial data are as follows :

Equity shares outstanding	1000000	400000
EPS (₹)	40	28
Market price per share (₹)	250	160

a) Illustrate the impact of merger on EPS of both the companies.

b) The management of ABC Ltd. has quoted a share exchange ratio of 1 : 1 for the merger. Assuming that P/E ratio of XYZ Ltd. will remain unchanged after the merger, what will be the gain from merger for ABC Ltd.?

c) What will be the gain / loss to shareholders of XYZ Ltd. ?

d) Determine the maximum exchange ratio acceptable to shareholders of XYZ Ltd.

QUESTION NO. 2

R Ltd. and S Ltd. operating in same industry are not experiencing any rapid growth but providing a steady stream of earnings. R Ltd.'s management is interested in acquisition of S. Ltd. due to its excess plant capacity. Share of S Ltd. is trading in market at ₹ 3.20 each. Other data relating to S Ltd. is as follows:

Balance Sheet of S Ltd.

Liabilities	Amount (₹)	Assets	Amount (₹)
Current Liabilities	1,59,80,000	Current Assets	2,48,75,000
Long Term Liabilities	1,28,00,000	Other Assets	94,00,000
Reserve & Surplus	2,79,95,000	Property Plants & Equipment	3,45,00,000
Share Capital (80 Lakhs shares of ₹ 1.5 each)	1,20,00,000		
Total	6,87,75,000	Total	6,87,75,000

Particulars	R Ltd. (₹)	S Ltd. (₹)	Combined Entity (₹)
Profit after Tax	86,50,000	49,72,000	1,21,85,000
Residual Net Cash Flows per year	90,10,000	54,87,000	1,85,00,000
Required return on equity	13.75%	13.05%	12.5%

You are required to compute the following:

(i) Minimum price per share S Ltd. should accept from R Ltd.

(ii) Maximum price per share R Ltd. shall be willing to offer to S Ltd.

(iii) Floor Value of per share of S Ltd., whether it shall play any role in decision for its acquisition by R Ltd.

QUESTION NO. 3

The following information relating to the acquiring Company A Ltd. and the target Company B Ltd. are available. Both the Companies are promoted by Multinational Company, Trident Ltd.

The promoter's holding is 50% and 60% respectively in A Ltd. and B Ltd.:

	A Ltd.	B Ltd.
Share Capital (₹)	200 Lakhs	100 Lakhs
Free Reserves and Surplus (₹)	800 Lakhs	500 Lakhs
Paid up Value per share (₹)	100	10
Free Float Market Capitalization (₹)	400 Lakhs	128 Lakhs
P/E Ratio (times)	10	4

Trident Ltd. is interested to do justice to the shareholders of both the Companies. For the swap ratio weights are assigned to different parameters by the Board of Directors as follows:

Book Value:	25%
EPS (Earning per share):	50%
Market Price:	25%

a) What is the swap ratio based on above weights?

b) What is the Book Value, EPS and expected Market price of A Ltd. after acquisition of B Ltd. (assuming P/E. ratio of A Ltd. remains unchanged and all assets and liabilities of B Ltd. are taken over at book value).

c) Calculate:

(i) Promoter's revised holding in the A Ltd.

(ii) Free float market capitalization,

(iii) Also calculate No. of Shares, Earning per Share (EPS) and Book Value (B.V.), if after acquisition of B Ltd., A Ltd. decided to:

1. Issue Bonus shares in the ratio of 1:2; and
2. Split the stock (share) as ₹5 each fully paid

QUESTION NO. 4

Given is the following information:

	Day Ltd.	Night Ltd.
Net Earnings	₹ 5 crores	₹ 3.5 crores
No. of Equity Shares	10,00,000	7,00,000

The shares of Day Ltd. and Night Ltd. trade at 20 and 15 times their respective P/E ratios.

Day Ltd. considers taking over Night Ltd. By paying ₹ 55 crores considering that the market price of Night Ltd. reflects its true value. It is considering both the following options:

I. Takeover is funded entirely in cash.

II. Takeover is funded entirely in stock.

You are required to calculate the cost of the takeover and advise Day Ltd. on the best alternative.

QUESTION NO. 5

The following is the Balance-sheet of Grape Fruit Company Ltd as on March 31st 2011.

Liabilities		Assets	(₹ in lacs)
6 lacs equity shares of ₹100/- each	600	Land & Building	200
2 lacs 14% Preference shares of ₹100/- each	200	Plant & Machinery	300
13% Debentures	200	Furnitures & Fixtures	50
Debenture Interest accrued and Payable	26	Inventory	150
Loan from Bank	74	Sundry debtors	70
Trade Creditors	340	Cash at Bank	130
		Preliminary Expenses	10

		Cost of Issue of debentures	5
		Profit & Loss A/c	525
	1440		**1440**

The Company did not perform well and has suffered sizable losses during the last few years. However, it is now felt that the company can be nursed back to health by proper financial restructuring and consequently the following scheme of reconstruction has been devised:

(i) Equity shares are to be reduced to ₹ 25/- per share, fully paid up;

(ii) Preference shares are to be reduced (with coupon rate of 10%) to equal number of shares of ₹50 each fully paid up.

(iii) Debenture holders have agreed to forego interest accrued to them. Beside this, they have agreed to accept new debentures carrying a coupon rate of 9%.

(iv) Trade creditors have agreed to forgo 25 per cent of the amount due to them.

(v) The company issues 6 lac of equity shares at ₹25/- each and the entire sum was to be paid on application. The existing shareholders have agreed to subscribe to the new issue.

(vi) While Land and Building is to be revalued at ₹450 lacs, Plant & Machinery is to be written down to ₹120 lacs. A provision amounting to ₹15 lacs is to be made for bad and doubtful debts.

You are required to

a) Show the impact of financial restructuring/re-construction

b) Prepare the fresh balance sheet after the reconstructions is completed on the basis of the above proposals.

QUESTION NO. 6

a) Personal Computer Division of Distress Ltd., a computer hardware manufacturing company has started facing financial difficulties for the last 2 to 3 years. The management of the division headed by Mr. Smith is interested in a buyout on 1 April 2013. However, to make this buy-out successful there is an urgent need to attract substantial funds from venture capitalists.

Ven Cap, a European venture capitalist firm has shown its interest to finance the proposed buy-out. Distress Ltd. is interested to sell the division for ₹ 180 crore and Mr. Smith is of opinion that an additional amount of ₹ 85 crore shall be required to make this division viable. The expected financing pattern shall be as follows:

Source	Mode	Amount (₹ Crore)
Management	Equity Shares of ₹ 10 each	60.00
VenCap VC	Equity Shares of ₹ 10 each	22.50
	9% Debentures with attached warrant of ₹ 100 each	22.50
	8% Loan	160.00
Total		265.00

b) The warrants can be exercised any time after 4 years from now for 10 equity shares @ ₹ 120 per share.

c) The loan is repayable in one go at the end of 8th year. The debentures are repayable in equal annual installment consisting of both principal and interest amount over a period of 6 years.

d) Mr. Smith is of view that the proposed dividend shall not be kept more than 12.5% of distributable profit for the first 4 years. The forecasted EBIT after the proposed buyout is as follows:

Year	2013-14	2014-15	2015-16	2016-17
EBIT (₹ crore)	48	57	68	82

e) Applicable tax rate is 35% and it is expected that it shall remain unchanged at least for 5-6 years. In order to attract VenCap, Mr. Smith stated that book value of equity shall increase by 20% during above 4 years. Although, VenCap has shown their interest in investment but are doubtful about the projections of growth in the value as per projections of Mr. Smith. Further VenCap also demanded that warrants should be convertible in 18 shares instead of 10 as proposed by Mr. Smith.

f) You are required to determine whether or not the book value of equity is expected to grow by 20% per year. Further if you have been appointed by Mr. Smith as advisor then whether you would suggest to accept the demand of VenCap of 18 shares instead of 10 or not.

QUESTION NO. 7

ICL is proposing to take over SVL with an objective to diversify. ICL's profit after tax (PAT) has grown @ 18 per cent per annum and SVL's PAT is grown @ 15 per cent per annum. Both the companies pay dividend regularly. The summarised Profit & Loss Account of both the companies are as follows:

₹ in Crores

Particulars	ICL	SVL
Net Sales	4,545	1,500
PBIT	2,980	720
Interest	750	25
Provision for Tax	1,440	445
PAT	790	250
Dividends	235	125

	ICL		SVL	
Fixed Assets				
Land & Building (Net)	720		190	
Plant & Machinery (Net)	900		350	
Furniture & Fixtures (Net)	30	1,650	10	550
Current Assets		775		580
Less: Current Liabilities				
Creditors	230		130	
Overdrafts	35		10	
Provision for Tax	145		50	
Provision for dividends	60	470	50	240
Net Assets		1,955		890
Paid up Share Capital (₹ 10 per share)	250		125	
Reserves and Surplus	1,050	1,300	660	785
Borrowing		655		105
Capital Employed		1,955		890

Market Price Share (₹)	52	75

ICL's Land & Buildings are stated at current prices. SVL's Land & Buildings are revalued three years ago. There has been an increase of 30 per cent per year in the value of Land & Buildings.

SVL is expected to grow @ 18 per cent each year, after merger.

ICL's Management wants to determine the premium on the shares over the current market price which can be paid on the acquisition of SVL. You are required to determine the premium using:

(i) Net Worth adjusted for the current value of Land & Buildings plus the estimated average profit after tax (PAT) for the next five years.

(ii) The dividend growth formula.

(iii) ICL will push forward which method during the course of negotiations?

Period (t)	1	2	3	4	5
FVIF (30%, t)	1.300	1.690	2.197	2.856	3.713
FVIF (15%, t)	1.15	2.4725	3.9938	5.7424	7.7537

QUESTION NO. 8

B Ltd. wants to acquire S Ltd. and has offered a swap ratio of 2 : 3 (2 shares for every 3 share of S Ltd.) Following information is available:

Particulars	B Ltd.	S Ltd.
Profit after tax (in ₹)	21,00,000	4,50,000
Equity shares outstanding (Nos.)	6,00,000	1,80,000
EPS (in ₹)	3.5	2.5
PE Ratio	10 times	7 times
Price quoting per share on BSE before the merger announcement	35	17.5

Required:

(i) The number of equity shares to be issued by B Ltd. for acquisition of S Ltd.

(ii) What is the EPS of B Ltd. after the acquisition?

(iii) Determine the equivalent earnings per share of S Ltd. and calculate per share gain or loss to shareholders of S Ltd.

(iv) What is the expected market price per share of B Ltd. after the acquisition, assuming its PE Multiple remains unchanged?

(v) Determine the market value of the merged firm.

(vi) After the announcement of merger, price of shares of S Ltd. rose by 10% on BSE. Mr. X, an investor, having 10,000 shares of S Ltd. is having another investment opportunity, which yields annual return of 14% is seeking your advise whether he needs to offload the shares in the market or accept the shares from B Ltd.

QUESTION NO. 9

The CEO of a company thinks that shareholders always look for EPS. Therefore he considers maximization of EPS as his company's objective. His company's current Net Profits are ₹ 80.00 lakhs and P/E multiple is 10.5. He wants to buy another firm which has current income of ₹ 15.75 lakhs & P/E multiple of 10.

What is the maximum exchange ratio which the CEO should offer so that he could keep EPS at the current level, given that the current market price of both the acquirer and the target company are ₹ 42 and ₹ 105 respectively?

If the CEO borrows funds at 15% and buys out Target Company by paying cash, how much should he offer to maintain his EPS? Assume tax rate of 30%.

Mutual Funds

Study Session 5

QUESTION NO. 1

Mr. Y has invested in the three mutual funds (MF) as per the following details:

Particulars	MF 'X'	MF 'Y'	MF 'Z'
Amount of Investment (₹)	2,00,000	4,00,000	2,00,000
Net Assets Value (NAV) at the time of purchase (₹)	10.30	10.10	10
Dividend Received up to 31.03.2018 (₹)	6,000	0	5,000
NAV as on 31.03.2018 (₹)	10.25	10	10.20
Effective Yield per annum as on 31.03.2018 (percent)	9.66	-11.66	24.15

Assume 1 Year =365 days

Mr. Y has misplaced the documents of his investment. Held him in finding the date of his original investment after ascertaining the following:

(i) Number of units in each scheme;
(ii) Total NAV;
(iii) Total Yield; and
(iv) Number of days investment held.

QUESTION NO. 2

Mr. X on 1.7.2000, during the initial offer of some Mutual Fund invested in 10,000 units having face value of ₹ 10 for each unit. On 31.3.2001 the dividend operated by the MF was 10% and Mr. X found that his annualized yield was 153.33%. On 31.12.2002, 20% dividend was given. On 31.3.2003 Mr. X redeemed all his balance of 11,296.11 units when his annualized yield was 73.52 %. What are the NAVs on 31.3.2001, 31.12.2002 and 31.03.2003?

QUESTION NO. 3

On 1st April, an open ended scheme of mutual fund had 300 lakh units outstanding with Net Assets Value (NAV) of ₹ 18.75. At the end of April, it issued 6 Lakh units at opening NAV plus 2% load, adjusted for dividend equalization. At the end of May, 3 Lakh units were repurchased at opening NAV less 2% exit load adjusted for dividend equalization. At the end of June, 70% of its available income was distributed.

In respect of April - June quarter, the following additional information are available :

	₹ in lakh
Portfolio value appreciation	425.470
Income of April	22.950
Income of May	34.425
Income of June	45.450

You are required to calculate :

a) Income available for distribution;
b) Issue price at the end of April,
c) Repurchase price at the end of May, and
d) Net asset value (NAV) as on 30th June.

QUESTION NO. 4

M/S. Corpus an AMC, on 1.04.2015 has floated two schemes viz. Dividend Plan and Bonus Plan. Mr. X, an investor has invested in both the schemes. The following details (except the issue price) are available:

Date	Dividend (%)	Bonus Ratio	NAV	
			Dividend Plan	Bonus Plan
1.04.2015			?	?
31.12.2016		1 :4 (One unit on 4 units held)	47	40
31.03.2017	12		48	42
31.03.2018	10		50	39
31.12.2018		1 :5 (One unit on 5 units held)	46	43
31.03.2019	15		45	42
31.03.2020	-	-	49	44

Additional details

Investment (₹)	₹ 9,20,000	₹ 10,00,000
Average Profit (₹)	₹ 27, 748.60	
Average Yield (%)		6.40

You are required to calculate the issue price of both the schemes as on 1.04.2015.

QUESTION NO. 5

Mr. Alex, a practicing Chartered Accountant, can earn a return of 15 percent by investing in equity shares on his own. He is considering a recently announced equity based mutual fund scheme in which initial expenses are 6 percent and annual recurring expenses are 2 percent.

(i) How much should the mutual fund earn to provide Mr. Alex a return of 15 percent per annum?

(ii) Mr. Alex's current Annual Professional Income is ₹ 40 Lakhs. His portfolio value is ₹ 50 Lakhs and now he is spending 10% of his time to manage his portfolio. If he spends this time on profession, his professional income will go up in same proportion. He is thinking to invest his entire portfolio into a Multicap Fund, assuming the fund's NAV will grow at 13% per annum (including dividend).

You are requested to advise Mr. Alex, whether he can invest the portfolio into Multicap Funds ? If so, what is the net financial benefit?

QUESTION NO. 6

Based on the following data, estimate the Net Asset Value (NAV) 1st July 2016 on per unit basis of a Debt Fund:

Name of Security	Face Value ₹	Purchase Price ₹	Maturity Date	No. of Securities	Coupon Date(s)	Duration of Bonds
10.71% GOI 2028	100	104.78	31st March, 2028	100000	31st March	7.3494
10 % GOI 2023	100	100.00	31st March, 2023	50000	31st March & 30th September	5.086
9.5 % GOI 2021	100	97.93	31st December, 2021	40000	30th June & 31st December	4.3949
8.5% SGL 2025	100	91.36	30th June 2025	20000	30th June	6.5205

Number of Units (₹ 10 face value each): 100000

All securities were purchased at a time when applicable Yield to Maturity (YTM) was 10%. On NAV date, the required yield increased by 75 basis point and Cash in hand and accrued expenses were ₹ 6,72,800 and ₹ 2,37,400 respectively.

Derivatives Analysis & Valuation (Futures)

Study Session 6

QUESTION NO. 1

The NSE-50 Index futures are traded with rupee value being ₹ 100 per index point. On 15th September, the index closed at 1195, and December futures (last trading day December 15) were trading at 1225. The historical dividend yield on the index has been 3% per annum and the borrowing rate was 9.5% per annum.

(i) Determine whether on September 15, the December futures were under priced or overpriced?
(ii) What arbitrage transaction is possible to gain out this mispricing?
(iii) Calculate the gains and losses if the index on 15th December closes at (a) 1260 (b) 1175.

Assume 365 days in a year for your calculations.

QUESTION NO. 2

The Following data relate to A Ltd.'s Portfolio:

Shares	X Ltd.	Y Ltd.	Z Ltd.
No. of Shares (lakh)	6	8	4
Price per share (₹)	1000	1500	500
Beta	1.50	1.30	1.70

The CEO is of opinion that the portfolio is carrying a very high risk as compared to the market risk and hence interested to reduce the portfolio's systematic risk to 0.95. Treasury Manager has suggested two below mentioned alternative strategies:

(i) Dispose off a part of his existing portfolio to acquire risk free securities, or
(ii) Take appropriate position on Nifty Futures, currently trading at 8250 and each Nif ty points multiplier is ₹ 210.

You are required to:

(a) Interpret the opinion of CEO, whether it is correct or not.
(b) Calculate the existing systematic risk of the portfolio,
(c) Advise the value of risk-free securities to be acquired,
(d) Advise the number of shares of each company to be disposed off,
(e) Advise the position to be taken in Nifty Futures and determine the number of Nifty contracts to be bought/sold; and
(f) Calculate the new systematic risk of portfolio if the company has taken position in Nifty Futures and there is 2% rise in Nifty.

Note: Make calculations in ₹ lakh and upto 2 decimal points.

QUESTION NO. 3

A is an investor and having in its Portfolio Shares worth ₹ 1,20,00,000 at current price and Cash ₹ 10,00,000. The Beta (β) of Share Portfolio is 1.4. After four months the price of shares dropped by 1.8%.

You are required to determine:

(i) Current Portfolio Beta and
(ii) Portfolio Beta after four months-if A on current date goes for long position on ₹ 1,30,00,000 Nifty futures.

QUESTION NO. 4

Mr. X, is a Senior Portfolio Manager at ABC Asset Management Company. He expects to purchase a portfolio of shares in 90 days. However he is worried about the expected price increase in shares in coming day and to hedge against this potential price increase he decides to take a position on a 90-

day forward contract on the Index. The index is currently trading at 2290. Assuming that the continuously compounded dividend yield is 1.75% and risk free rate of interest is 4.16%, you are required to determine:

(a) Calculate the justified forward price on this contract.

(b) Suppose after 28 days of the purchase of the contract the index value stands at 2450 then determine gain/ loss on the above long position.

(c) If at expiration of 90 days the Index Value is 2470 then what will be gain on long position.

Note: Take 365 days in a year and value of $e^{0.005942} = 1.005960$, $e^{0.001849} = 1.001851$.

QUESTION NO. 5

A company is long on 10 MT of copper @ ₹ 474 per kg (spot) and intends to remains so for the ensuing quarter. The standard deviation of changes of its spot and future prices are 4% and 6% respectively, having correlation coefficient of 0.75.

What is its hedge ratio? What is the amount of the copper future it should short to achieve a perfect hedge?

QUESTION NO. 6

Mr. SG sold five 4-Month Nifty Futures on 1st February 2020 for ₹ 9,00,000. At the time of closing of trading on the last Thursday of May 2020 (expiry), Index turned out to be 2100. The contract multiplier is 75.

Based on the above information calculate:

(i) The price of one Future Contract on 1st February 2020.

(ii) Approximate Nifty Sensex on 1st February 2020 if the Price of Future Contract on same date was theoretically correct. On the same day Risk Free Rate of Interest and Dividend Yield on Index was 9% and 6% p.a. respectively.

(iii) The maximum Contango/ Backwardation.

(iv) The pay-off of the transaction.

Note: Carry out calculation on month basis.

Derivatives Analysis & Valuation (Options)

Study Session 7

QUESTION NO. 1

Mr. X established the following spread on the Delta Corporation's stock

(i) Purchased one 3-month call option with a premium of ₹ 30 and an exercise price of ₹ 550.

(ii) Purchased one 3-month put option with a premium of ₹ 5 and an exercise price of ₹ 450.

Delta Corporation's stock is currently selling at ₹ 500. Determine profit or loss, if the price of Delta 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 Delta Corporation.

QUESTION NO. 2

You as an investor had purchased a 4 month call option on the equity shares of X Ltd. of ₹ 10, of which the current market price is ₹ 132 and the exercise price ₹ 150. You expect the price to range between ₹ 120 to ₹ 190.

The expected share price of X Ltd. and related probability is given below:

Expected Price (₹)	120	140	160	180	190
Probability	.05	.20	.50	.10	.15

Compute the following:

a) Expected Share price at the end of 4 months.

b) Value of Call Option at the end of 4 months, if the exercise price prevails.

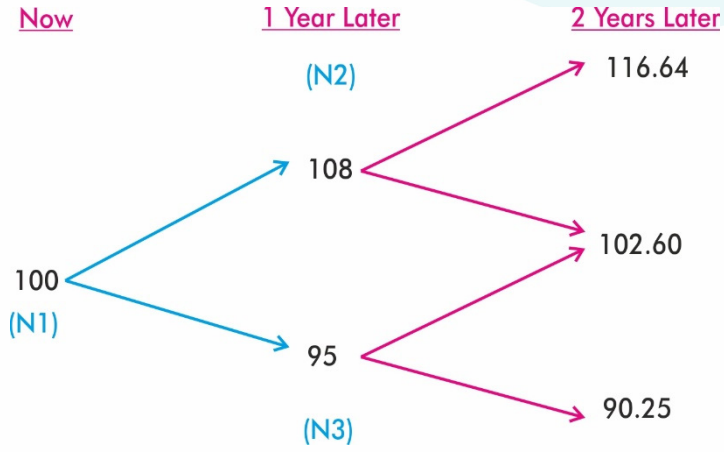
c) In case the option is held to its maturity, what will be the expected value of the call option?

QUESTION NO. 3

Spot Price is ₹ 60. A One year European Call Option is being quoted in the market at option premium of ₹ 15 with Exercise Price of ₹ 55. Risk Free Rate of return is 12% p.a.The stock can either rise or fall after a year. If it can fall by 30% by what percentage (%) can it rise?

QUESTION NO. 4

A two year tree for a share of stock in ABC Ltd., is as follows:



Consider a two years American call option on the stock of ABC Ltd., with a strike price of ₹ 98. The current price of the stock is ₹ 100. Risk free return is 5 per cent per annum with a continuous compounding and $e^{0.05} = 1.05127$.

Assume two time periods of one year each.
Using the Binomial Model, calculate:
(i) The probability of price moving up and down;
(ii) Expected pay offs at each nodes i.e. N1, N2 and N3 (round off upto 2 decimal points).

QUESTION NO. 5

AB Ltd.'s equity shares are presently selling at a price of ₹ 500 each. An investor is interested in purchasing AB Ltd.'s shares. The investor expects that there is a 70% chance that the price will go up to ₹ 650 or a 30% chance that it will go down to ₹ 450, three months from now. There is a call option on the shares of the firm that can be exercised only at the end of three months at an exercise price of ₹ 550.

Calculate the following:

(i) If the investor wants a perfect hedge, what combination of the share and option should he select ?
(ii) Explain how the investor will be able to maintain identical position regardless of the share price.
(iii) If the risk-free rate of return is 5% for the three months period, what is the value of the option at the beginning of the period ?
(iv) What is the expected return on the option?

QUESTION NO. 6

From the following data for certain stock, find the value of a call option:

Price of stock now	=	₹ 80
Exercise price	=	₹ 75
Standard deviation of continuously compounded annual return	=	0.40
Maturity period	=	6 months
Annual interest rate	=	12%

Given

Number of S.D. from Mean, (z)	Area of the left or right (one tail)
0.25	0.4013
0.30	0.3821
0.55	0.2912
0.60	0.2743
$e^{0.12x0.5}$ = 1.062	
In 1.0667 = 0.0646	

Foreign Exchange Exposure & Risk Management

Study Session 8

QUESTION NO. 1

The risk free rate of interest rate in USA is 8% p.a. and in UK is 5% p.a. The spot exchange rate between US $ and UK £ is 1$ = £ 0.75.

Assuming that is interest is compounded on daily basis then at which forward rate of 2 year there will be no opportunity for arbitrage.

Further, show how an investor could make risk-less profit, if two year forward price is 1 $ = 0.85 £.

Given e-0. 06 = 0.9418 & e-0.16 = 0.8521, e0.16 = 1.1735, e-0.1 = 0.9048

QUESTION NO. 2

On 1st January 2019 Global Ltd., an exporter entered into a forward contract with BBC Bank to sell US$ 2,00,000 on 31st March 2019 at ₹ 71.50/$. However, due to the request of the importer, Global Ltd. received the amount on 28 February 2019. Global Ltd. requested the Bank to take delivery of the remittance on 2nd March 2019. The Inter- banking rates on 28th February were as follows:

Spot Rate	₹ 71.20/71.25
One month premium	5/10

If Bank agrees to take early delivery then what will be the net inflow to Global Ltd. assuming that the prevailing prime lending rate is 15%. Assume 365 days in a year.

QUESTION NO. 3

On 10th July, an importer entered into a forward contract with bank for US $ 50,000 due on 10th September at an exchange rate of ₹ 66.8400. The bank covered its position in the interbank market at ₹ 66.6800.

How the bank would react if the customer requests on 20th September:

(i) to cancel the contract?

(ii) to execute the contract?

(iii) to extend the contract with due date to fall on 10th November?

The exchange rates for US$ in the interbank market were as below:

	10th September	20th September
Spot US$1 =	66.1500/1700	65.9600/9900
Spot/September	66.2800/3200	66.1200/1800
Spot/October	66.4100/4300	66.2500/3300
Spot/November	66.5600/6100	66.4000/4900

Exchange margin was 0.1% on buying and selling.

Interest on outlay of funds was 12% p.a.

You are required to show the calculations to:

a) cancel the Contract,

b) execute the Contract, and

c) extend the Contract as above.

QUESTION NO. 4

NP and Co. has imported goods for US $ 7,00,000. The amount is payable after three months. The company has also exported goods for US $ 4,50,000 and this amount is receivable in two months. For receivables amount a forward contract is already taken at ₹ 48.90.

The market rates for ₹ and Dollar are as under:

Spot	₹ 48.50/70
Two months	25/30 points
Three months	40/45 points

The company wants to cover the risk and it has two options as under:

a) To cover payables in the forward market and

b) To lag the receivables by one month and cover the risk only for the net amount. No interest for delaying the receivables is earned. Evaluate both the options if the cost of Rupee Funds is 12%. Which option is preferable?

QUESTION NO. 5

JKL Ltd., an Indian company has an export exposure of JPY 10,000,000 payable August 31, 2014. Japanese Yen (JPY) is not directly quoted against Indian Rupee.

The current spot rates are:

INR/US $	₹ 62.22
JPY/US$	JPY 102.34

It is estimated that Japanese Yen will depreciate to 124 level and Indian Rupee to depreciate against US $ to ₹ 65.

Forward rates for August 2014 are

INR/US $	₹ 66.50
JPY/US$	JPY 110.35

Required:

Calculate the expected loss, if the hedging is not done. How the position will change, if the firm takes forward cover?

If the spot rates on August 31, 2014 are:

INR/US $	₹ 66.25
JPY/US$	JPY 110.85

Is the decision to take forward cover justified?

QUESTION NO. 6

You have following quotes from Bank A and Bank B :

	Bank A	Bank B
SPOT	USD/CHF 1.4650/55	USD/CHF 1.4653/60
3 months	5/10	
6 months	10/15	
SPOT	GBP/USD 1.7645/60	GBP/ USD 1.7640/50
3 months	25/20	
6 months	35/25	

Calculate:

a) How much minimum CHF amount you have to pay for 1 Million GBP spot ?

b) Considering the quotes from Bank A only, for GBP/CHF what are the Implied Swap points for Spot over 3 months?

QUESTION NO. 7

Your bank's London office has surplus funds to the extent of US$ 500000 for a period of 3 months. The cost of funds to the bank is 4 % p.a. It proposes to invest these funds in London, New York or Frankfurt and obtain the best yield, without any exchange risk to the bank. The following rates of interest are available at the three centres of domestic funds there at for a period of 3 months.

London	5 % p.a.
New York	8 % p.a.
Frankfurt	3% p.a.

The market rates in London for US dollars and EURO are as under:

London on New York

Spot	1.5350/90
1 month	15/18
2 months	30/35
3 months	80/85

London on Frankfurt

Spot	1.8260/90
1 month	60/55
2 months	95/90
3 months	145/140

At which centre, will the investment be made & what will be the net gain (to the nearest pound) to the bank on the invested funds?

QUESTION NO. 8

DSE Ltd. is an export oriented business in Kolkata. DSE Ltd. invoices in customers currency. Its receipts of US $ 3,00,000 is due on July 1st, 2019.

Market information as at April 1st 2019

Exchange Rates		Currency Futures		
US $/₹		US $/₹		Contract Size = ₹ 6,40,000/-
Spot	0.0154	April	0.0155	
1 Month Forward	0.0150	July	0.0151	
3 Months Forward	0.0147			

Initial Margin		Interest Rates in India
April	₹ 13,000	9%
July	₹ 24,000	8.50%

On July, the spot rate US $/₹ is 0.0146 and currency future rate is 0.0147 Comment which of the following methods would be most advantageous for DSE Ltd.

(i) Using forward contract.
(ii) Using currency futures
(iii) Not hedging currency risks.

It may be assumed that variation in margin would be settled on the maturity of the futures contract.

QUESTION NO. 9

Best of Luck Ltd. London will have to make a payment of $ 3,64,897 in six months' time. The company is considering the various choices it has in order to hedge its transaction exposure.

Exchange rates:	
Spot rate	$1.5617-1.5673
Six month forward rate	$1.5455-1.5609

Money Market rates:

	Borrow (%)	Invest (%)
US	6	4.5
UK	7	5.5

Foreign currency option prices (1 unit is £12,500):

Exercise price	Call option (March)	Put option (March)
$ 1.70	$ 0.037	$ 0.096

By making the appropriate calculations decide which of the following hedging alternatives is the most attractive to Best of Luck Ltd:

a) Forward market
b) Money market Cover
c) Currency options

QUESTION NO. 10

With the relaxation of investment norms in India in international market upto $ 2,50,000 Mr. X to hedge himself against the risk of declining Indian economy and weakening of Indian Rupee during last few year decided to diversify into International Market.

Accordingly, Mr. X invested a sum of ₹ 1.58 crore on 1.1.20x1 in Standard & Poor Index. On 1.1.20x2 Mr. X sold his investment. The other relevant data is given below:

	1.1.20x1	1.1.20x2
Index of Stock Market in India	7395	?
Standard & Poor Index	2028	1919
Exchange Rate	62.00/62.25	67.25/67.50

You are required to:

(i) Determine the return for a US investor.
(ii) Determine return of Mr. X of holding period.
(iii) Determine the value of Index of Stock Market in India as on 1.1.20x2 at which Mr. X would be indifferent between investment in Standard & Poor Index and Indian Stock Market.

QUESTION NO. 11

A German subsidiary of an US based MNC has to mobilize 100000 Euro's working capital for the next 12 months. It has the following options:

Loan from German Bank	:	@ 5% p.a.
Loan from US Parent Bank	:	@ 4% p.a.
Loan from Swiss Bank	:	@ 3% p.a.

Banks in Germany charge an additional 0.25% p.a. towards loan servicing. Loans from outside Germany attract withholding tax of 8% on interest payments. If the interest rates given above are market determined, examine which loan is the most attractive using interest rate differential.

QUESTION NO. 12

You as a dealer in foreign exchange have the following position in Swiss Francs on 31st October, 2009:

	Swiss Francs (SF)
Balance in the Nostro A/c Credit	1,00,000
Opening Position Overbought	50,000
Purchased a bill on Zurich	80,000
Sold forward TT	60,000

Forward purchase contract cancelled	30,000
Remitted by TT	75,000
Draft on Zurich cancelled	30,000

What steps would you take, if you are required to maintain a credit Balance of Swiss Francs 30,000 in the Nostro A/c and keep as overbought position on Swiss Francs 10,000?

QUESTION NO. 13

K Ltd. currently operates from 4 different buildings and wants to consolidate its operations into one building which is expected to cost ₹ 90 crores. The Board of K Ltd. had approved the above plan and to fund the above cost, agreed to avail an External Commercial Borrowing (ECB) of GBP 10 m from G Bank Ltd. on the following conditions:

- The Loan will be availed on 1st April, 2019 with interest payable on half yearly rest.
- Average Loan Maturity life will be 3.4 years with an overall tenure of 5 years.
- Upfront Fee of 1.20%.
- Interest Cost is GBP 6 months LIBOR + Margin of 2.50%.
- The 6 month LIBOR is expected to be 1.05%.

K Ltd. also entered into a GBP-INR hedge at 1 GBP = INR 90 to cover the exposure on account of the above ECB Loan and the cost of the hedge is coming to 4.00% p.a.

As a Finance Manager, given the above information and taking the 1 GBP = INR 90:

(i) Calculate the overall cost both in percentage and rupee terms on an annual basis.

(ii) What is the cost of hedging in rupee terms?

(iii) If K Ltd. wants to pursue an aggressive approach, what would be the net gain/loss for K Ltd. if the INR depreciates/appreciates against GBP by 10% at the end of the 5 years assuming that the loan is repaid in GBP at the end of 5 years?

Ignore time value and taxes and calculate to two decimals.

QUESTION NO. 14

On 1st February 2020, XYZ Ltd. a laptop manufacturer imported a particular type of Memory Chips from SKH Semiconductor of South Korea. The payment is due in one month from the date of Invoice, amounting to 1190 Million South Korean Won (SKW). Following Spot Exchange Rates (1st February) are quoted in two different markets:

USD/ INR	75.00/ 75.50	in Mumbai
USD/ SKW	1190.00/ 1190.75	in New York

Since hedging of Foreign Exchange Risk was part of company's strategic policy and no contract for hedging in SKW was available at any in-shore market, it approached an off-shore Non- Deliverable Forward (NDF) Market for hedging the same risk.

In NDF Market a dealer quoted one-month USD/ SKW at 1190.00/1190.50 for notional amount of USD 100,000 to be settled at reference rate declared by Bank of Korea.

After 1 month (1st March 2020) the dealer agreed for SKW 1185/ USD as rate for settlement and on the same day the Spot Rates in the above markets were as follows:

USD/ INR	75.50/ 75.75	in Mumbai
USD/ SKW	1188.00/ 1188.50	in New York

Analyze the position of company under each of the following cases, comparing with Spot Position of 1st February:

(i) Do Nothing.

(ii) Opting for NDF Contract.

Note: Both ₹/ SKW Rate and final payment (to be computed in ₹ Lakh) to be rounded off upto 4 decimal points.

QUESTION NO. 15

A US investor chose to invest in Sensex for a period of one year. The relevant information is given below.

Size of investment ($)	20,00,000
Spot rate 1year ago (₹/$)	42.50/60
Spot rate now (₹/$)	43.85/90
Sensex 1 year ago	3,256
Senex now	3,765
Inflation in US	5%
Inflation in India	9%

(i) Compute the nominal rate of return to the US investor.
(ii) Compute the real depreciation /appreciation of Rupee.
(iii) What should be the exchange rate if relevant purchasing power parity holds good?
(iv) What will be the real return to an Indian investor in Sensex?

QUESTION NO. 16

M/s. Sky products Ltd., of Mumbai, an exporter of sea foods has submitted a 60 days bill for EUR 5,00,000 drawn under an irrevocable Letter of Credit for negotiation. The company has desired to keep 50% of the bill amount under the Exchange Earners Foreign Currency Account (EEFC). The rates for ₹/USD and USD/EUR in inter-bank market are quoted as follows:

	₹/ USD	USD/EUR
Spot	67.8000 - 67.8100	1.0775 - 1.8000
1 month forward	10/11 Paise	0.20/0.25 Cents
2 months forward	21/22 Paise	0.40/0.45 Cents
3 months forward	32/33 Paise	0.70/0.75 Cents

Transit Period is 20 days. Interest on post shipment credit is 8 % p.a. Exchange Margin is 0.1%. Assume 365 days in a year.
You are required to calculate:
(i) Exchange rate quoted to the company
(ii) Cash inflow to the company
(iii) Interest amount to be paid to bank by the company.

QUESTION NO. 17

You, a foreign exchange dealer of your bank, are informed that your bank has sold a T.T. on Corporation for Danish Kroner 10,00,000 at the rate of Danish Kroner 1 = ₹ 6.5150, You are required to cover the transaction either in London or New York market.
The rates on that date are as under:

Mumbai- London	₹ 74.3000 — ₹ 74.3200
Mumbai – New York	₹ 49.2500 — ₹ 49.2625
London- Copenhagen	DKK 11.4200 — DKK 11.4350
New York- Copenhagen	DKK 07.5670 — DKK 07.5840

In which market will you cover the transaction, London or New York, and what will be the exchange profit or loss on the transaction? Ignore brokerages.

QUESTION NO. 18

ABC Ltd. of UK has exported goods worth Can $ 5,00,000 receivable in 6 months. The exporter wants to hedge the receipt in the forward market. The following information is available:
Spot Exchange Rate Can $ 2.5/£

Interest Rate in UK 12%
Interest Rate In Canada 15%

The forward rates truly reflect the interest rates differential. Find out the gain/loss to UK exporter if Can $ spot rates (i) declines 2%, (ii) gains 4% or (iii) remains unchanged over next 6 months.

QUESTION NO. 19

An importer customer of your bank wishes to book a forward contract with your bank on 3rd September for sale to him of SGD 5,00,000 to be delivered on 30th October.

The spot rates on 3rd September are USD/INR 49.3700/3800 and USD/SGD 1.7058/68. The swap points are:

	USD / INR	USD/SGD	
Spot/September	0300/0400	1st month forward	48/49
Spot/October	1100/1300	2nd month forward	96/97
Spot/November	1900/2200	3rd month forward	138/140
Spot/December	2700/3100		
Spot/January	3500/4000		

Calculate the rate to be quoted to the importer by assuming an exchange margin of 5 paisa.

Interest Rate Risk Management

Study Session 9

QUESTION NO. 1

The following market data is available:

Spot USD/JPY 116.00

Deposit rates p.a.	USD	JPY
3 months	4.50%	0.25%
6 months	5.00%	0.25%

Forward Rate Agreement (FRA) for Yen is Nil.

a) What should be 3 months FRA rate at 3 months forward?

b) The 6 & 12 months LIBORS are 5% & 6.5% respectively.

c) A bank is quoting 6/12 USD FRA at 6.50 - 6.75%. Is any arbitrage opportunity available? Calculate profit in such case.

QUESTION NO. 2

An Indian company obtains the following quotes (₹/$)

Spot:	35.90/36.10
3 - Months forward rate:	36.00/36.25
6 - Months forward rate:	36.10/36.40

The company needs $ funds for six months. Determine whether the company should borrow in $ or ₹ Interest rates are :

3 - Months interest rate : ₹ : 12%, $: 6%

6 - Months interest rate : ₹ : 11.50%, $: 5.5%

Also determine what should be the rate of interest after 3-months to make the company indifferent between 3-months borrowing and 6-months borrowing in the case of:

(i) Rupee borrowing

(ii) Dollar borrowing

Note: For the purpose of calculation you can take the units of dollar and rupee as 100 each.

QUESTION NO. 3

A Inc. and B Inc. intend to borrow $ 200,000 and $ 200,000 in ¥ respectively for a time horizon of one year. The prevalent interest rates are as follows:

Company	¥ Loan	$ Loan
A Inc	5%	9%
B Inc	8%	10%

The prevalent exchange rate is $1 = ¥120.

They entered in a currency swap under which it is agreed that B Inc will pay A Inc @ 1% over the ¥ Loan interest rate which the later will have to pay as a result of the agreed currency swap whereas A Inc will reimburse interest to B Inc only to the extent of 9%. Keeping the exchange rate invariant, quantify the opportunity gain or loss component of the ultimate outcome, resulting from the designed currency swap.

QUESTION NO. 4

XYZ Inc. having a £ 10 million floating rate loan on July 1, 2013 with resetting of coupon rate every 6 months equal to LIBOR + 50 bp. XYZ is interested in a collar strategy by selling a Floor and buying a Cap. XYZ buys the 3 years Cap and sell 3 years Floor as per the following details on July 1, 2013:

Notional Principal Amount	$ 10 million
Reference Rate	6 months LIBOR
Strike Rate	4% for Floor and 7% for Cap
Premium	0*

*Since Premium paid for Cap = Premium received for Floor

Using the following data you are required to determine:

(i) Effective interest paid out at each reset date,

(ii) The average overall effective rate of interest p.a.

Reset Period	LIBOR (%)
31-12-2013	6.00
30-06-2014	7.50
31-12-2014	5.00
30-06-2015	4.00
31-12-2015	3.75
30-06-2016	4.25

QUESTION NO. 5

TMC Holding Ltd. has a portfolio of shares of diversified companies valued at ₹ 400 crore enters into a swap arrangement with None Bank on the terms that it will get 1.15% quarterly on notional principal of ₹ 400 crore in exchange of return on portfolio which is exactly tracking the Sensex which is presently 21600.

You are required to determine the net payment to be received/ paid at the end of each quarter if Sensex turns out to be 21860, 21780, 22080 and 21960.

QUESTION NO. 6

The Treasury desk of a global bank incorporated in UK wants to invest GBP 200 million on 1st January, 2019 for a period of 6 months and has the following options:

(1) The Equity Trading desk in Japan wants to invest the entire GBP 200 million in high dividend yielding Japanese securities that would earn a dividend income of JPY 1,182 million. The dividends are declared and paid on 29th June. Post dividend, the securities are expected to quote at a 2% discount. The desk also plans to earn JPY 10 million on a stock borrow lending activity because of this investment. The securities are to be sold on June 29 with a T+1 settlement and the amount remitted back to the Treasury in London.

(2) The Fixed Income desk of US proposed to invest the amount in 6 month G-Secs that provides a return of 5% p.a.

The exchange rates are as follows:

Currency Pair	1-Jan-2019 (Spot)	30-Jun-2019 (Forward)
GBP-JPY	148.0002	150.0000
GBP- USD	1.28000	1.30331

QUESTION NO. 7

IB an Indian firm has its subsidiary in Japan and Zaki a Japanese firm has its subsidiary in India and face the following interest rates:

Company	IB	Zaki
INR floating rate	BPLR + 0.50%	BPLR + 2.50%
JPY (Fixed rate)	2%	2.25%

Zaki wishes to borrow Rupee Loan at a floating rate and IB wishes to borrow JPY at a fixed rate. The amount of loan required by both the firms is same at the current exchange rate. A financial institution

may arrange a swap and requires 25 basis points as its commission. Gain, if any, is to be shared by the firms equally.

You are required to find out:

(i) Whether a swap can be arranged which may be beneficial to both the firms?

(ii) What rate of interest will the firms end up paying?

BOND VALUATION

Study Session 10

QUESTION NO. 1

MP Ltd. issued a new series of bonds on January 1,2000. The bonds were sold at par (₹ 1,000), having a coupon rate 10% p.a. and mature on 31st December, 2015. Coupon payments are made semi-annually on June 30th and December 31st each year. Assume that you purchased an outstanding MP Ltd. Bond on 1st March, 2008 when the going interest rate was 12%.

Required:

a) What was the YTM of MP Ltd. Bonds as on January 1, 2000?

b) What amount you should pay to complete the transaction for purchasing the bond on 1st March 2008 ? Of that amount how much should be accrued interest and how much would represent bonds basic value.

QUESTION NO. 2

XL Ispat Ltd. has made an issue of 14 per cent non-convertible debentures on January 1, 2007. These debentures have a face value of ₹ 100 and is currently traded in the market at a price of ₹ 90.

Interest on these NCDs will be paid through post-dated cheques dated June 30 and December 31. Interest payments for the first 3 years will be paid in advance through post-dated cheques while for the last 2 years post-dated cheques will be issued at the third year. The bond is redeemable at par on December 31, 2011 at the end of 5 years.

Required :

(i) Estimate the current yield and YTM of the bond.

(ii) Calculate the duration of the NCD.

(i) Assuming that intermediate coupon payments are, not available for reinvestment calculate the realised yield on the NCD.

QUESTION NO. 3

The following data is related to 8.5% Fully Convertible (into Equity shares) Debentures issued by JAC Ltd. at ₹ 1000.

Market Price of Debenture	₹ 900
Conversion Ratio	30
Straight Value of Debenture	₹ 700
Market Price of Equity share on the date of Conversion	₹ 25
Expected Dividend Per Share	₹ 1

You are required to calculate:

a) Conversion Value of Debenture

b) Market Conversion Price

c) Conversion Premium per share

d) Ratio of Conversion Premium

e) Premium over Straight Value of Debenture

f) Favourable income differential per share

g) Premium pay back period

QUESTION NO. 4

M/s. Earth Limited has 11% bond worth of ₹ 2 Crores outstanding with 10 years remaining to maturity. The company is contemplating the issue of a ₹ 2 Crores 10 year bond carrying the coupon rate of 9% and use the proceeds to liquidate the old bonds.

The unamortized portion of issue cost on the old bonds is ₹ 3 lakhs which can be written off no sooner the old bonds are called. The company is paying 30% tax and it's after tax cost of debt is 7%. Should Earth Limited liquidate the old bonds?

You may assume that the issue cost of the new bonds will be ₹ 2.5 lakhs and the call premium is 5%.

QUESTION NO. 5

The following is the Yield structure of AAA rated debenture:

Period (or Maturity)	Yield (%)
3 months	8.5%
6 months	9.25
1 year	10.50
2 years	11.25
3 years and above	12.00

a) Based on the expectation theory calculate the implicit one-year forward rates in year 2 and year 3.

b) If the interest rate increases by 50 basis points, what will be the percentage change in the price of the bond having a maturity of 5 years? Assume that the bond is fairly priced at the moment at ₹ 1,000.

QUESTION NO. 6

The following data are available for three bonds A, B and C. These bonds are used by a bond portfolio manager to fund an outflow scheduled in 6 years. Current yield is 9%. All bonds have face value of ₹100 each and will be redeemed at par. Interest is payable annually.

Bond	Maturity (Years)	Coupon rate
A	10	10%
B	8	11%
C	5	9%

(i) Calculate the duration of each bond.

(ii) The bond portfolio manager has been asked to keep 45% of the portfolio money in Bond A. Calculate the percentage amount to be invested in bonds B and C that need to be purchased to immunise the portfolio.

(iii) After the portfolio has been formulated, an interest rate change occurs, increasing the yield to 11%. The new duration of these bonds are: Bond A = 7.15 Years, Bond B = 6.03 Years and Bond C = 4.27 years.
Is the portfolio still immunized? Why or why not?

(iv) Determine the new percentage of B and C bonds that are needed to immunize the portfolio. Bond A remaining at 45% of the portfolio.

Present values be used as follows :

Present Values	t1	t2	t3	t4	t5
PVIF0.09, t	0.917	0.842	0.772	0.708	0.650
	t6	t7	t8	t9	t10
PVIF0.09, t	0.596	0.547	0.502	0.460	0.4224

QUESTION NO. 7

The following data are available for a bond:

Face Value ₹ 10,000 to be redeemed at par on maturity

Coupon rate 8.5 per cent per annum

Years to Maturity 5 years

Yield to Maturity (YTM) 10 per cent You are required to calculate:

(i) Current market price of the Bond,

(ii) Macaulay's Duration,
(iii) Volatility of the Bond,
(iv) Convexity of the Bond,
(v) Expected market price, if there is a decrease in the YTM by 200 basis points
  (a) By Macaulay's Duration based estimate
  (b) By Intrinsic Value Method.

Given

Years	1	2	3	4	5
PVIF (10%, n)	0.909	0.826	0.751	0.683	0.621
PVIF (8%, n)	0.926	0.857	0.794	0.735	0.681

QUESTION NO. 8

In March 2020, XYZ Bank sold some 7% Interest Rate Futures underlying Notional 7.50% Coupon Bonds. The exchange provides following details of eligible securities that can be delivered:

Security	Quoted Price of Bonds	Conversion Factor
7.96 GOI 2023	1037.40	1.0370
6.55 GOI 2025	926.40	0.9060
6.80 GOI 2029	877.50	0.9195
6.85 GOI 2026	972.30	0.9643
8.44 GOI 2027	1146.30	1.1734
8.85 GOI 2028	1201.70	1.2428

Recommend the Security that should be delivered by the XYZ Bank if Future Settlement Price is 1000.

QUESTION NO. 9

ABC Ltd. wants to issue 9% Bonds redeemable in 5 years at its face value of ₹ 1,000 each. The annual spot yield curve for similar risk class of Bond is as follows:

Year	Interest Rate
1	12%
2	11.62%
3	11.33%
4	11.06%
5	10.80%

(i) Evaluate the expected market price of the Bond if it has a Beta value of 1.10 due to its popularity because of lesser risk.
(ii) Interpret the nature of the above yield curve and reasons for the same.

Note: Use PV Factors upto 4 decimal points and value in ₹ upto 2 decimal points.

Portfolio Management

Study Session 11

QUESTION NO. 1

B Ltd. has been enjoying a substantial net cash inflow and until the surplus funds are needed to meet tax and dividend payments, and to finance further capital expenditure in several months' time, they have been invested in a small portfolio of short - term equity investments. Details of the portfolio, which consists of shares in four companies, are as follows:

Company	No. of Shares Held	Equity Beta	M.P.S. (₹)	Dividend Yield
D Ltd.	60,000	1.16	4.29	19.5%
E Ltd.	80,000	2.28	2.92	24.0%
F Ltd.	1,00,000	0.90	2.17	17.5%
G Ltd.	1,25,000	1.50	3.14	26.0%

The current market return is 19% per year and the risk free rate is 11% per year.

a) On the basis of the data given, calculate the risk of short-term investment portfolio relative to that of the market.

b) Recommend with reasons whether B Ltd. should change the composition of its portfolio.

QUESTION NO. 2

There are two Mutual Funds viz. D Mutual Fund Ltd. and K Mutual Fund Ltd. Each having close ended equity schemes.

NAV as on 31-12-2014 of equity schemes of D Mutual Fund Ltd. is ₹70.71 (consisting 99% equity and remaining cash balance) and that of K Mutual Fund Ltd. is 62.50 (consisting 96% equity and balance in cash).

Following is the other information:

Particular	Equity Schemes	
	D Mutual Fund Ltd.	K Mutual Fund Ltd.
Sharpe Ratio	2	3.3
Treynor Ratio	15	15
Standard deviation	11.25	5

There is no change in portfolios during the next month and annual average cost is ₹ 3 per unit for the schemes of both the Mutual Funds.

If Share Market goes down by 5% within a month, calculate expected NAV after a month for the schemes of both the Mutual Funds.

For calculation, consider 12 months in a year and ignore number of days for particular month.

QUESTION NO. 3

Mr. Abhishek is interested in investing ₹ 2,00,000 for which he is considering following three alternatives:

(i) Invest ₹ 2,00,000 in Mutual Fund X (MFX)

(ii) Invest ₹ 2,00,000 in Mutual Fund Y (MFY)

(iii) Invest ₹ 1,20,000 in Mutual Fund X (MFX) and ₹ 80,000 in Mutual Fund Y (MFY)

Average annual return earned by MFX and MFY is 15% and 14% respectively. Risk free rate of return is 10% and market rate of return is 12%.

Covariance of returns of MFX, MFY and market portfolio Mix are as follow:

	MFX	MFY	Mix
MFX	4.800	4.300	3.370

MFY	4.300	4.250	2.800
Mix	3.370	2.800	3.100

You are required to calculate:

a) Variance of return from MFX, MFY and market return,
b) Portfolio return, beta, portfolio variance and portfolio standard deviation,
c) Expected return, systematic risk and unsystematic risk; and
d) Sharpe ratio, Treynor ratio and Alpha of MFX, MFY and Portfolio Mix

QUESTION NO. 4

Mr. X owns a portfolio with the following characteristics:

	Security A	Security B	Risk Free Security
Factor 1 sensitivity	0.80	1.50	0
Factor 2 sensitivity	0.60	1.20	0
Expected Return	15%	20%	10%

It is assumed that security returns are generated by a two factor model.

a) If Mr. X has ₹ 1,00,000 to invest and sells short ₹ 50,000 of security B and purchases ₹ 1,50,000 of security A what is the sensitivity of Mr. X's portfolio to the two factors?
b) If Mr. X borrows ₹ 1,00,000 at the risk free rate and invests the amount he borrows along with the original amount of ₹ 1,00,000 in security A and B in the same proportion as described in part (i), what is the sensitivity of the portfolio to the two factors?

What is the expected return premium of factor 2?

QUESTION NO. 5

The following information is available for the share of X Ltd. and stock exchange for the last 4 years

	X LTD.		Index of Stock Exchange	Return from Market Funds Securities	Return from Govt. Securities
	Share Price	Divided Yield			
Present Year	197	10%	2182	16%	15%
1 Years ago	164.2	12%	1983	15%	15%
2 Years ago	155	8%	1665	16%	16%
3 Years ago	121	10%	1789	10%	14%
4 Years ago	95	10%	1490	18%	15%

With above information available please calculate:

a) Expected Return on X Ltd.'s share.
b) Expected Return on Market Index.
c) Risk Free Rate of Return
d) Beta of X Ltd.

QUESTION NO. 6

Mr. Shyam is holding the following securities:

Particulars of Securities	Cost ₹	Dividend Interest ₹	Market Price ₹	Beta
Gold Ltd.	10,000	1,725	9,800	0.60
Silver Ltd.	15,000	1,000	16,200	0.80
Bronze Ltd.	14,000	700	20,000	0.60
GOI Bonds	36,000	3,600	34,500	0.01

Average return of the portfolio is 15.7%. Using Average Beta, Calculate:

a) Expected rate of return in each case, using the Capital Asset Pricing Model (CAPM)

b) Risk free rate of return.

QUESTION NO. 7

The returns and market portfolio for a period of four years are as under:

Year	% Return of Stock B	% Return on Market Portfolio
1	10	8
2	12	10
3	9	9
4	3	-1

For stock B, you are required to determine:

(i) Characteristic line; and

(ii) The Systematic and Unsystematic risk.

QUESTION NO. 8

Indira has a fund of ₹ 3 lacs which she wants to invest in share market with rebalancing target after every 10 days to start with for a period of one month from now. The present NIFTY is 5326. The minimum NIFTY within a month can at most be 4793.4. She wants to know as to how she would rebalance her portfolio under the following situations, according to the theory of Constant Proportion Portfolio Insurance Policy, using "2" as the multiplier:

1. Immediately to start with.
2. 10 days later-being the 1st day of rebalancing if NIFTY falls to 5122.96.
3. 10 days further from the above date if the NIFTY touches 5539.04.

For the sake of simplicity, assume that the value of her equity component will change in tandem with that of the NIFTY and the risk free securities in which she is going to invest will have no Beta.

QUESTION NO. 9

The risk free rate of return is 5%. The expected rate of return on the market portfolio is 11%. The expected rate of growth in dividend of X Ltd. is 8%. The last dividend paid was ₹ 2.00 per share. The beta of X Ltd. equity stock is 1.5.

(i) What is the present price of the equity stock of X Ltd.?

(ii) How would the price change when:

- The inflation premium increases by 3%
- The expected growth rate decreases by 3% and
- The beta decreases to 1.3.

International Financial Management

Study Session 12

QUESTION NO. 1

XY Limited is engaged in large retail business in India. It is contemplating for expansion into a country of Africa by acquiring a group of stores having the same line of operation as that of India. The exchange rate for the currency of the proposed African country is extremely volatile. Rate of inflation is presently 40% a year. Inflation in India is currently 10% a year. Management of XY Limited expects these rates likely to continue for the foreseeable future.

Estimated projected cash flows, in real terms, in India as well as African country for the first three years of the project are as follows:

	Year-0	Year-1	Year-2	Year-3
Cash flows in Indian ₹ (000)	-50,000	-1,500	-2,000	-2,500
Cash flows in African Rands (000)	- 2,00,000	50,000	70,000	90,000

XY Ltd. assumes the year 3 nominal cash flows will continue to be earned each year indefinitely. It evaluates all investments using nominal cash flows and a nominal discounting rate. The present exchange rate is African Rand 6 to ₹ 1.

You are required to calculate the net present value of the proposed investment considering the following:

(i) African Rand cash flows are converted into rupees and discounted at a risk adjusted rate.

(ii) All cash flows for these projects will be discounted at a rate of 20% to reflect it's high risk.

Ignore taxation.

	Year - 1	Year - 2	Year - 3
PVIF @ 20%	0.833	0.694	0.579

QUESTION NO. 2

Opus Technologies Ltd., an Indian IT company is planning to make an investment through a wholly owned subsidiary in a software project in China with a shelf life of two years. The inflation in China is estimated as 8 percent. Operating cash flows are received at the year end.

For the project an initial investment of Chinese Yuan (CN¥) 30,00,000 will be in a piece of land. The land will be sold after the completion of project at estimated value of CN¥ 35,00,000. The project also requires an office complex at cost of CN¥ 15,00,000 payable at the beginning of project. The complex will be depreciated on straight-line basis over two years to a zero salvage value. This complex is expected to fetch CN¥ 5,00,000 at the end of project.

The company is planning to raise the required funds through GDR issue in Mauritius. Each GDR will have 5 common equity shares of the company as underlying security which are currently trading at ₹ 200 per share (Face Value = ₹ 10) in the domestic market. The company has currently paid a dividend of 25% which is expected to grow at 10% p.a. The total issue cost is estimated to be 1 percent of issue size.

The annual sales is expected to be 10,000 units at the rate of CN¥ 500 per unit. The price of unit is expected to rise at the rate of inflation. Variable operating costs are 40 percent of sales. Current Fixed Operating costs is CN¥ 22,00,000 per year which is expected to rise at the rate of inflation.

The tax rate applicable in China for business income and capital gain is 25 percent and as per GOI Policy no further tax shall be payable in India. The current spot rate of CN¥ 1 is ₹ 9.50. The nominal interest rate in India and China is 12% and 10% respectively and the international parity conditions hold.

You are required to :

a) Identify expected future cash flows in China and determine NPV of the project in CN¥.

b) Determine whether Opus Technologies should go for the project or not, assuming that there neither there is any restriction nor any charges/taxes payable on the transfer of funds from China to India.

QUESTION NO. 3

Equity of KGF Ltd. (KGFL) is ₹ 410 Crores, its debt, is worth ₹ 170 Crores. Printer Division segments value is attributable to 74%, which has an Asset Beta (βp) of 1.45, balance value is applied on Spares and Consumables Division, which has an Asset Beta (βsc) of 1.20 KGFL Debt beta (βD) is 0.24.

You are required to calculate:

(i) Equity Beta (βE),

(ii) Ascertain Equity Beta (βE), if KGF Ltd. decides to change its Debt Equity position by raising further debt and buying back of equity to have its Debt Equity Ratio at 1.90. Assume that the present Debt Beta (βD1) is 0.35 and any further funds raised by way of Debt will have a Beta (βD2) of 0.40.

(iii) Whether the new Equity Beta (βE) justifies increase in the value of equity on account of leverage?

QUESTION NO. 4

A proposed foreign investment involves creation of a plant with an annual output of 1 million units. The entire production will be exported at a selling price of USD 10 per unit.

At the current rate of exchange dollar cost of local production equals to USD 6 per unit. Dollar is expected to decline by 10% or 15%. The change in local cost of production and probability from the expected current level will be as follows:

Decline in value of USD (%)	Reduction in local cost of production (USD/unit)	Probability
0	-	0.4
10	0.30	0.4
15	0.15 Additional reduction	0.2

The plant at the current rate of exchange will have a depreciation of USD 1 million annually. Assume local Tax rate as 30%.

You are required to find out:

(i) Annual Cash Flow After Tax (CFAT) under all the different scenarios of exchange rate.

(ii) Expected value of CFAT assuming no repatriation of profits.

(iii) Viability of the investment proposal assuming an initial investment of USD 25 million on plant and working capital with a required rate of return of 11% on investment and on the basis of CFAT arrived under option (ii). The CFAT will grow @ 3% per annum in perpetuity.

Miscellaneous

Study Session 13

QUESTION NO. 1

ABB Ltd. has a surplus cash balance of ₹ 180 lakhs and wants to distribute 50% of it to the equity shareholders. The company decides to buyback equity shares. The company estimates that its equity share price after re-purchase is likely to be 15% above the buyback price. if the buyback route is taken. Other information is as under:

1. Number of equity shares outstanding at present (Face value ₹ 10 each) is ₹ 20 lakhs.
2. The current EPS is ₹ 5.

You are required to calculate the following:

I. The price at which the equity shares can be re-purchased, if market capitalization of the company should be ₹ 400 lakhs after buy back.

II. Number of equity shares that can be re-purchased.

III. The impact of equity shares re-purchase on the EPS, assuming that the net income remains unchanged.

QUESTION NO. 2

Telbel Ltd. is considering undertaking a major expansion an immediate cash outlay of ₹ 150 crore. The Board of Director of company are expecting to generate an additional profit of ₹ 15.30 crore after a period of one year. Further, it is expected that this additional profit shall grow at the rate of 4% for indefinite period in future.

Presently, Telbel Ltd. is completely equity financed and has 50 crore shares of ₹10 each. The current market price of each share is ₹ 22.60 (cum dividend). The company has paid a dividend of ₹ 1.40 per share in last year. For the last few years dividend is increasing at a compound rate of 6% p.a. and it is expected to be continued in future also. This growth rate shall not be affected by expansion project in any way.

Board of Directors are considering following ways of financing the possible expansion:

(1) A right issue on ratio of 1:5 at price of ₹15 per share.

(2) A public issue of shares.

In both cases the dividend shall become payable after one year. You as a Financial Consultant required to:

(a) Determine whether it is worthwhile to undertake the project or not.

(b) Calculate ex-dividend market price of share if complete expansion is financed from the right issue.

(c) Calculate the number of new equity shares to be issued and at what price assuming that new shareholders do not suffer any loss after subscribing new shares.

(d) Calculate the total benefit from expansion to existing shareholders under each of two financing option.

QUESTION NO. 3

From the following particulars, calculate the effective rate of interest p.a. as well as the total cost of funds to Bhaskar Ltd., which is planning a CP issue:

Issue Price of CP	₹ 97,550
Face Value	₹ 1,00,000
Maturity Period	3 Months Issue Expenses:
Brokerage	0.15% for 3 months
Rating Charges	0.50% p.a
Stamp Duty	0.175% for 3 months

QUESTION NO. 4

AXY Ltd. is able to issue commercial paper of ₹ 50,00,000 every 4 months at a rate of 12.5% p.a. The cost of placement of commercial paper issue is ₹ 2,500 per issue. AXY Ltd. is required to maintain line of credit ₹ 1,50,000 in bank balance. The applicable income tax rate for AXY Ltd. is 30%. What is the cost of funds (after taxes) to AXY Ltd. for commercial paper issue? The maturity of commercial paper is four months.

QUESTION NO. 5

The closing value of Sensex for the month of October, 2007 is given below:

Date Closing	Sensex Value
1.10.07	2800
3.10.07	2780
4.10.07	2795
5.10.07	2830
8.10.07	2760
9.10.07	2790
10.10.07	2880
11.10.07	2960
12.10.07	2990
15.10.07	3200
16.10.07	3300
17.10.07	3450
19.10.07	3360
22.10.07	3290
23.10.07	3360
24.10.07	3340
25.10.07	3290
29.10.07	3240
30.10.07	3140
31.10.07	3260

You are required to test the weak form of efficient market hypothesis by applying the run test at 5% and 10% level of significance.

Following value can be used :

Value of t at 5% is 2.101 at 18 degrees of freedom

Value of t at 10% is 1.734 at 18 degrees of freedom

QUESTION NO. 6

Using the chop-shop approach (or Break-up value approach), assign a value for Cornett GMBH. Whose stock is currently trading at a total market price of €4 million. For Cornett, the accounting data set forth three business segments: consumer wholesaling, specialty services, and assorted centers Data for the firm's three segments are as follows:

BUSINESS SEGMENT	Segment Sales	Segment Assets	Segment Income
Consumer Wholesaling	€ 1,500,000	€ 750,000	€ 100,000
Specialty services	€ 800,000	€ 700,000	€ 150,000
Assorted centers	€ 2,000,000	€ 3,000,000	€ 600,000

Industry data for "pure-play" firms have been compiled and are summarized as follows:

BUSINESS SEGMENT	Capitalization/Sales	Capitalization/Assets	Capitalization/Operating Income
Consumer wholesaling	0.75	0.60	10
Specialty services	1.10	0.90	7
Assorted centers	1.00	0.60	6

QUESTION NO. 7

Mr. X is of the opinion that market has recently shown the Weak Form of Market Efficiency. In order to test the validity of his impression he has collected the following data relating to the movement of the SENSEX for the last 20 days.

Days	Open	High	Low	Close
1	33470.94	33513.79	33438.03	33453.99
2	33453.64	33478.11	33427.82	33434.83
3	33414.06	33440.29	33397.65	33431.93
4	33434.94	33446.18	33377.78	33383.41
5	33372.92	33380.27	33352.12	33370.93
6	33375.85	33389.49	33331.42	33340.75
7	33340.89	33340.89	33310.95	33330.98
8	33326.84	33340.91	33306.17	33335.08
9	33307.16	33328.22	33296.43	33301.97
10	33298.64	33318.60	33254.28	33259.03
11	33260.04	33228.85	33241.66	33251.53
12	33255.92	33289.46	33249.46	33285.89
13	33288.86	33535.67	33255.98	33329.28
14	33335.00	33346.21	33276.72	33284.17
15	33293.83	33310.86	33278.54	33298.78
16	33300.02	33337.79	33300.02	33325.38
17	33323.36	33356.34	33322.44	33329.95
18	33322.81	33345.98	33317.44	33319.67
19	33317.51	33321.18	33294.19	33302.32
20	33290.86	33324.96	33279.62	33319.61

You are required:

To test the **Weak Form of Market Efficiency** using Auto-Correlation test, taking time lag of 10 days.

QUESTION NO. 8

Bank A enters into a Repo for 21 days with Bank B in 8% Government of India Bonds 2020 @ 6.10% for ₹ 5 crore. Assuming that clean price is ₹ 97.30 and initial margin is 1.50% and days of accrued interest are 240 days (assume 360 days in a year).

Compute:

(i) the dirty price.

(ii) The repayment at maturity.

QUESTION NO. 9

ABC Ltd. is considering a project X, which is normally distributed and has mean return of ₹ 2 crore with Standard Deviation of ₹ 1.60 crore.

In case ABC Ltd. loses on any project more than ₹ 1.00 crore there will be financial difficulties. Determine the probability the company will be in financial difficulty.

Given: Standard Normal Distribution Table (Z-Score) providing area between Mean and Z score

Z Score	Area
1.85	0.4678
1.86	0.4686
1.87	0.4693

Z Score	Area
1.88	0.4699
1.89	0.4706

Security Valuation

Study Session 2

SOLUTION 1

(i) According to Dividend Discount Model approach the firm's expected or required return on equity is computed as follows:

$= \frac{D_1}{P_O} + g$

Where,

K_e = Cost of equity share capital

D_1 = Expected dividend at the end of year 1

P_O = Current market price of the share.

g = Expected growth rate of dividend.

Therefore, $K_e = \frac{3.36}{146} + 7.5\% = 0.0230+0.075=0.098$ Or, K_e = 9.80%

(ii) With rate of return on retained earnings (r) 10% and retention ratio (b) 60%, new growth rate will be as follows:

g = br i.e. = 0.10 x 0.60 = 0.06

Accordingly dividend will also get changed and to calculate this, first we shall calculate previous retention ratio (b1) and then EPS assuming that rate of return on retained earnings (r) is same. With previous Growth Rate of 7.5% and r =10% the retention ratio comes out to be: 0.075 =b_1 X 0.10

b_1 = 0.75 and payout ratio = 0.25 with 0.25 payout ratio the EPS will be as follows:

$\frac{3.36}{0.25} = 13.44$

With new 0.40 (1 – 0.60) payout ratio the new dividend will be

D_1 = 13.44 X 0.40 = 5.376

Accordingly new K_e will be

$K_e = \frac{5.376}{146} + 6.0\%$

or, $K_e = 9.68\%$

SOLUTION 2

The expected rate of return on equity after 2008 = 0.0625 + 1.10(0.055) = 12.3% The dividends from 2003 onwards can be estimated as:

Year	2003	2004	2005	2006	2007	2008	2009
Earnings Per Share (€)	2.1	2.415	2.78	3.19	3.67	4.22	4.48
Dividends Per Share (€)	0.69	0.794	0.913	1.048	1.206	1.387	2.91

a. The price as of 2008 = €2.91/(0.123- 0.06) = €46.19

b. The required rate of return upto 2008 = 0.0625 + 1.4(0.055) = 13.95%.

The dividends upto 2008 are discounted using this rate as follow:

Year	PV of Dividend
2004	0.794/1.1395 = 0.70
2005	0.913/(1.1395)2 = 0.70
2006	1.048/(1.1395)3 = 0.70
2007	1.206/(1.1395)4 = 0.72
2008	1.387/(1.1395)5 = 0.72
Total	3.54

The current price = €3.54 + €46.19/(1.1395)5= €27.58.

* Values have been rounded off.

SOLUTION 3

Value of share at present $= \frac{D_1}{K_e - g}$

$= \frac{2(1.06)}{0.08-0.06} = ₹\ 106$

However, if the Board implement its decision, no dividend would be payable for 3 years and the dividend for year 4 would be ₹ 2.50 and growing at 7% p.a. The price of the share, in this case, now would be:

$P_O = \frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)^3} = ₹\ 198.46$

So, the price of the share is expected to increase from ₹ 106 to ₹198.45 after the announcement of the project. The investor can take up this situation as follows:

Expected market price after 3 years	$\frac{2.50}{0.08-0.07}$	₹ 250.00
Expected market price after 2 years	$\frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)}$	₹ 231.00
Expected market price after 1 years	$\frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)^2}$	₹ 214.33

In order to maintain his receipt at ₹ 2,000 for first 3 year, he would sell

10 shares in first year @ ₹ 214.33 for ₹ 2,143.30
9 shares in second year @ ₹ 231.48 for ₹ 2,083.32
8 shares in third year @ ₹ 250 for ₹ 2,000.00

At the end of 3rd year, he would be having 973 shares valued @ ₹ 250 each i.e.₹ 2,43,250. On these 973 shares, his dividend income for year 4 would be @ ₹ 2.50 i.e. ₹ 2,432.50.

So, if the project is taken up by the company, the investor would be able to maintain his receipt of at least ₹ 2,000 for first three years and would be getting increased income thereafter.

SOLUTION 4

(a) Working Notes:

(i) Computation of Growth Rate in Earning and EPS

Year	1	2	3	4	5	6	7	8	9	10
Growth in Earning	40%	40%	40%	40%	40%	34%	28%	22%	16%	10%
EPS (₹)	5.60	7.84	10.98	15.37	21.51	28.82	36.89	45.00	52.20	57.42

(ii) Computation of Payout Ratio and Dividend

Year	1	2	3	4	5	6	7	8	9	10
Payout Ratio	10%	10%	10%	10%	10%	18%	26%	34%	42%	50%
Dividend (₹)	0.56	0.78	1.10	1.54	2.15	5.19	9.59	15.30	21.92	28.71

(iii) Calculation of PV of Dividend

Year	Dividend (₹)	PVF	PV of Dividend (₹)
1	0.56	0.855	0.48
2	0.78	0.731	0.57
3	1.10	0.625	0.69
4	1.54	0.534	0.82
5	2.15	0.456	0.98
6	5.19	0.390	2.02

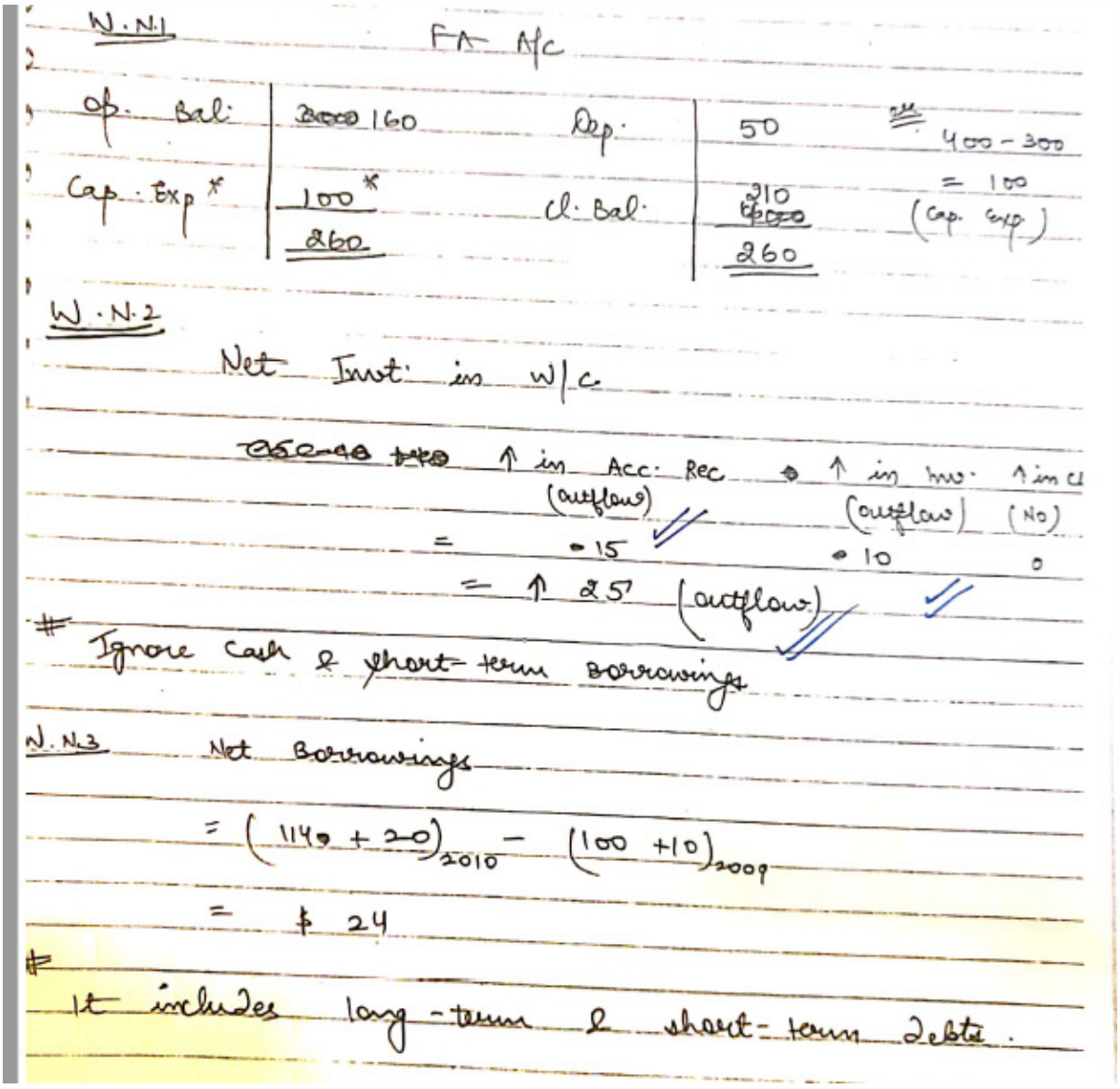
7	9.59	0.333	3.19
8	15.30	0.285	4.36
9	21.92	0.244	5.35
10	28.71	0.209	6.00
			24.46

TV $= \frac{28.71(1.10)}{0.17-0.10} \times 0.209 =$ ₹ 94.29

Intrinsic Value = ₹ 24.46 + ₹ 94.29 = ₹ 118.75

Since the Intrinsic Value of Equity share is less than current market price, it is not advisable to invest in the same.

SOLUTION 5



Calculation of FCFF & FCFE (2010)

FCFF		FCFE	
EBITDA	145	EBITDA	145
(-) Dep.	(50)	(-) Dep.	(50)
EBT	95	(-) Intt.	(15)
(-) Tax (30%)	(28.5)	EBT	80
NOPAT	66.5	(-) Tax (30%)	24
(+) Dep.	50	NOPAT	56
	116.5	(+) Dep.	50
(-) Cap. Exp.	(100)	(-) Cap. Exp.	(100)
(-) ↑ in WC	(25)	(-) ↑ in WC	(25)
FCFF	$ -8.5	(+) Net Bor.	24
		FCFE	$ 5

Playing Puzzle

(1) CFO = NI + Dep. - ↑ in WC
= 56 + $50 - 25
= 81

(2) Calculate FCFF from CFO

= CFO + Intt. (1-Tax) (-) Inv. in FA
= 81 + 15 (1 - .30) - 100
= (-) $ 8.50

(3) Calculate FCFE from CFO

= CFO - Capital Exp. + Net Borrowings
= 81 - 100 + 24
= $ 5

(4) Calculate FCFF from FCFE

= FCFE + Intt. (1-Tax) - Net Borrowings
= 5 + 15 (1 - .30) - 24
= (-) $ 8.50

(5) Calculate change in Cash Bal.

= ~~CFO~~ FCFE - Equity Dividend +/- Issue/Re-purchase
= 5 - 0 ± 0
= $ 5

Corporate Valuation

Study Session 3

SOLUTION 1

High growth phase :

k_e = 0.10 + 1.15 x 0.06 = 0.169 or 16.9%.

k_d = 0.13 x (1-0.3) = 0.091 or 9.1%.

Cost of capital = 0.5 x 0.169 + 0.5 x 0.091 = 0.13 or 13%.

Stable growth phase :

k_e= 0.09 + 1.0 x 0.05 = 0.14 or 14%.

k_d = 0.1286 x (1 - 0.3) = 0.09 or 9%.

Cost of capital = 0.6 x 0.14 + 0.4 x 0.09 = 0.12 or 12%.

Determination of forecasted Free Cash Flow of the Firm (FCFF)

(₹ in crores)

	Yr. 1	Yr. 2	Yr 3	Yr. 4	Terminal Year
Revenue	2,400	2,880	3,456	4,147.20	4,561.92
EBIT	360	432	518.40	622.08	684.29
EAT	252	302.40	362.88	435.46	479.00
Capital Expenditure	96	115.20	138.24	165.89	-
Less Depreciation					
Δ Working Capital	100.00	120.00	144.00	172.80	103.68
Free Cash Flow (FCF)	56.00	67.20	80.64	96.77	375.32

Alternatively, it can also be computed as follows:

(₹in crores)

	Yr. 1	Yr. 2	Yr 3	Yr. 4	Terminal Year
Revenue	2,400	2,880	3,456	4,147.20	4,561.92
EBIT	360	432	518.40	622.08	684.29
EAT	252	302.40	362.88	435.46	479.00
Add: Depreciation	240	288	345.60	414.72	456.19
	492	590.40	708.48	850.18	935.19
Less: Capital Exp.	336	403.20	483.84	580.61	456.19
Δ WC	100.00	120.00	144.00	172.80	103.68
	56.00	67.20	80.64	96.77	375.32

Present Value (PV) of FCFF during the explicit forecast period is:

FCFF (₹ in crores)	PVF @ 13%	PV (₹ in crores)
56.00	0.885	49.56
67.20	0.783	52.62
80.64	0.693	55.88
96.77	0.613	₹59.32
		217.38

Terminal Value of Cash Flow

$$\frac{375.32}{0.12 - 0.10} = ₹18,766.00\text{Crores}$$

PV of the terminal, value is:

₹18,766.00Crores x $\frac{1}{(1.03)^4}$ = ₹18,766.00Crores x 0.613 = ₹11,503.56 Crores

The value of the firm is :

₹ 217.38 Crores + ₹ 11,503.56 Crores = ₹ 11,720.94 Crores

QUESTION 2

Projected Balance Sheet					
	Year 1	Year 2	Year 3	Year 4	Year 5
Fixed Assets (25% of Sales)	13,000	16,900	21,970	28,561.00	28,561.00
Current Assets (15% of Sales)	7,800	10,140	13,182	17,136.60	17,136.60
Total Assets	20,800	27,040	35,152	45,697.60	45,697.60
Equity (37.5% of sales)	19,500	25,350	32,955	42,841.50	42,841.50
Sundry Creditors (2.5% of Sales)	1,300	1,690	2,197	2,856.10	2,856.10
Total Liabilities	20,800	27,040	35,152	45,697.60	45,697.60

Projected Cash Flows:-

	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	52,000	67,600	87,880.00	1,14,244.00	1,14,244.00
PBT (15% of sales)	7,800	10,140	13,182.00	17,136.60	17,136.60
PAT (10.5% of sales)	5,460	7,098	9,227.40	11,995.62	11,995.62
Depreciation	1,500	1,950	2,535.00	3,295.50	4,284.15
Addition to Fixed Assets	4,500	5,850	7,605.00	9,886.50	4,284.15
Increase in Net Current Assets	1,500	1,950	2,535.00	3,295.50	-
Operating cash flow	960	1,248	1,622.40	2,109.12	11,995.62

Projected Cash Flows:-

Present value of Projected Cash Flows:-

Cash Flows	PVF at 15%	PV
960	0.870	835.20
1248	0.756	943.49
1622.40	0.658	1067.54
2109.12	0.572	1206.42
		4,052.65

Residual Value = 11,995.62/0.15 = 79,970.80

Present value of Residual value	=	79,970.80 x PVF (15%, 4)
	=	79,970.80 x 0.572 = 45,743.30
Total shareholders' value	=	45743.30 + 4052.65 = 49795.95
Pre-strategy value	=	4200 / 0.15 = 28,000
∴ Value of strategy	=	49795.95 – 28,000 = 21795.95

SOLUTION 3

(c) No. of Shares = $\frac{₹1200\ crore}{₹40}$ = 30 Crores

EPS = $\frac{PAT}{No.of\ shares}$ = $\frac{₹300\ crore}{30\ crore}$ = ₹ 10.00

FCFE = Net income – [(1-b) (capex – dep) + (1-b) (ΔWC)]

FCFE = 10.00 – [(1- 0.25) (48 - 40) + (1 - 0.25) (4)]

= 10.00 – [6.00 + 3.00] = 1.00

Cost of Equity = Rf + ß (Rm – Rf)

= 8.7 + 0.1 (10.3 – 8.7) = 8.86%

Po = $\frac{FCFE\ (1+g)}{ke-g}$ = $\frac{1.00\ (1+0.08)}{0.0886-0.08}$ = $\frac{1.08}{0.0086}$ = ₹ 125.58

SOLUTION 4

(i) Let us first compute the Cost of Equity ke = $\frac{D}{P}$ = $\frac{25}{125}$ = 20%

(ii) Current Earning = ₹ 25 x 10,00,000 = ₹ 2,50,00,000

The new project can be financed by retaining ₹ 1,75,00,000 of ₹ 2,50,00,000 earning next year, reducing dividend payment to ₹ 75,00,000 or

$= \frac{75,00,000}{10,00,000}$ = ₹ 7.50 per share

(iii) In the following years, dividend will increase due to the cash generated by the new project. Dividend per share in year 2 shall be:

$= \frac{25,00,000+50,00,000}{10,00,000}$ = ₹ 30 per share

(iv) The new share price can be calculated by finding the Present Value of the revised dividend payments:

$P = \frac{7.50}{1.20} + \frac{30.00}{0.20} \times \frac{1}{1.20}$ = ₹ 131.25 per share

SOLUTION 5

Cost of capital by applying Free Cash Flow to Firm (FCFF) Model is as follows:-

Value of Firm = $V_O = \frac{FCFF_1}{K_c - g_n}$

Where –

$FCFF_1$ = Expected FCFF in the year 1

K_c = Cost of capital

g_n = Growth rate forever

Thus, ₹ 1800 lakhs = ₹ 54 lakhs $/(K_c - g_n)$

Since g = 9%, then K_c = 12%

Now, let X be the weight of debt and given cost of equity = 20% and cost of debt = 10%, then 20% (1 – X) + 10% X = 12%

Hence, X = 0.80, so book value weight for debt was 80%

Correct weight should be 60 of equity and 72 of debt.

Cost of capital = Kc = 20%(60/132)+10% (72/132) = 14.5455% and correct firm's value = ₹ 54 lakhs/(0.1454 – 0.09) = ₹ 974.73 lakhs.

SOLUTION 6

(a) Calculation of Profit after tax (PAT)

	₹
Profit before interest and tax (PBIT)	32,00,000
Less: Debenture interest (₹ 64,00,000 × 12/100)	7,68,000
Profit before tax (PBT)	24,32,000
Less: Tax @ 35%	8,51,200
Profit after tax (PAT)	15,80,800
Less: Preference Dividend	
(₹ 40,00,000 × 8/100) 3,20,000	
Equity Dividend (₹ 80,00,000 × 8/100) 6,40,000	9,60,000
Retained earnings (Undistributed profit)	6,20,800

Calculation of Interest and Fixed Dividend Coverage

$= \frac{\text{PAT+ Debenture interest}}{\text{Debenture interest + Preference dividend}}$

$= \frac{15,80,800+ 7,68,000}{7,68,000+ 3,20,000} = \frac{23,48,800}{10,88,000}$ = 2.16 Times

(b) Calculation of Capital Gearing Ratio

Capital Gearing Ratio = $\frac{\text{Fixed interest bearing funds}}{\text{Equity shareholders' funds}}$

$= \frac{\text{Preference Share Capital + Debentures}}{\textit{Equity Share Capital + Reserves}} = \frac{40,00,000 + 64,00,000}{80,00,000 + 32,00,000} = \frac{1,04,00,000}{1,12,00,000}$ = 0.93

(c) Calculation of Yield on Equity Shares:

Yield on equity shares is calculated at 50% of profits distributed and 5% on undistributed profits:

	₹
50% on distributed profits (₹ 6,40,000 × 50/100)	3,20,000
5% on undistributed profits (₹ 6,20,800 × 5/100)	31,040
Yield on equity shares	3,51,040

Yield on equity shares % $= \frac{Yield\ on\ shares}{Equity\ share\ Capital} \times 100$

$= \frac{3,51,040}{80,00,000} \times 100 = 4.39\%$ or, 4.388%

Calculation of Expected Yield on Equity shares

Note: There is a scope for assumptions regarding the rates (in terms of percentage for every one time of difference between Sun Ltd. and Industry Average) of risk premium involved with respect to Interest and Fixed Dividend Coverage and Capital Gearing Ratio. The below solution has been worked out by assuming the risk premium as:

(i) 1% for every one time of difference for Interest and Fixed Dividend Coverage.

(ii) 2% for every one time of difference for Capital Gearing Ratio.

(a) Interest and fixed dividend coverage of Sun Ltd. is 2.16 times but the industry average is 3 times. Therefore, risk premium is added to Sun Ltd. Shares @ 1% for every 1 time of difference.

Risk Premium = 3.00 – 2.16 (1%) = 0.84 (1%) = 0.84%

(b) Capital Gearing ratio of Sun Ltd. is 0.93 but the industry average is 0.75 times. Therefore,

risk premium is added to Sun Ltd. shares @ 2% for every 1 time of difference.

Risk Premium = (0.75 – 0.93) (2%)

= 0.18 (2%) = 0.36%

	(%)
Normal return expected	9.60
Add: Risk premium for low interest and fixed dividend coverage	0.84
Add: Risk premium for high interest gearing ratio	0.36
Value of Equity Share	10.80

$= \frac{Actual\ yield}{Expected\ yield}$ x Paid up value of share $= \frac{4.39}{10.80} \times 100 =$ ₹ 40.65

SOLUTION 7

In semi-strong form of stock market, the share price should accurately reflect new relevant information when it is made publicly available including Implant Inc. expansion scheme and redemption of the term loan.

The existing Market Value $ 2 x 7,000,000		$ 14,000,000
The new investment has an expected NPV		$ 2,200,000
Proceeds of New Issue		$ 15,000,000
Issue Cost of		($ 600,000)
PV of Benefit of early redemption		
Interest of $ 900,000 ($,6,000,000 x 15 %)x 3.791	3,411,900	
PV of Repayment in 5 years $ 6,000,000 x 0.621	3,726,000	
	7,137,900	
Redemption Cost Now	(6,000,000)	
Penalty charges	(350,000)	787,900
Expected Total Market value		31,387,900
New No. of shares (30 Million + 7 Million)		37,00,000
Expected Share Price of Company		$ 0.848

SOLUTION 8

Working Notes:

Computation of Earning Per Share (EPS)

Particulars		Amount (₹)
Margin of Division A	(₹ 50 crore x 10% x 5%)	25,00,000
Margin of Division B	(₹ 20 crore x 30% x 8%)	48,00,000
Margin of Division C	(₹ 8.5 crore x 2% x 10%)	1,70,000
		74,70,000
No. of Equity Shares		3,00,000
EPS		₹ 24.90

(i) Market Price based on One Year Forecast

Expected Market Price at the end of the year = ₹ 24.90 x 10 = ₹ 249

PV of the Expected Price = ₹ 249 x 0.847 = ₹ 210.90

I would NOT like to purchase the share as the expected market price of shares is less than its current price of ₹ 250.

(ii) If Earning is expected to grow @ 15%

Year	EPS (₹)	Dividend (₹)	PVF@18%	PV (₹)
1	28.64	---	0.847	---
2	32.93	---	0.718	---
3	37.87	11.36	0.609	6.92
4	43.55	13.07	0.516	6.74
5	50.08	15.02	0.437	6.56
				20.22

Share Price after 5 years = $\frac{15.02(1.15)}{0.18-0.15}$ = ₹ 575.77

PV of the Market Price after 5 years = ₹ 575.77 X 0.437 = ₹ 251.61

Total PV of Inflows = ₹ 20.22 + ₹ 251.61 = ₹ 271.83

Thus, the maximum price I would be willing to pay for the share shall be ₹ 271.83.

SOLUTION 9

(a) Net Assets Method

To compute the value of shares as per this method we shall compute the Net Assets.

(i) Value of Land & Building of XYZ Ltd. = ₹ 1,500 lac (1.25)4 = ₹ 3,662.11 lac. Thus, net asset value will be:

	₹
Land & Building	3,662.11 lac
Plant & Machinery	2,800.00 lac
Account Receivable	2,400.00 lac
Stock	2,100.00 lac
Bank/Cash	400.00 lac
	11,362.11 lac
Less: Bank Overdraft	100.00 lac
Sundry Creditors	1,100.00 lac
Tax Payable	400.00 lac
Dividend Payable	400.00 lac
Long Term Loan	1,000.00 lac
	8362.11 lac

(ii) Estimated profit for next 5 years

= ₹ 1,510 lac (1.12) + ₹ 1,510 lac (1.12)2 + ₹ 1,510 lac (1.12)3 + ₹ 1,510 lac (1.12)4 + ₹ 1,510 lac (1.12)5

= ₹ 1,691.20 lac + ₹ 1,894.14 lac + ₹ 2,121.44 lac + ₹ 2,376.01 lac +

₹ 2,661.14 lac

= ₹ 10,743.93 lac.

The total yield value= ₹ 8,362.11 lac + ₹ 10,743.93 lac = ₹ 19,106.04 lac

XYZ Ltd.s share's current market value = ₹ 470 x 40 lacs shares

=₹ 1,88,00,00,000

= ₹ 18,800 lac

The premium is thus ₹ 306.04 lac (₹ 19,106.04 lac – ₹ 18,800 lac) i.e. ₹ 7.65 per share or 1.63% [7.65/470].

This is not a sound basis for valuation as it ignores the time value of money. The premium of 1.63% above the current market price is very small compared to those achieved in many real bids.

(b) Dividend Valuation Model

$Po=\frac{D1}{Ke-g}=\frac{Do\,(1+g)}{ke-g}$

$Do=\frac{₹760\ lac}{40\ lac}$ = ₹19 per share

Thus D1 = ₹ 19(1+0.12) = ₹ 21.28

K_e using CAPM

K_e = Rf +βj (Rm - Rf) =10% + 1.05(16% - 10%) = 16.3%

$P0=\frac{₹21.28}{16.3\%-12\%}=\frac{21.28}{4.3\%}$ = ₹ 494.88 per share

The premium is ₹ 24.88 (₹ 494.88 – ₹ 470) i.e. 5.29% above the current market price.

Thus, this method should be used for bidding shares of XYZ Ltd.'s share

Assumptions

- Valuation is based on a constant growth rate and unchanged dividend policy.
- It will be more rational to assess the value of XYZ Ltd. incorporating post merger synergies.

SOLUTION 10

Estimation of Ratios

Sl. No.	Particulars	SK Ltd.	AS Ltd.	Average
(i)	Market to Book Value	$=\frac{450}{400}$ =1.125	$=\frac{400}{300}$ =1.333	1.2290
(ii)	Market to Replacement Cost	$=\frac{450}{600}$ =0.750	$=\frac{400}{550}$ =0.727	0.7385
(iii)	Market to Sales	$=\frac{450}{550}$ =0.818	$=\frac{400}{450}$ =0.889	0.8535
(iv)	Market to Net Income	$=\frac{450}{18}$ =25	$=\frac{400}{16}$ =25	25

Application of Ratios to XY Ltd.

Sl. No.	Particulars	XY Ltd. (₹)	Average	Indicative Value of XY Ltd. (₹)
(i)	Book Value	250	1.2290	250 x 1.2290 = 307.25
(ii)	Replacement Cost	500	0.7385	500 x 0.7385 = 369.25
(iii)	Sales	500	0.8535	500 x 0.8535 = 426.75
(iv)	Net Income	14	25	14 x 25 = 350.00
Average				₹ 363.31

Value of XY Ltd. according to the comparable method is ₹ 363.31

SOLUTION 11

(i) Weighted Average Cost of Capital of DY Ltd.

Cost of Equity as per CAPM

ke = Rf + β x Market Risk Premium

= 7% + 1.4 x [12% - 7%]

= 7% + 7% = 14%

Cost of Debt kd = 8% (1 – 0.30) = 5.60%

$$\text{WACC (ko)} = K_e \times \frac{E}{E+D} + K_d \times \frac{D}{E+D} = 14.00 \times \frac{500}{750} + 5.60 \times \frac{250}{750}$$

= 9.33% + 1.87% = 11.20%

(ii) Economic Value Added (EVA) of DY Ltd.

		₹ Lakhs
Sales		₹ 1,000
Operating Expenses (excluding interest)	₹ 620 ₹ 20	₹ 600
		₹ 400
Less: Tax @ 30%		₹ 120
Net Operating Profit after Tax (NOPAT)		₹ 280

Calculation of Capital Employed

	₹ Lakhs
Equity Share Capital	250
Reserves & Surplus	250
8% Debentures	250
Total Capital Employed	750

EVA = NOPAT – (WACC □ Total Capital) EVA = ₹ 280 Lakh – 0.1120 □ ₹ 750 lakhs EVA = 196.00 lakhs

(iii) Determination of Market Value Added (MVA)

	₹ Lakh
Market value of Equity Stock [₹ 900 Lakh - ₹ 250 Lakh]	650
Equity Fund [₹ 250 Lakh + ₹ 250 Lakh]	500
Market Value Added	150

Alternatively, it can also be computed as follows:

	₹ Lakh
Market value of DY Ltd.	900
Capital employed [₹ 250 Lakh + ₹ 250 Lakh + ₹ 250 Lakh]	750
Market Value Added	150

Mergers, Acquisitions & Corporate Restructuring

Study Session 4

SOLUTION 1

Working Notes :

(a)

	XYZ Ltd.	ABC Ltd.
Equity shares outstanding (Nos.)	10,00,000	4,00,000
EPS	₹ 40	₹ 28
Profit	₹ 400,00,000	₹ 112,00,000
PE Ratio	6.25	5.71
Market price per share	₹ 250	₹ 160

(b) EPS after merger

No. of shares to be issued (4,00,000 x 0.70)	2,80,000
Exiting Equity shares outstanding	10,00,000
Equity shares outstanding after merger	12,80,000
Total Profit (₹ 400,00,000 + ₹ 112,00,000)	₹ 512,00,000
EPS	₹ 40

(i) Impact of merger on EPS of both the companies

	XYZ Ltd.	ABC Ltd.
EPS after Merger	₹ 40	₹ 28
EPS before Merger	₹ 40	₹ 28*
	Nil	Nil

* ₹ 40 x 0.70

(ii) Gain from the Merger if exchange ratio is 1: 1

No. of shares to be issued	4,00,000
Exiting Equity shares outstanding	10,00,000
Equity shares outstanding after merger	14,00,000
Total Profit (₹ 400,00,000 + ₹ 112,00,000)	₹ 512,00,000
EPS	₹ 36.57
Market Price of Share (₹ 36.57 x 6.25)	₹ 228.56
Market Price of Share before Merger	₹ 160.00
Impact (Increase/ Gain)	₹ 68.56

(iii) Gain/ loss from the Merger to the shareholders of XYZ Ltd.

Market Price of Share	₹ 228.56
Market Price of Share before Merger	₹ 250.00
Loss from the merger (per share)	₹ 21.44

(iv) Maximum Exchange Ratio acceptable to XYZ Ltd. shareholders

	₹ Lakhs
Market Value of Merged Entity (₹ 228.57 x 1400000)	3199.98
Less: Value acceptable to shareholders of XYZ Ltd.	2500
Value of merged entity available to shareholders of ABC Ltd. Market Price Per Share	699.98
No. of shares to be issued to the shareholders of ABC Ltd. (lakhs)	250
	2.8

Thus maximum ratio of issue shall be 2.80 : 4.00 or 0.70 share of XYZ Ltd. for one share of ABC Ltd.

SOLUTION 2

(b) (i) Calculation of Minimum price per share S Ltd. should accept from R Ltd.

Value of S Ltd. $= \frac{\text{Residual Cash Flow}}{ke-g} = \frac{54,87,000}{0.1305-0} =$ ₹ 4,20,45,977

Value per share of S Ltd. $= \frac{4,20,45,977}{80,00,000} =$ ₹ 5.26

Book Value of per share of S Ltd. $= \frac{3,99,95,000}{80,00,000} =$ ₹ 4.99 or ₹ 5

Therefore, the minimum price per share S ltd. should accept from R Ltd. is ₹ 5 (current book value)

(ii) Calculation of Maximum price per share R Ltd. shall be willing to offer to S Ltd.

Value of R Ltd. $= \frac{\text{Residual Cash Flow}}{ke-g} = \frac{90,10,000}{0.1375-0} =$ ₹ 6,55,27,273

Value of Combined entity $= \frac{1,85,00,000}{0.125-0} =$ ₹ 14,80,00,000

Value of synergy = Value of Combined entity – Individual values of R Ltd. and S Ltd.

= ₹ 14,80,00,000 – (₹ 4,20,45,977 + ₹ 6,55,27,273)

= ₹ 4,04,26,750

Maximum price per share R Ltd. shall be willing to offer to S Ltd. shall be computed as follows:

$= \frac{\text{Value of S Ltd.as per Residual cash flows + Synergy benefits}}{No.of\ shares}$

$= \frac{4,20,45,977 + 4,04,26,750}{80,00,000} =$ ₹ 10.31

(iii) Floor value of per share of S Ltd shall be ₹ 3.20 (current market price) and it shall not play any role in decision for the acquisition of S Ltd. as it is lower than its current book value.

SOLUTION 3

(a)

	A Ltd.	B Ltd.
Share Capital	200 Lakh	100 Lakh
Free Reserves	800 Lakh	500 Lakh
Total	1000 Lakh	600 Lakh
No. of Shares	2 Lakh	10 Lakh
Book Value per share	₹ 500	₹ 60
Promoter's holding	50%	60 %
Non promoter's holding	50%	40 %
Free Float Market Cap. i.e. relating to Public's holding	400 Lakh	128 Lakh
Hence Total market Cap.	800 Lakh	320 Lakh
No. of Shares	2 Lakh	10 Lakh
Market Price	₹ 400	₹ 32
P/E Ratio	10	4
EPS	40	8
Profits (₹ 2 X 40 lakh)	₹ 80 Lakh	-
(₹ 8 X 10 lakh)	-	₹ 80 Lakh

Calculation of Swap Ratio

Book Value	1 : 0.12	0.12 x 25%	0.03
EPS	01:00.2	0.20 x 50%	0.1
Market Price	01:00.1	0.08 x 25%	0.02
Total			**0.15**

Swap ratio is for every one share of Abhishek Ltd., to issue 0.15 shares of Abhiman Ltd. Hence total no. of shares to be issued.

10 Lakh x 0.15 = 1.50 lakh shares

(b) Book Value, EPS & Market Price

Total No of Shares	2 Lakh + 1.5 Lakh = 3.5 Lakh
Total Capital	₹ 200 Lakh + ₹ 150 Lakh = ₹ 350 Lakh
Reserves	₹ 800 Lakh + ₹ 450 Lakh = ₹ 1,250 Lakh
Book Value	$\frac{350\ Lakh + 1,250\ Lakh}{3.5\ Lakh}$ = ₹ 457.14 per share
EPS	$\frac{Total\ Profit}{No.\ of\ Share} = \frac{80\ Lakh + 80\ Lakh}{3.5\ Lakh} = \frac{160\ Lakh}{3.5}$ = ₹ 45.71
Expected Market Price	EPS (₹ 45.71) x P/E Ratio (10) = ₹ 457.10

(c) (1) Promoter's holding

Promoter's Revised Holding	A Ltd. 50% i.e.	1.00 Lakh shares
	B Ltd. 60% i.e.	0.90 Lakh shares
	Total	1.90 Lakh shares

Promoter's % = 1.90/3.50 x 100 = 54.29%

(2) Free Float Market Capitalization

Free Float Market Capitalization = (3.5 Lakh – 1.9 Lakh) x ₹ 457.10 = ₹ 731.36 Lakh

(3) (i) & (ii)

Revised Capital	₹ 350 Lakh + ₹ 175 Lakh = ₹ 525 Lakh
No. of shares before Split (F.V ₹ 100)	5.25 Lakh
No. of Shares after Split (F.V. ₹ 5)	5.25 x 20 = 105 Lakh
EPS	160 Lakh / 105 Lakh = 1.523
Book Value	Cap. ₹ 525 Lakh + ₹ 1075 Lakh No. of Shares =105 Lakh = ₹ 15.238 per share

SOLUTION 4

(a) Working Notes:

	Day Ltd.	Night Ltd.
Net Earnings	₹ 5 crores	₹ 3.5 crores
No. of Equity Shares	10,00,000	7,00,000
EPS	50	50
P/E	20 times	15 times
MPS	₹ 1000	₹ 750
Market Value	1,00,00,00,000	52,50,00,000

(i) If takeover is funded by Cash

Since Market Price of Night Ltd. reflects its full value, cost of takeover to Day Ltd is 55 crore – 52.50 crore = ₹ 2.5 crore.

(ii) If the takeover is funded by stock

Number of shares to be issued to Night Ltd.

= ₹ 55 Crore/ ₹ 1000 = 550000 Lakhs

Market Value of Merged Firm = ₹ 1,00,00,00,000 + ₹ 52,50,00,000

= ₹ 1,52,50,00,000 i.e. ₹ 152.50 Crore

Proportion that Night Ltd.'s shareholders get in Day Ltd.'s Capital Structure will be:

$\frac{5.5\ lakhs}{5.5\ lakhs+10\ lakhs}$ = 0.3548

True Cost of Merger = ₹ 152.50 Crore x 0.3548 – ₹ 55 Crore

= -₹ 0.893 Crore

Since true cost is negative in case of funding from stock, Day Ltd. would better off by funding the takeover by stock.

SOLUTION 5

Impact of Financial Restructuring

(i) Benefits to Grape Fruit Ltd.

(a) Reduction of liabilities payable

	₹ in lakhs
Reduction in equity share capital (6 lakh shares x ₹75 per share)	450
Reduction in preference share capital (2 lakh shares x ₹50 per share)	100
Waiver of outstanding debenture Interest	26
Waiver from trade creditors (₹340 lakhs x 0.25)	85
	661
(b) Revaluation of Assets Appreciation of Land and Building (₹450 lakhs - ₹200 lakhs)	250
Total (A)	**911**

(ii) Amount of ₹911 lakhs utilized to write off losses, ficticious assets and over- valued assets.

Writing off profit and loss account	525
Cost of issue of debentures	5
Preliminary expenses	10
Provision for bad and doubtful debts	15
Revaluation of Plant and Machinery	120
(₹300 lakhs – ₹180 lakhs)	
Total (B)	675
Capital Reserve (A) – (B)	**236**

(iii) Balance sheet of Grape Fruit Ltd as at 31st March 2011 (after re-construction)

Liabilities	Amount	Assets		Amount
12 lakhs equity shares of ₹ 25/- each	300	Land & Building		450
10% Preference shares of ₹ 50/- each	100	Plant & Machinery		180
Capital Reserve	236	Furnitures & Fixtures		50
9% debentures	200	Inventory		150
Loan from Bank	74	Sundry debtors	70	
Trade Creditors	255	Prov. for Doubtful Debts	-15	55
		Cash-at-Bank (Balancing		280
		figure)*		
	1165			1165

*Opening Balance of ₹130/- lakhs + Sale proceeds from issue of new equity shares ₹150/- lakhs.

SOLUTION 6

Working Notes

Calculation of Interest Payment on 9% Debentures

PVAF (9%,6) = 4.486

Annual Installment $= \frac{22.50\ crore}{4.486}$ =₹5.0156 crore

Year	Balance Outstanding (₹ Crore)	Interest (₹ Crore)	Installment (₹ Crore)	Principal Repayment (₹ Crore)	Balance (₹ Crore)
1	22.5000	2.025	5.0156	2.9906	19.5094
2	19.5094	1.756	5.0156	3.2596	16.2498
3	16.2498	1.462	5.0156	3.5536	12.6962
4	12.6962	1.143	5.0156	3.8726	8.8236

Statement showing Value of Equity

Particulars	2013-14 (₹ Crore)	2014-15 (₹ Crore)	2015-16 (₹ Crore)	2016-17 (₹ Crore)
EBIT	48.0000	57.0000	68.0000	82.0000

Interest on 9% Debentures	2.0250	1.7560	1.4620	1.1430
Interest on 8% Loan	12.8000	12.8000	12.8000	12.8000
EBT	33.1750	42.4440	53.7380	68.0570
Tax* @35%	11.6110	14.8550	18.8080	23.8200
EAT	21.5640	27.5890	34.9300	44.2370
Dividend @12.5% of EAT*	2.6955	3.4490	4.3660	5.5300
	18.8685	24.1400	30.5640	38.7070
Balance b/f	Nil	18.8685	43.0085	73.5725
Balance c/f	18.8685	43.0085	73.5725	112.2795
Share Capital	82.5000	82.5000	82.5000	82.5000
	101.3685	125.5085	156.0725	194.7795

*Figures have been rounded off.

In the beginning of 2013-14 equity was ₹ 82.5000crore which has been grown to ₹ 194.7795 over a period of 4 years. In such case the compounded growth rate shall be as follows:

(194.7795/82.5000)¼ - 1 = 23.96%

This growth rate is slightly higher than 20% as projected by Mr. Smith.

If the condition of VenCap for 18 shares is accepted the expected share holding after 4 years shall be as follows:

No. of shares held by Management	6.00 crore
No. of shares held by VenCap at the starting stage	2.25 crore
No. of shares held by VenCap after 4 years	4.05 crore
Total holding	6.30 crore

Thus, it is likely that Mr. Smith may not accept this condition of VenCap as this may result in losing their majority ownership and control to VenCap. Mr. Smith may accept their condition if management has further opportunity to increase their ownership through other forms.

SOLUTION 7

(i) Computation of Premium (Net Worth Formula):

Amount ₹ in Crores

Total Assets (Fixed assets + Current Assets) = (550 + 580)	1130
Less: Liabilities (Current Liabilities + Borrowings) = (240 + 105)	345
Net Assets Value	785
Current Value of Land after growing for three years @ 30% = 190 X 2.197	417.43
Less: Book Value	190.00
Increase in the Value of land	227.43
Adjusted NAV (785 + 227.43)	1012.43
Current Profit after Tax (@15 % for 5 years i.e. 250 X 7.7537	1938.43
Average Profit for 1 year = 1938.43/5	387.69
Total Value of Firm (1012.43 + 387.69)	1400.12
Total Market Value = No of shares X MPS = 12.50 X 75	937.50
Premium (Total Value – Market Value)	462.62
Premium (%) = 462.62/937.50 * 100	49.35%

(ii) Computation of Premium (Dividend Growth Formula):

Existing Growth Rate	0.15
DPS= 125/12.50	10
MPS	75
Cost of Equity (D1/MP + g) = [(10 X 1.15/75) + 0.15]	0.3033
Expected growth rate after merger	0.18
Expected Market Price = 10 X [1.18 / (0.3033 - 0.18)]	95.70
Premium over current market price (95.70 - 75)/ 75 X 100	27.60%

Alternatively, if given figure of dividend is considered as D1 then Premium over Current Market Price shall be computed as follows:

Cost of Equity $\left(\frac{D1}{P}+g\right)$	$\left(\frac{10}{75}+0.15\right)$	0.2833
Expected Growth Rate after Merger		0.18
Expected Market Price 10.00 / (0.2833 – 0.18)		96.81
Premium over Current Market Price (96.81 - 75)/ 75 x 100		29.08%

(iii) During the course of negotiations, ICL will push forward valuation based on Growth Rate Method as it will lead to least cash outflow.

SOLUTION 8

(i) The number of shares to be issued by B Ltd.:

The Exchange ratio is 2:3 So, new Shares = 1,80,000 x $\frac{2}{3}$ = 1,20,000 shares.

(ii) EPS of B Ltd. after acquisition:

Total Earnings	(₹ 21,00,000 + ₹ 4,50,000)	₹25,50,000
No. of Shares	(6,00,000 + 1,20,000)	7,20,000
EPS	(₹ 25,50,000/7,20,000)	₹ 3.5416 or 3.54

(iii) Equivalent EPS of S Ltd. and gain/loss to shareholders:

Equivalent EPS of S Ltd. (₹ 3.54 x $\frac{2}{3}$)	₹ 2.36
Less: EPS before merger	₹ 2.50
Loss	(₹ 0.14)

(iv) New Market Price of B Ltd. (P/E remaining unchanged):

Present P/E Ratio of B Ltd.	10 times
Expected EPS after merger	₹ 3.54
Expected Market Price (₹3.54 x 10)	₹ 35.40

(v) Market Value of merged firm:

Total number of Shares	7,20,000
Expected Market Price	₹ 35.40
Total value (7,20,000 x 35.40)	₹ 2,54,88,000

(vi)

(1) Equivalent EPS of S Ltd.	₹ 2.36
(2) BSE price per share before merger announcement	₹ 17.50

(3)	After the merger announcement 10% increase in price of share	₹ 1.75
(4)	Present Market Price of share (2 + 3)	₹ 19.25
(5)	Return on Market Price per share (1/4)	12.26

As Mr. X is having another opportunity to earn 14% and expected return on S Ltd.'s share is 12.26%, it is advisable to offload in market.

Mutual Funds

Study Session 5

SOLUTION 1

(i) Number of Units in each Scheme

MF 'X'	$\frac{₹2,00,000}{₹10.30}$	= 19,417.48
MF 'Y'	$\frac{₹4,00,000}{₹10.10}$	= 39,603.96
MF 'Z'	$\frac{₹2,00,000}{₹10.00}$	= 20,000.00

(ii) Total NAV on 31.03.2018

MF 'X'	= 19,417.48 x ₹ 10.25	₹ 1,99,029.17
MF 'Y'	= 39,603.96 x ₹ 10.00	₹ 3,96,039.60
MF 'Z'	= 20,000.00 x ₹ 10.20	₹ 2,04,000.00
Total		₹ 7,99,068.77

(iii) Total Yield

	Capital Yield	Dividend Yield	Total
MF 'X'	₹ 1,99,029.17- ₹ 2,00,000 = - ₹ 970.83	₹ 6,000	₹ 5,029.17
MF 'Y'	₹ 3,96,039.60 - ₹ 4,00,000 = - ₹ 3,960.40	Nil	- ₹ 3,960.40
MF 'Z'	₹ 2,04,000 - ₹ 2,00,000 = ₹ 4,000	₹ 5,000	₹ 9,000.00
		Total	₹ 10,068.77

Total Yield $= \frac{₹10,068.77}{₹8,00,000} \times 100 = 1.2586\%$

(iv) No. of Days Investment Held

	MF 'X'	MF 'Y'	MF 'Z'
Let No. of days be	X	Y	Z
Initial Investment (₹)	2,00,000	4,00,000	2,00,000
Yield (₹)	5,029.17	-3,960.40	9,000.00
Yield (%)	2.5146	-0.9901	4.5
Period of Holding (Days)	$2.5146 \times \frac{365}{9.66}$	$0.9901 \times \frac{365}{11.66}$	$4.5 \times \frac{365}{24.15}$
	= 95 Days	= 31 Days	= 68 Days
Date of Original Investment	26.12.17	28.02.18	22.01.18

SOLUTION 2

Yield for 9 months = (153.33 x 9/12) = 115%

Market value of Investments as on 31.03.2001 = 1,00,000/- + (1,00,000x 115%)
= ₹2,15,000/-

Therefore, NAV as on 31.03.2001 = (2,15,000-10,000)/10,000 = ₹20.50

(NAV would stand reduced to the extent of dividend payout, being (10,000 × 10 × 10%) = ₹10,000)

Since dividend was reinvested by Mr. X, additional units acquired $= \frac{₹10,000}{₹20.50} = 487.80$ units

Therefore, units as on 31.03.2001 = 10, 000+ 487.80 = 10,487.80

[Alternately, units as on 31.03.2001 = (2,15,000/20.50) = 10,487.80]

Dividend as on 31.12.2002 = 10,487.80 x 10 x 0.2 = ₹20,975.60

Let X be the NAV on 31.12.2002, then number of new units reinvested will be ₹20,975.60/X. Accordingly 11296.11 units shall consist of reinvested units and 10487.80 (as on 31.03.2001). Thus, by way of equation it can be shown as follows:

$= 11296.11 = \frac{20975.60}{X} + 10487.80$

Therefore, NAV as on 31.12.2002 = 20,975.60/(11,296.11- 10,487.80)
= ₹25.95

NAV as on 31.03.2003 = ₹ 1,00,000 (1+0.7352x33/12)/11296.11
= ₹ 26.75

SOLUTION 3

Calculation of Income available for Distribution

	Units (Lakh)	Per Unit (₹)	Total (₹ In lakh)
Income from April	300	0.0765	22.95
Add: Dividend equalization collected on issue	6	0.0765	0.459
	306	0.0765	23.409
Add: Income from May		0.1125	34.425
	306	0.189	57.834
Less: Dividend equalization paid on repurchase	3	0.189	-0.567
	303	0.189	57.267
Add: Income from June		0.15	45.45
	303	0.339	102.717
Less: Dividend Paid		0.2373	-71.9019
	303	0.1017	30.8151

Calculation of Issue Price at the end of April

	₹
Opening NAV	18.75
Add: Entry Load 2% of ₹ 18.750	0.375
	19.125
Add: Dividend Equalization paid on Issue Price	0.0765
	19.2015

Calculation of Repurchase Price at the end of May

	₹
Opening NAV	18.75
Less: Exit Load 2% of ₹ 18.750	-0.375
	18.375
Add: Dividend Equalization paid on Issue Price	0.189
	18.564

Closing NAV

		₹ (Lakh)
Opening Net Asset Value (₹ 18.75 × 300)		5625.0000
Portfolio Value Appreciation		425.4700
Issue of Fresh Units (6 × 19.2015)		115.2090
Income Received		102.8250
(22.950 + 34.425 + 45.450)		
		6268.504
Less: Units repurchased (3 × 18.564)	-55.692	
Income Distributed	-71.9019	(-127.5939)
Closing Net Asset Value		6140.9101
Closing Units (300 + 6 – 3) lakh		303 lakh
Closing NAV as on 30th June		₹ 20.2670

SOLUTION 4

(i) Dividend Plan

(a)	Average Annual gain over a period of 5 Years	27748.60
(b)	Total gain over a period of 5 years (a*5)	138743
(c)	Initial Investment	920000
(d)	Total value of investment (b+c)	1058743
(e)	NAV as on 31.3.2020	49
(f)	Number of units at the end of the period as on 31.03.2019 (d/e)	21607

	1	2	3	4 = (2*3)	5	6 = 1/ (4+5)*4	7
Period	**Units held**	**Rate**	**Unit value**	**Dividend**	**NAV**	**New Units***	**Balance Units Pre Dividend**
31.03.2019	21607	0.15	10	1.5	45	697	20910
31.03.2018	20910	0.1	10	1	50	410	20500
31.03.2017	20500	0.12	10	1.2	48	500	20000

Issue Price as on 01 04.2015 Investment 920000/ Units purchased 20000 (c/i) = ₹ 46

* Let the units issued be X

X = (Closing Units/NAV + Dividend) x Dividend

(ii) Bonus Plan

(a)	Average Yield	0.064
(b)	Investment	1000000
(c)	Gain over a period of 5 years (a*b*5)	320000
(d)	Market Value as on 31.03.2019 (b + c)	1320000
(e)	NAV as on 31.03.2020	44
(f)	Total units as on 31.03.2020 (d/e)	30000
(g)	No of units as on 31.03.2018 Pre bonus = 30000*5/ (5 + 1)	25000
(h)	No of units as on 31.12.2016 Pre bonus = 25000*4/ (4 + 1)	20000
(i)	Issue Price as on 01.04.2015 Investment 1000000/ Units purchased 20000 (b/h)	50

SOLUTION 5

(i) Personal earnings of Mr. Alex = R1 = 15% Mutual Fund earnings = R2

$$R2 = \frac{1}{1-Initial\ Expenses(\%)} \times R1 + \text{Recurring expenses}(\%)$$

$$= \frac{1}{1-0.06} \times 15\% + 2\%$$

= 17.96%

Mutual Fund earnings = 17.96%

(ii) Net financial benefit to Mr. Alex if he invests his portfolio in Fund: Present Income of Mr. Alex

	₹ Lakhs
Annual Professional Income (A)	40.00
Portfolio Value	50.00
Income on his Portfolio @ 15% (B)	7.50
Total Income (A) + (B)	47.50

Expected Income of Mr. Alex after investing the Portfolio in Multi-cap Fund:

	₹ Lakhs
Annual Professional Income (A)	40.00
Additional Professional Income (B)	4.00
Portfolio Value	50.00
Income on his Portfolio @ 13% (C)	6.50
Total Income (A) + (B) + (C)	50.50

It is advisable to invest in Multi-cap Mutual Funds and devote the time on profession. He will get net benefit of ₹ 3 Lakhs (₹50.50 - ₹47.50)

SOLUTION 6

Working Notes:

(i) Calculation of Interest Accrued

Name of Security	Maturity Date	Amount (₹)
10.71% GOI 2028	100 x 100000 x 10.71% x (3/12)	2,67,750
10 % GOI 2023	100 x 50000 x 10.00% x (3/12)	1,25,000
	Total	3,92,750

Note: Interests on two remaining securities shall not be considered as last interest was paid on 30.06.2016

(ii) Valuation of Securities

Name of Security	Purchase Amount ₹	Duration of Bonds	Volatility (%)	(+)/(-)	Total Amount ₹
10.71% GOI 2028	1,04,78,000	7.3494	$\frac{7.3494}{1.10} \times 0.75$	- 5,25,053	99,52,947
			= 5.0110		
10% GOI 2023	50,00,000	5.086	$\frac{5.086}{1.05} \times 0.75$	- 1,81,645	48,18,355
			= 3.6329		
9.5% GOI 2021	39,17,200	4.3949	$\frac{4.3949}{1.05} \times 0.75$	- 1,22,969	37,94,231
			= 3.1392		
8.5% SGL 2025	18,27,200	6.5205	$\frac{6.5205}{1.10} \times 0.75$	- 81,230	17,45,970
			= 4.4456		
					2,03,11,503

Calculation of NAV

Particulars	₹ crores
Value of Securities as computed above	2,03,11,503
Cash in hand	6,72,800
Interest accrued	3,92,750
Sub total assets (A)	2,13,77,053
Less: Liabilities	2,37,400
Expenditure accrued	
Sub total liabilities (B)	2,37,400
Net Assets Value (A) – (B)	2,11,39,653
No. of units	1,00,000
Net Assets Value per unit (₹ 2,11,39,653/ 1,00,000)	₹ 211.40

Derivatives Analysis & Valuation (Futures)

Study Session 6

SOLUTION 1

(i) Current price of the December Future = ₹ 100 [1195 + 1195 (0.095 - 0.03)$\times\frac{91}{365}$]
= ₹ 100 [1195 + 19.37]
= ₹ 1,21,437

Since the current market price of December-15 is ₹ 1,22,500 (₹ 100 x 1225) it is overpriced.

(ii) Since the actual future is overpriced, the cash and carry arbitrage is possible i.e. sell the future contract and borrow to buy the stock.

(iii) September 15

Transaction	Cash Flow
Buy (1195 x ₹ 100) = ₹ 1,19,500 worth of Stocks	- ₹ 1,19,500.00
Borrow ₹ 1,19,500 @ 9.50% for 91 days	+ ₹ 1,19,500.00
Sell a Future Contract @ 1225	0
Total	0

(a) If on December 15, the Index closes at 1260

Transaction	Cash Flow (₹)
Repay ₹ 1,19,500 @ 9.50% for 91 days	- 1,22,330.35
Cancellation of Future Contract (1,22,500 – 1,26,000)	- 3,500.00
Sell 1,19,500 worth of Stocks @ 1,260 $\frac{1260}{1195}\times$1,19,500	+1,26,000.00
Dividend Earned @ 3% $\frac{91}{365}\times$1,19,500$\times$3%	+ 893.79
Gain due to Arbitrage	+ 1,063.44

(b) If on December 15, the Index closes at 1175

Transaction	Cash Flow (₹)
Repay ₹ 1,19,500 @ 9.50% for 91 days	**- 1,22,330.35**
Cancellation of Future Contract (1,22,500 – 1,17,500)	**+5,000.00**
Sell 1,19,500 worth of Stocks @ 1,175 $\frac{1175}{1195}\times$**1,19,500**	**+ 1,17,500.00**
Dividend Earned @ 3% $\frac{91}{365}$ **x 1,19,500 x 3%**	**+ 893.79**
Gain due to Arbitrage	**+ 1,063.44**

SOLUTION 2

(a) Yes, the apprehension of CEO is correct as the current portfolio is more riskier than market as the beta (Systematic Risk) of market portfolio is as computed as follows:

Shares	No. of shares (lakhs) (1)	Market Price of Per Share (2) (₹)	(1) × (2) (₹ lakhs)	% to total (w)	ß (x)	Wx
X Ltd.	6.00	1000.00	6000.00	0.30	1.50	0.45
Y Ltd.	8.00	1500.00	12000.00	0.60	1.30	0.78
Z Ltd.	4.00	500.00	2000.00	0.10	1.70	0.17
			20000.00	1.00		1.40

(b) Since the Beta of existing portfolio is 1.40, the systematic risk of the current portfolio is 1.40.

(c) Required Beta 0.95

Let the proportion of risk-free securities for target beta 0.95 = p

0.95 = 0 × p + 1.40 (1 – p)

p = 0.32 i.e. 32%

Shares to be disposed off to reduce beta (20000 × 32%) ₹ 6,400 lakh and Risk Free securities to be acquired for the same amount.

(d) Number of shares of each company to be disposed off

Shares	% to total (w)	Proportionate Amount (₹ lakhs)	Market Price Per Share (₹)	No. of Shares (Lakh)
X Ltd.	0.30	1920.00	1000.00	1.92
Y Ltd.	0.60	3840.00	1500.00	2.56
Z Ltd.	0.10	640.00	500.00	1.28

(e) Since, the company is in long position in cash market it shall take short position in Future Market.

Number of Nifty Contract to be sold

$\frac{(1.40-0.95) \times 20000 \text{ lakh}}{8{,}250 \times 210}$ = 519 contracts

(f) If there is 2% rises in Nifty there will be 2.80%(2%x1.40) rise for portfolio of shares

	₹ Lakh
Current Value of Portfolio of Shares	20000
Value of Portfolio after rise	20560
Mark-to-Market Margin paid (8250 × 0.020 × ₹ 210 × 519)	179.83
Value of the portfolio after rise of Nifty	20380.17
% change in value of portfolio (20380.17 – 20000)/ 20000	1.90%
% rise in the value of Nifty	2%
New Systematic Risk (Beta)	0.95

SOLUTION 3

(i) Current portfolio
Current Beta for share = 1.4
Beta for cash = 0

Current portfolio beta= $\frac{120\ lakhs}{130\ lakhs}$ x 1.4 + 0 x$\frac{10\ lakhs}{130\ lakhs}$ = 1.2923

(ii) Portfolio beta after 4 months:

Beta for portfolio of shares = $\frac{Change\ in\ Value\ of\ Portfolio\ of\ share}{Change\ in\ Value\ of\ Market\ Portfolio\ (Index)}$

1.4 = $\frac{0.018}{Change\ in\ Value\ of\ Market\ Portfolio\ (Index)}$

Change in value of market portfolio (Index) = (0.018 / 1.4) x 100 = 1.2857
Position taken on 100 lakh Nifty futures : Long
Value of index after 4 months = ₹ 130 lakh x (1.00 - 0.012857)
= ₹ 128.3286 lakh

Mark-to-market paid	= ₹ 1.6714 lakh
Cash balance after payment of mark-to-market	= ₹ 8.3286 lakh
Value of portfolio after 4 months	= ₹ 120 lakh x (1 - 0.018) + ₹ 8.3286 lakh = ₹ 126.1686 lakh
₹ 130 lakh - ₹126.1686 lakh	
Change in value of portfolio	$=\frac{₹130\ lakh - ₹126.1686\ lakh}{₹130\ lakh}$
	= 2.9472%
Portfolio beta	= 0.029472/0.012857 = 2.2923

SOLUTION 4

(a) The Forward Price shall be = $S_0e^{n(r-y)}$
Where
S_0 = Spot price n = period
r = risk free rate of interest y = dividend yield Accordingly,
Forward Price = $2290\ e^{90/365(0.0416 - 0.0175)}$
$= 2290\ e^{0.005942}$
$= 2290(1.005960)$
$= 2303.65$

(b) Gain/loss on Long Position after 28 days
$= 2450 - 2290\ e^{28/365(0.0416 - 0.0175)}$
$= 2450 - 2290\ e^{0.001849}$
$= 2450 - 2290(1.001851)$
$= 2450 - 2294.24$
$= 155.76$

(c) Gain/loss on Long Position at maturity
$= S_n - S_0e^{n(r-y)}$
$= 2470.00 - 2303.65$
$= 166.35$

SOLUTION 5

The optional hedge ratio to minimize the variance of Hedger's position is given by:

$$H = \rho\frac{\sigma S}{\sigma F}$$

Where
σ_S = Standard deviation of ΔS
σ_F = Standard deviation of ΔF
ρ = coefficient of correlation between ΔS and ΔF
H = Hedge Ratio
ΔS = change in Spot price.
ΔF = change in Future price.
Accordingly

$$H = 0.75 \times \frac{0.04}{0.06} = 0.5$$

No. of contract to be short = 10 x 0.5 = 5
Amount = 5000 x ₹ 474 = ₹ 23,70,000

SOLUTION 6

(i) The price of one Future Contract

Let X be the Price of Future Contract. Accordingly,

$5 = \frac{₹9,00,000}{X}$

X (Price of One Future Contract) = ₹ 1,80,000

(ii) Current Future price of the index $= \frac{₹1,80,000}{75} = 2400$

Let Y be the current Nifty Index (on 1st February 2020) then

Accordingly, Y + Y (0.09 - 0.06)$\frac{4}{12}$=2400

and Y = $\frac{2400}{1.01}$ = 2376.24

Hence Nifty Index on 1st February 2020 shall be approximately 2376.

(iii) To determine whether the market is in Contango/ Backwardation first we shall compute Basis as follows:

Basis = Spot Price – Future Price

If Basis is negative the market is said to be in Contango and when it is positive the market is said to be Backwardation.

Since current Spot Price is 2400 and Nifty Index is 2376, the Basis is negative and hence there is Contango Market and maximum Contango shall be 24 (2400 – 2376).

(iv) Pay off on the Future transaction shall be [(2400-2100) x 375] =₹ 112500

The Future seller gains if the Spot Price is less than Futures Contract price as position shall be reversed at same Spot price. Therefore, Mr. SG has gained ₹ 1,12,500/- on the Short position taken.

Derivatives Analysis & Valuation (Options)

Study Session 7

SOLUTION 1

Total premium paid on purchasing a call and put option
= (₹30 per share × 100) + (₹5 per share × 100).
= 3,000 + 500 = ₹3,500

In this case, X exercises neither the call option nor the put option as both will result in a loss for him.

Ending value = - ₹3,500 + zero gain = - ₹3,500
i.e Net loss = ₹3,500

Since the price of the stock is below the exercise price of the call, the call will not be exercised. Only put is valuable and is exercised.

Total premium paid = ₹3,500
Ending value = – ₹3,500 + ₹[(450 – 350) × 100] = – ₹3,500 + ₹10,000 = ₹6,500
Net gain = ₹6,500

In this situation, the put is worthless, since the price of the stock exceeds the put's exercise price. Only call option is valuable and is exercised.

Total premium paid = ₹3,500
Ending value = -3,500 +[(600 – 550) × 100]
Net Gain = -3,500 + 5,000 = ₹1,500

SOLUTION 2

(1) Expected Share Price
= ₹120X 0.05 + ₹140X 0.20 + ₹160X 0.50 + ₹180X 0.10 + ₹190X 0.15
= ₹6 + ₹28 + ₹80 + ₹18 + ₹28.50 = ₹160.50

(2) Value of Call Option
= ₹150 - ₹150 = Nil

(3) If the option is held till maturity the expected Value of Call Option

Expected price (X)	Value of call (C)	Probability (P)	CP
₹ 120	0	0.05	0
₹ 140	0	0.20	0
₹ 160	₹ 10	0.50	₹ 5
₹ 180	₹ 30	0.10	₹ 3
₹ 190	₹ 40	0.15	₹ 6
		Total	₹ 14

Alternatively, it can also be calculated as follows:
Expected Value of Option

(120 – 150) X 0.1	Not Exercised*
(140 – 150) X 0.2	Not Exercised*
(160 – 150) X 0.5	5
180 – 150) X 0.1	3
(190 – 150) X 0.15	6
	14

* If the strike price goes below ₹ 150, option is not exercised at all.

SOLUTION 3

Spot price = 60 [Given] ; Low Price at one year =70% of ₹ 60 = ₹ 42 [Given];
High price (after calculation) = ₹ 81% Increase in price = $\frac{81-60}{60}$ x100 = 35%
Working Note:

(1) Maturity	Value of Call as on Expiry	Probability	Expected Value
X	X -55	$\frac{60(1+.12)-42}{X-42}(WN-1)$	16.8 (WN-3)
42	0	$\frac{60(1+.12)-42}{X-42}(WN-2)$	0
			16.8

(2) Probability of price Increase (p) = $\frac{60(1+.12)-42}{X-42}$ and therefore
Probability of price Decrease (1-p) = 1 - $\frac{60(1+.12)-42}{X-42}$

(3) Option Premium after one year =15 (1+.12)1 =16.8
Now: (x -55) $\frac{60(1+.12)-42}{X-42}$ =16.8 ≥ $\frac{(x-55)}{X-42}$ × 25.2 =16.8 ≥ $\frac{(x-55)}{X-42}$ = .67 × 55 = 67× -28.14
≥ X – 0.67 X = 28.14 +55 ≥ 33X= 26.86 ≥ X =81.40 ≥ 81 (approx.)

SOLUTION 4

(i) Using the single period model, the probability of price moving up is

P = $\frac{R-d}{u-d}$ = $\frac{1.05127-\frac{95}{100}}{\frac{108}{100}-\frac{95}{100}}=\frac{0.10127}{0.13}$=0.779 say 0.78 i.e. 78%

Therefore, the probability of price moving down = 1 - 0.78 = 0.22 i.e. 22%

(ii) Expected pay-off at

Node N2

$\frac{0.78\times18.64+0.22\times4.60}{1.05127}=\frac{15.55}{1.05127}$= ₹ 14.79

Node N3

$\frac{0.78\times4.60+0.22\times0}{1.05127}=\frac{3.588}{1.05127}$ = ₹ 3.41

Node N1

$\frac{0.78\times14.79+0.22\times3.41}{1.05127}=\frac{12.286}{1.05127}$= ₹ 11.69

SOLUTION 5

(i) To compute perfect hedge we shall compute Hedge Ratio (Δ) as follows:
Δ = $\frac{C1-C2}{S1-S2}=\frac{100-0}{650-450}=\frac{100}{200}$ = 0.50
The investor should purchase 0.50 share for every 1 call option
Or, the investor should purchase 1 share for every 2 Call Option.

(ii) How the investor will be able to maintain his position if he purchase 0.50 share for 1 call option written.

(a) If price of share goes upto ₹ 650 then value of purchased share will be:

Sale Proceeds of Investment (0.50 x ₹ 650)	₹ 325
Loss on account of Short Position (₹ 650 – ₹ 550)	₹ 100
	₹ 225

(b) If price of share comes down to ₹ 450 then value of purchased share will be:
Sale Proceeds of Investment (0.50 x ₹ 450) ₹ 225

(iii) The Value of Option, say, P at the beginning of the period shall be computed as follows:
(₹ 250 – P) 1.05 = ₹ 225
₹ 262.50 – 1.05P = ₹ 225
₹ 37.5 = 1.05P P = ₹ 35.71

(iv) Expected Return on the Option
Expected Option Value = (₹ 650 – ₹ 550) × 0.70 + ₹ 0 × 0.30 = ₹70
Expected Rate of Return $=\frac{70-35.71}{35.71} \times 100 = 96.02\%$

SOLUTION 6

Applying the Black Scholes Formula, Value of the Call option now:
The Formula Value of option = $V_S\, N(d_1) - \frac{E}{e^{rt}}\, N(d_2)$

$$d_1 = \frac{In(S/E) + \left(r + \frac{\sigma^2}{2}\right)t}{\sigma\sqrt{t}}$$

$d_2 = d_1 - \sigma\sqrt{t}$
Where,
C = Theoretical call premium
S = Current stock price
t = time until option expiration
K = option striking price
r = risk-free interest rate
N = Cumulative standard normal distribution e = exponential term
σ = Standard deviation of continuously compounded annual return.
In = natural logarithim
d1

$$= \frac{In(1.0667) + (0.12 + 0.08)0.50}{0.40\sqrt{0.50}}$$

$= \frac{0.0646+0.20\times0.50}{040\times0.7071}$
$= \frac{0.1646}{0.2828}$
= 0.5820
d2 = 0.5820 – 0.2828 = 0.2992
N(d1) = N (0.5820)=0.7197
N(d2) = N (0.2992)=0.6176
C= $V_S\, N(d_1) - \frac{E}{e^{rt}}\, N(d_2)$
= 80 x 0.7197 - $\frac{75}{1.062}$×0.6176
= 57.57 – 70.62 x 0.6176
= 57.57 – 43.61
= ₹13.96
Teaching Notes:
Students may please note following important point:
Values of N(d1) and N(d2) have been computed by interpolating the values of areas under respective numbers of SD from Mean (Z) given in the question.
It may also be possible that in question paper areas under Z may be mentioned otherwise e.g. Cumulative Area or Area under Two tails. In such situation the areas of the respective Zs given in the question will be as follows:
Cumulative Area

Number of S.D. from Mean, (z)	Cumulative Area
0.25	0.5987
0.30	0.6179

0.55	0.7088
0.60	0.7257

Two tail area

Number of S.D. from Mean, (z)	Area of the left and right (two tail)
0.25	0.8026
0.30	0.7642
0.55	0.5823
0.60	0.5485

Foreign Exchange Exposure & Risk Management

Study Session 8

SOLUTION 1

2 year Forward Rate will be calculated as follows: $F = Se^{(r_{uk} - r_{us})t}$

Where F = Forward Rate
S = Spot Rate
r_{UK} = Risk Free Rate in UK
r_{US} = Risk Free Rate in US
t = Time

Accordingly,
F = $0.75e^{(0.05 - 0.08)2}$
= 0.75 x 0.9418
= 0.7064

Thus,
1 US $ = £ 0.7064
If forward rate is 1 US $ = 0.85£ then an arbitrage opportunity exists. Take following steps.
a) Should borrow UK £
b) Buy US $
c) Enter into a short forward contract on US $ Accordingly,
The riskless profit would be
a) Say borrow £ 0.7064e-(0.05)(2) = £ 0.6392 and invest in UK for 2 yea₹
b) Now buy US $ at US $ 1e-(0.08)2 = US $ 0.8521, so that after two year it can be used to close out the position.
c) After two year the investment in US $ will become US $ 0.8521 e(0.08)(2) = US $ 0.8521 x 1.1735 =
1 US $
d) Sell this US $ for £ 0.85 and repay loan of £ 0.6392 along with interest i.e £ 0.7064. Thus arbitrage profit will be UK£ 0.85 – UK£ 0.7064 = UK£ 0.1436 say UK£ 0.144

SOLUTION 2

(a) On 28th February 2019 bank would purchase form the exporter US$ 200000 at the agreed rate i.e. ₹ 71.50/$. However, bank will charge for this early delivery consisting of Swap Difference and Interest on outlay of funds.

(i) Swap Difference

Bank sells at	₹ 71.20
It buys at	₹ 71.35
Swap loss per US$	₹ 0.15

Swap loss for $ 200000 is ₹ 30,000

(ii) Interest on Outlay of funds

On February Bank sell $ in Market	₹ 71.20
Bank buys from customer	₹ 71.50
Outlay per US $	₹ 0.30
Outlay of funds for US$ 200000	₹ 60,000

Interest of outlay of funds on ₹ 60,000 for 31 days (1st March 2019 to 31st March 2019) at 15% p.a. i.e. ₹ 764

(iii) Charges for early delivery

Swap Loss	₹ 30,000
Interest on Outlay of Funds	₹ 764
	₹ 30,764

(iv) Net Inflow to Global Ltd.

Proceed of US $ 200000@₹ 71.50	₹ 1,43,00,000
Less: Charges for early delivery	₹ 30,764
Net Inflow	₹ 1,42,69,236

SOLUTION 3

In each of the case first the FEADI Rule of Automatic Cancellation shall be applied and customer shall pay the charges consisted of following:

(a) Exchange Difference
(b) Swap Loss
(c) Interest on Outlay Funds

(a) Exchange Difference

(1) Cancellation Rate:

The forward sale contract shall be cancelled at Spot TT Purchase for $ prevailing on the date of cancellation as follows:

$/ ₹ Market Buying Rate	₹ 65.9600
Less: Exchange Margin @ 0.10%	₹ 0.0660
	₹ 65.8940

Rounded off to ₹ 65.8950

(2) Amount payable on $ 50,000

Bank sells $50,000 @ ₹ 66.8400	₹ 33,42,000
Bank buys $50,000 @ ₹ 65.8950	₹ 32,94,750
Amount payable by customer	**₹ 47,250**

(b) Swap Loss

On 10th September the bank does a swap sale of $ at market buying rate of ₹ 66.1500 and forward purchase for September at market selling rate of ₹ 66.3200.

Bank buys at	₹ 66.3200
Bank sells at	₹ 66.1500
Amount payable by customer	**₹ 0.1700**

Swap Loss for $ 50,000 in ₹ = ₹ 8,500

(c) Interest on Outlay of Funds

On 10thSeptember, the bank receives delivery under cover contract at ₹ 66.6800 and sell spot at ₹ 66.1500.

Bank buys at	₹ 66.6800
Bank sells at	₹ 66.1500
Amount payable by customer	**₹ 0.5300**

Outlay for $ 50,000 in ₹ 26,500

Interest on ₹ 26,500 @ 12% for 10 days ₹ 87

(d) Total Cost

Cancellation Charges	₹ 47,250.00
Swap Loss	₹ 8,500.00
Interest	₹ 87.00
	₹ 55,837.00

(e) New Contract Rate

The contract will be extended at current rate

$/ ₹ Market forward selling Rate for November	₹ 66.4900
Add: Exchange Margin @ 0.10%	₹ 0.0665
	₹ 66.5565

Rounded off to ₹ 66.5575

(i) Charges for Cancellation of Contract = ₹ 55,838.00 or ₹ 55,837.00

(ii) Charges for Execution of Contract

Charges for Cancellation of Contract	₹ 55,837.00
Spot Selling US$ 50,000 on 20th September at ₹ 65.9900 + 0.0660 (Exchange Margin) = ₹ 66.0560 rounded to ₹ 66.0550	₹ 33,02,750.00
	₹ 33,58,587.00

(iii) Charges for Extension of Contract

Charges for Cancellation of Contract	₹ 55837
New Forward Rate	₹ 66.5575

SOLUTION 4

(A) To cover payable and receivable in forward Market

Amount payable after 3 months	$7,00,000
Forward Rate	₹ 48.45
Thus Payable Amount (₹) (A)	₹3,39,15,000
Amount receivable after 2 months	$ 4,50,000
Forward Rate	₹ 48.90
Thus Receivable Amount (₹) (B)	₹2,20,05,000
Interest @ 12% p.a. for 1 month (C)	₹2,20,050
Net Amount Payable in (₹) (A) – (B) – (C)	₹1,16,89,950

(B) Assuming that since the forward contract for receivable was already booked it shall be cancelled if we lag the receivables. Accordingly any profit/ loss on cancellation of contract shall also be calculated and shall be adjusted as follows:

Amount Payable ($)	$7,00,000
Amount receivable after 3 months	$4,50,000
Net Amount payable	$2,50,000
Applicable Rate	₹ 48.45
Amount payable in (₹) (A)	₹ 1,21,12,500

Profit on cancellation of Forward cost (48.90 – 48.30) × 4,50,000 (B) ₹2,70,000

Thus net amount payable in (₹) (A) + (B) = ₹ 1,18,42,500

Since net payable amount is least in case of first option, hence the company should cover payable and receivables in forward market.

Note: In the question it has not been clearly mentioned that whether quotes given for 2 and 3 months (in points terms) are premium points or direct quotes. Although above solution is based on the assumption that these are direct quotes, but students can also consider them as premium points and solve the question accordingly.

SOLUTION 5

Since the direct quote for ¥ and ₹ is not available it will be calculated by cross exchange rate as follows:

₹/$ x $/¥	= ₹/¥
62.22/102.34 = 0.6080	
Spot rate on date of export 1¥	= ₹ 0.6080
Expected Rate of ¥ for August 2014	= ₹ 0.5242 (₹ 65/¥124)
Forward Rate of ¥ for August 2014	= ₹ 0.6026 (₹ 66.50/¥110.35)

(i) Calculation of expected loss without hedging

Value of export at the time of export (₹ 0.6080 x ¥10,000,000)	₹ 60,80,000
Estimated payment to be received on Aug. 2014 (₹ 0.5242 x ¥10,000,000)	₹ 52,42,000
Loss	₹ 8,38,000

Hedging of loss under Forward Cover

₹ Value of export at the time of export (₹ 0.6080 x ¥10,000,000) Payment to be received under Forward Cover (₹ 0.6026 x ¥10,000,000)	₹ 60,80,000
Loss	₹ 60,26,000
	₹ 54,000

By taking forward cover loss is reduced to ₹ 54,000.

(ii) Actual Rate of ¥ on August 2014 = ₹ 0.5977 (₹ 66.25/¥110.85)

Value of export at the time of export (₹ 0.6080 x ¥10,000,000) Estimated payment to be received on Aug. 2014 (₹ 0.5977 x ¥10,000,000)	₹ 60,80,000
Loss	₹ 59,77,00
	₹ 1,03,000

The decision to take forward cover is still justified.

SOLUTION 6

(i) To Buy 1 Million GBP Spot against CHF
First to Buy USD against CHF at the cheaper rate i.e. from Bank A. 1 USD = CHF 1.4655
Then to Buy GBP against USD at a cheaper rate i.e. from Bank B 1 GBP=USD 1.7650 By applying chain rule Buying rate would be
1 GBP = 1.7650 * 1.4655 CHF
1 GBP = CHF 2.5866
Amount payable CHF 2.5866 Million or CHF 25,86,600

(ii) Spot rate Bid rate GBP 1 = CHF 1.4650 * 1.7645 = CHF 2.5850
Offer rate GBP 1 = CHF 1.4655 * 1.7660 = CHF 2.5881
GBP / USD 3 months swap points are at discount
Outright 3 Months forward rate GBP 1 = USD 1.7620 / 1.7640
USD / CHF 3 months swap points are at premium
Outright 3 Months forward rate USD 1 = CHF 1.4655 / 1.4665
Hence
Spot rate GBP 1 = CHF 2.5850 / 2.5881
Therefore 3 month swap points are at discount of 28/12.

SOLUTION 7

(i) If investment is made at London

Convert US$ 5,00,000 at Spot Rate (5,00,000/1.5390)	£ 3,24,886
Add: £ Interest for 3 months on £ 324,886 @ 5%	£ 4,061
	£ 3,28,947
Less: Amount Invested	$ 5,00,000
Interest accrued thereon	$5,000
	$ 5,05,000
Equivalent amount of £ required to pay the above sum ($ 5,05,000/1.5430)	£ 3,27,285
Arbitrage Profit	£ 1,662

(ii) If investment is made at New York

Gain $ 5,00,000 (8% - 4%) x 3/12	$5,000
Equivalent amount in £ 3 months ($ 5,000/ 1.5475)	£ 3,231

(iii) If investment is made at Frankfurt

Convert US$ 500,000 at Spot Rate (Cross Rate) 1.8260/1.5390	€ 1.19
Euro equivalent US$ 500,000	€ 5,93,250
Add: Interest for 3 months @ 3%	€ 4,449
	€ 5,97,699
3 month Forward Rate of selling € (1/1.8150)	£ 0.5510
Sell € in Forward Market € 5,97,699 x £ 0.5510	£ 3,29,332
Less: Amounted invested and interest thereon	£ 3,27,285
Arbitrage Profit	£ 2,047

Since out of three options the maximum profit is in case investment is made in New York. Hence it should be opted.

SOLUTION 8

(i)	Receipts using a forward contract (3,00,000/0.0147)	= ₹ 2,04,08,163
(ii)	Receipts using currency futures	
	The number of contracts needed is (3,00,000/0.0151)/6,40,000 = 31.04 say 31	
	Initial margin payable is 31 x ₹ 24,000 = ₹ 7,44,000	
	On July 1 Close at 0.0147	
	Receipts = US$3,00,000/0.0146	= ₹ 2,05,47,945
	Variation Margin = [(0.0151 – 0.0147) x 31 x 640000/-]/0.0146	
	OR (0.0004x31x 640000)/0.0146 = 7936/0.0146	5,43,562
		2,10,91,507
	Less: Interest Cost – 7,44,000 x 0.085 x 3/12	15,810
	Net Receipts	₹ 2,10,75,697
iii)	No hedge	
	US$ 3,00,000/0.0146	₹ 2,05,47,945

The most advantageous option would have been to hedge with futures.

SOLUION 9

In the given case, the exchange rates are indirect. These can be converted into direct rates as follows:

Spot rate

1 USD = $\frac{1}{1.5673}$ GBP ---- $\frac{1}{1.5617}$ GBP

1 USD = GBP 0.63804 ---- GBP 0.64033

6 months' forward rate

1 USD = $\frac{1}{1.5609}$ GBP ---- $\frac{1}{1.5455}$ GBP

1 USD = GBP 0.64066 ---- GBP 0.64704

Payoff in 3 alternatives

(i) Forward Cover

Amount payable	USD 3,64,897
Forward rate	GBP 0.64704
Payable in	GBP 2,36,103

(ii) Money market Cover

Amount payable	USD 3,64,897
PV @ 4.5% for 6 months i.e $\frac{1}{1.0225}$ = 0.9779951	USD 3,56,867
Spot rate purchase	GBP 0.64033
Borrow GBP 3,56,867 × 0.64033	GBP 2,28,512
Interest for 6 months @ 7 %	GBP 7,998
Payable after 6 months	GBP 2,36,510

(iii) Currency options

Amount payable	USD 3,64,897
Unit in Options contract	GBP 12,500
Value in USD at strike rate of 1.70 (GBP 12,500 × 1.70)	USD 21,250
Number of contracts USD 3,64,897/ USD 21,250	17.17
Exposure covered USD 21,250 × 17	USD 3,61,250
Exposure to be covered by Forward (USD 3,64,897 - USD 3,61,250)	USD 3,647
Options premium 17 × GBP 12,500 × 0.096	USD 20,400
Premium in GBP (USD 20,400 × 0.64033)	GBP 13,063
Total payment in currency option	
Payment under option (17 × 12,500)	GBP 2,12,500
Premium payable	GBP 13,063
Payment for forward cover (USD 3,647 × 0.64704)	GBP 2,360
	GBP 2,27,923

Thus total payment in:

(i)	Forward Cover	2,36,103 GBP
(ii)	Money Market	2,36,510 GBP
(iii)	Currency Option	2,27,923 GBP

The company should take currency option for hedging the risk.

SOLUTION 10

(i) Return of a US Investor

$= \frac{\text{Ending Price} - \text{Initial Price}}{\text{Initial Price}} \times 100$

$= \frac{1919-2028}{2028} \times 100 = -5.37\%$

(ii) Return of Mr. X

Initial Investment (₹)	1.58 Crore
Applicable Exchange Rate on 1.1.20x1	₹ 62.25
Equivalent US$	US$ 2,53,815.26
Purchase Price of Standard & Poor Index	2028
No. of Standard & Poor Indices Purchased	125.16
Ending Price of Standard & Poor Index	1919
Proceeds realised in US$ on sale of Standard & Poor Index	US$ 2,40,182.04
Applicable Exchange Rate on 1.1.20x2	₹ 67.25
Proceeds realised in INR on sale of Standard & Poor Index	₹ 1,61,52,242
Rate of Return $\left(\frac{16152242-15800000}{15800000} \times 100\right)$	2.23%

(iii) Rate of Return had the amount been invested in India

Initial Investment (₹)	1.58 Crore
Purchase Price of Indian Index	7395
No. of Standard & Poor Indices Purchased	2136.58
Let Ending Price of Indian Index	X
Then to be indifferent with return in International Market	$\frac{2136.58 \times X - 1.58}{1.58} \times 100 = 2.23$
Price of Indian Index to be indifferent	7559.90 say 7560

SOLUTION 11

Net Cost under each of the Options is as follows:

(i) Loan from German Bank Cost = 5% + 0.25% = 5.25%

(ii) Loan from US Parent Bank

Effective Rate of Interest $\left(\frac{4}{1-0.08}\right)$	4.35%
Premium on US$ $\left(\frac{1.05}{1.04} - 1\right)$	0.96%

Net Cost	5.31%

(iii) Loan from Swiss Bank

Effective Rate of Interest $\left(\frac{3}{1-0.08}\right)$	3.26%
Premium on US$ $\left(\frac{1.05}{1.03}-1\right)$	1.94%
Net Cost	5.20%

Thus, loan from Swiss Bank is the best option as the Total Outflow including Interest is Less i.e. €105200

SOLUTION 12

Exchange Position:

Particulars	Purchase Sw. Fcs.	Sale Sw. Fcs.
Opening Balance Overbought	50,000	
Bill on Zurich	80,000	
Forward Sales – TT		60,000
Cancellation of Forward Contract		30,000
TT Sales		75,000
Draft on Zurich cancelled	30,000	—
	1,60,000	1,65,000
Closing Balance Oversold	5,000	—
	1,65,000	1,65,000

Cash Position (Nostro A/c)

	Credit	Debit
Opening balance credit	1,00,000	—
TT sales	—	75,000
	1,00,000	75,000
Closing balance (credit)	—	25,000
	1,00,000	1,00,000

The Bank has to buy spot TT Sw. Fcs. 5,000 to increase the balance in Nostro account to Sw. Fcs. 30,000.

This would bring down the oversold position on Sw. Fcs. as Nil.

Since the bank requires an overbought position of Sw. Fcs. 10,000, it has to buy forward Sw. Fcs. 10,000.

SOLUTION 13

(i) Calculation of Overall Cost

Upfront Fee (GBP 10 M @ 1.20%) ₹ 1,20,000

Interest Payment (GBP 10 M x 3.55% x 3.4) ₹ 12,07,000

Hedging Cost (GBP 10 M x 4% x 3.4) ₹ 13,60,000

Total ₹ 26,87,000

Or ₹ 2.687 million

Overall cost in % terms on Annual Basis $= \frac{2.687\text{million}}{1,00,00,000-1,20,000} \times \frac{1}{3.4}$

$= \frac{2.687}{9.88} \times \frac{1}{3.4} \times 100$

$= 8\%$

Overall Cost in Rupee terms@ GBP 1 = ₹ 90 x $\frac{2.687}{9.88}$ x 100 =₹ 711.26 lakhs

OR

Overall cost in % terms on Annual Basis $= \frac{2.687\text{million}}{1,00,00,000} \times \frac{1}{3.4}$

$= \frac{2.687}{1.00} \times \frac{1}{3.4} \times 100$

$= 7.9\%$

Overall Cost in Rupee terms@ GBP 1 = 10,000,000 X 7.90% X 90
= ₹ 71,100,000

OR

Calculation of overall cost

Interest & Margin	(A)	= 3.55%
Hedging cost	(B)	= 4%
		7.55%
Onetime fee		= 1.20%
Average loan maturity		= 3.4 years
Per annum cost 1.2/3.4	(C)	= 0.35%
Annual overall cost in % terms (A+B+C)		= 7.9%

Overall Cost in Rupee terms@ GBP 1 = 10,000,000 X 7.90% X 90
= ₹ 71,100,000

(ii) Cost of Hedging in terms of Rupees
₹ 13,60,000 x 90 = ₹ 12,24,00,000 = ₹ 12.24 crores in Total
OR
GBP10,000,000 X 90 X 4% = ₹ 3,60,00,000 on Annual Basis

(iii) If K Ltd. pursues an aggressive approach then Gain/Loss in INR Depreciation/ Appreciation shall be computed as follows:

(a) If INR depreciates by 10%

Re. loss per GBP = 90 x 10%	= ₹ 9
Total Losses GBP10M	= ₹ 90 Million
Less: Cost of Hedging	= ₹ 36 Million
Net Loss	= ₹ 54 million

(b) If INR appreciates by 10%

₹ Gains per GBP = ₹ 90 x 10%	= ₹ 9
Total Gain on Repayment of loan	= 90 Million
Add: Saving in Cost of Hedging	= 36 Million
Net Gain	= 126 Million

SOLUTION 14

(i) Do Nothing

We shall compute the cross rates in Spot Market on both days and shall compare the amount payable in INR on these two days.

On 1st February 2020

Rupee – Dollar selling rate	= ₹ 75.50
Dollar – SKW	= SKW 1190.00
Rupee – SKW cross rate	= ₹ 75.50 / 1190.00
	= ₹ 0.0634

Amount payable to Importer as per above rate (1190 Million x ₹ 0.0634) ₹ 754.4600 Lakh On 1st March 2020

Rupee – Dollar selling rate	= ₹ 75.75
Dollar – SKW	= SKW 1188.00
Rupee – SKW cross rate	= ₹ 75.75 / 1188.00
	= ₹ 0.0638

Amount payable to Importer as per above rate (1190 Million x ₹ 0.0638) ₹ 759.2200 Lakh Thus, Exchange Rate Loss = (₹ 759.2200 Lakh - ₹ 754.4600 Lakh) ₹ 4.7600 Lakh

(ii) Hedging in NDF

Since company needs SKW after one month it will take long position in SKW at quoted rate of SKW 1190/ USD and after one-month it will reverse its position at fixing rate of SKW 1187/USD. The profit/ loss position will be as follows:

Buy SKW 1190 Million and sell USD (1190 Million/ 1190)	USD 1,000,000
Sell SKW 1190 Million and buy USD at Fixing Rate (1190 Million/1185)	USD 1,004,219
Profit	USD 4,219

Final Position

Amount Payable in Spot Market (as computed earlier)	₹ 759.2200 Lakh
Less : Profit from NDF Market USD 4219 × 75.50	₹ 3.1853 Lakh
	₹ 756.0347 Lakh

Thus, Exchange Rate Loss = (₹ 756.0347 Lakh - ₹ 754.4600 Lakh) ₹ 1.5747 Lakh

Decision: Since Exchange Loss is less in case of NDF same can be opted for.

SOLUTION 15

(i) Nominal rate of return to the US investor

Size of investment ($)	20,00,000
Size of investment (₹) ($ 20,00,000 x 42.50)	8,50,00,000
Sensex at To	3,256
No. of units of Sensex that can be purchased at To	
(₹ 8,50,00,000/3,256)	26,105
Sensex at T1	3,765
Sale of Sensex (26,105 x 3,765)	9,82,85,325
US$ at T1	₹ 43.90
Equivalent Amount in US$	22,38,846
Gain in US$	2,38,846
Nominal rate to US investor	11.94%

(ii) Real Appreciation/Depreciation of Rupee

Real Exchange Rate (Buying) = $43.85 \frac{1+0.05}{1+0.09} = 42.24$

Real Appreciation of ₹ = $\frac{42.50-42.24}{42.50} \times 100 = 0.61\%$

(iii) Exchange rate if relevant purchasing power parity holds

Buying Rate = $42.50 \frac{1+0.09}{1+0.05} = 44.12$

Selling rate = $42.60 \frac{1+0.09}{1+0.05} = 44.22$

Exchange rate = 44.12/44.22

(iv) Real return to Indian Investor in Sensex

Nominal Return = $\frac{3765-3256}{3256} \times 100 = 15.63\%$

Real return = $\frac{1.1563}{1.09} - 1 = 0.0608$ or 6.08%

SOLUTION 16

(i) Transit and usance period is 80 days. It will be rounded off to the lower of months and @ months forward bid rate is to be taken

₹/USD	₹ 67.8000
Add: Premium for 2 months	₹ 0.2100
	₹ 68.0100
Less: Exchange margin @ 0.1%	₹ 0.0680
Bid rate for USD	₹ 67.9420
USD/EUR	USD 1.0775
Add: Premium	USD 0.0040
	USD 1.0815
₹/EUR Rate (67.942 x 1.0815)	₹ 73.4793
Amount of Export Bill	EUR 5,00,000
Less: EEFC	EUR 2,50,000
	EUR 2,50,000
Exchange Rate	₹ 73.4793

(ii) Cash Inflow ₹ 1,83,69,825

(iii) Interest for 80 days @ 8% ₹ 3,22,101

SOLUTION 17

Amount realized on selling Danish Kroner 10,00,000 at ₹ 6.5150 per Kroner = ₹ 65,15,000.

Cover at London:

Bank buys Danish Kroner at London at the market selling rate.

Pound sterling required for the purchase (DKK 10,00,000÷DKK 11.4200) = GBP 87,565.67

Bank buys locally GBP 87,565.67 for the above purchase at the market selling rate of ₹ 74.3200.

The rupee cost will be = ₹ 65,07,88

Profit (₹ 65,15,000 - ₹ 65,07,881) = ₹ 7,119

Cover at New York:

Bank buys Kroners at New York at the market selling rate.

Dollars required for the purchase of Danish Kroner (DKK10,00,000 ÷ 7.5670) = USD 1,32,152.77

Bank buys locally USD 1,32,152.77 for the above purchase at the market selling rate of ₹ 49.2625.

The rupee cost will be = ₹ 65,10,176.

Profit (₹ 65,15,000 - ₹ 65,10,176) = ₹ 4,824

The transaction would be covered through London which gets the maximum profit of ₹ 7,119 or lower cover cost at London Market by (₹ 65,10,176 - ₹ 65,07,881) = ₹ 2,295

SOLUTION 18

Forward Rate $= \frac{2.50(1+0.075)}{1+0.060}$ = Can$ 2.535/£

(i) If spot rate decline by 2%

Spot Rate = Can$ 2.50 x 1.02 = Can$ 2.55/£

	£
£ receipt as per Forward Rate (Can $ 5,00,000/ Can$ 2.535)	1,97,239
£ receipt as per Spot Rate (Can $ 5,00,000/ Can$ 2.55)	1,96,078
Gain due to forward contract	1,161

(ii) If spot rate gains by 4%

Spot Rate = Can$ 2.50 x 0.96 = Can$ 2.40/£

	£
£ receipt as per Forward Rate (Can $ 5,00,000/ Can$ 2.535)	1,97,239
£ receipt as per Spot Rate (Can $ 5,00,000/ Can$ 2.40)	2,08,333
Loss due to forward contract	11,094

(iii) If spot rate remains unchanged

	£
£ receipt as per Forward Rate (Can $ 5,00,000/ Can$ 2.535)	1,97,239
£ receipt as per Spot Rate (Can $ 5,00,000/ Can$ 2.50)	2,00,000
Loss due to forward contract	2,761

SOLUTION 19

USD/ ₹ on 3rd September	49.3800
Swap Point for October	0.1300
	49.5100
Add: Exchange Margin	0.0500
	49.5600
USD/ SGD on 3rd September	1.7058
Swap Point for 2nd month Forward	0.0096
	1.7154

Cross Rate for SGD/ ₹ of 30th October

USD/ ₹ selling rate = ₹ 49.5600

SGD/ ₹ buying rate = SGD 1.7154

SGD/ ₹ cross rate = ₹ 49.5600 / 1.7154

= ₹ 28.8912

Interest Rate Risk Management

Study Session 9

SOLUTION 1

1. 3 Months Interest rate is 4.50% & 6 Months Interest rate is 5% p.a.

Future Value 6 Months from now is a product of Future Value 3 Months now & 3 Months Future Value from after 3 Months.

$(1+0.05*6/12) = (1+0.045*3/12) \times (1+i\ i3,6\ *3/12)$

$i3,6 = [(1+0.05*\ 6/12)\ /(1+0.045\ \ \ *3/12) - 1]\ *12/3$

i.e. 5.44% p.a.

2. 6 Months Interest rate is 5% p.a & 12 Month interest rate is 6.5% p.a.

Future value 12month from now is a product of Future value 6 Months from now and 6 Months Future value from after 6 Months.

$(1+0.065) = (1+0.05*6/12) \times (1+\ i6,6\ *6/12)$

$i6,6 = [(1+0.065/1.025) - 1]\ *12/6$

6 Months forward 6 month rate is 7.80% p.a.

The Bank is quoting 6/12 USD FRA at 6.50 – 6.75%

Therefore, there is an arbitrage Opportunity of earning interest @ 7.80% p.a. & Paying @ 6.75%

Borrow for 6 months, buy an FRA & invest for 12 months

To get	$ 1.065 at the end of 12 months for $ 1 invested today
To pay	$ 1.060# at the end of 12 months for every $ 1 Borrowed today
Net gain	$ 0.005 i.e. risk less profit for every $ borrowed

(1+0.05/2) (1+.0675/2) = (1.05959) say 1.060

SOLUTION 2

(i) If company borrows in $ then outflow would be as follows:

Let company borrows $ 100	$100.00
Add: Interest for 6 months @ 5.5%	$2.75
Amount Repayable after 6 months	$102.75
Applicable 6 month forward rate	36.4
Amount of Cash outflow in Indian Rupees	₹ 3,740.10

If company borrows equivalent amount in Indian Rupee, then outflow would be as follows:

Equivalent ₹ amount ₹ 36.10 x 100	₹ 3,610.00
Add: Interest @11.50%	₹ 207.58
Amount of Cash outflow in Indian Rupees	₹ 3817.58

Since cash outflow is more in ₹ borrowing then borrowing should be made in $.

(ii) (a) Let 'Ir' be the interest rate of ₹ borrowing make indifferent between 3 months borrowings and 6 months borrowing then

$(1 + 0.03)(1 + Ir) = (1 + 0.0575)$

Ir = 2.67% or 10.68% (on annualized basis)

(b) Let 'id' be the interest rate of $ borrowing after 3 months to make indifference between 3 months borrowings and 6 months borrowings. Then,

$(1 + 0.015)(1 + id) = (1 + 0.0275)$

id = 1.232% or 4.93% (on annualized basis)

SOLUTION 3

Opportunity gain of A Inc under currency swap	Receipt	Payment	Net
Interest to be remitted to B. Inc in			
$ 2,00,000x9%=$18,000		¥21,60,000	
Converted into ($18,000x¥120)			
Interest to be received from B. Inc in $	¥14,40,000	-	
converted into Y (6%x$2,00,000 x ¥120)			
Interest payable on Y loan	-	¥12,00,000	
	¥14,40,000	¥33,60,000	
Net Payment	¥19,20,000	-	
	¥33,60,000	¥33,60,000	
$ equivalent paid ¥19,20,000 x(1/¥120)			$16,000
Interest payable without swap in $			$18,000
Opportunity gain in $			$ 2,000
Opportunity gain of B inc under currency swap	**Receipt**	**Payment**	**Net**
Interest to be remitted to A. Inc in ($ 2,00,000 x 6%)		$12,000	
Interest to be received from A. Inc in Y converted into	$18,000		
$ =¥21,60,000/¥120			
Interest payable on $ loan@10%	-	$20,000	
	$18,000	$32,000	
Net Payment	$14,000	-	
	$32,000	$32,000	
Y equivalent paid $14,000 X ¥120			¥16,80,000
Interest payable without swap in ¥ ($2,00,000X¥120X8%)			¥19,20,000
Opportunity gain in Y			¥ 2,40,000

Alternative Solution

Cash Flows of A Inc

(i) At the time of exchange of principal amount

Transactions		Cash Flows
Borrowings	$2,00,000 x ¥120	+ ¥240,00,000
Swap		- ¥240,00,000
Swap		+$2,00,000
Net Amount		+$2,00,000

(ii) At the time of exchange of principal amount

Transactions		Cash Flows
Interest to the lender	¥240,00,000X5%	¥12,00,000
Interest Receipt from B Inc.	¥2,00,000X120X6%	¥14,40,000
Net Saving (in $)	¥2,40,000/¥120	$2,000
Interest to B Inc.	$2,00,000X9%	-$18,000
Net Interest Cost		-$16,000

A Inc. used $2,00,000 at the net cost of borrowing of $16,000 i.e. 8%. If it had not opted for swap agreement the borrowing cost would have been 9%. Thus there is saving of 1%.

Cash Flows of B Inc

(i) At the time of exchange of principal amount

Transactions		Cash Flows
Borrowings		+ $2,00,000
Swap		- $2,00,000
Swap	$2,00,000X¥120	+¥240,00,000
Net Amount		+¥240,00,000

(ii) At the time of exchange of principal amount

Transactions		Cash Flows
Interest to the lender	$2,00,000X10%	- $20,000
Interest Receipt from A Inc.		+$18,000
Net Saving (in ¥)	-$2,000X¥120	- ¥2,40,000
Interest to A Inc.	$2,00,000X6%X¥120	- ¥14,40,000
Net Interest Cost		- ¥16,80,000

B Inc. used ¥240,00,000 at the net cost of borrowing of ¥16,80,000 i.e. 7%. If it had not opted for swap agreement the borrowing cost would have been 8%. Thus there is saving of 1%.

SOLUTION 4

(a) The pay-off of each leg shall be computed as follows:

Cap Receipt

Max {0, [Notional principal x (LIBOR on Reset date – Cap Strike Rate) x $\frac{\text{Number of days in the settlement period}}{365}$}

Floor Pay-off

Max {0, [Notional principal x (Floor Strike Rate – LIBOR on Reset date) x $\frac{\text{Number of days in the settlement period}}{365}$}

Statement showing effective interest on each re-set date

Reset Date	LIBOR (%)	Days	Interest Payment ($) LIBOR+0.50%	Cap Receipts ($)	Floor Pay-off ($)	Effective Interest
31-12-2013	6.00	184	3,27,671	0	0	3,27,671
30-06-2014	7.50	181	3,96,712	24,795	0	3,71,917
31-12-2014	5.00	184	2,77,260	0	0	2,77,260
30-06-2015	4.00	181	1,98,356	0	0	1,98,356
31-12-2015	3.75	184	1,89,041	0	12,603	2,01,644
30-06-2016	4.25	182	2,36,849	0	0	2,36,849
Total		1096				16,26,094

(b) Average Annual Effective Interest Rate shall be computed as follows:

$\frac{16,26,094}{1,00,00,000} \times \frac{365}{1096} \times 100 = 5.42\%$

SOLUTION 5

Qtrs. (1)	Sensex (2)	Sensex Return (%) (3)	Amount Payable (₹ Crore) (4)	Fixed Return (Receivable) (₹ Crore) (5)	Net (₹ Crore) (5) – (4)
0	21,600	-	-	-	-
1	21,860	1.2037	4.8148	4.6000	- 0.2148
2	21,780	-0.3660	-1.4640	4.6000	6.0640
3	22,080	1.3774	5.5096	4.6000	- 0.9096
4	21,960	-0.5435	-2.1740	4.6000	6.7740

SOLUTION 6

(1) Yield from Investment in Equity Trading Index in Japan

Conversion of GBP 200 million in JPY (148.0002) JPY 29600.04 Million

Dividend Income	JPY	1182.00 Million
Stock Lending	JPY	10.00 Million
Investment Value at End	JPY	29008.0392 Million
Amount available at End	JPY	30200.0392 Million
Forward Rate of 30.06.2019	JPY	150/ GBP
Amount to be Remitted back to London Gain = GBP 201.3336 – GBP 200	GBP GBP	201.3336 Million 1.3336 Million

(2) Fixed Income Desk of US

Conversion of GBP 200 million in USD (1.28000)	USD	256.00 Million
Add: Interest @ 5% p.a. for 6 months	USD	6.40 Million
Amount available at End	USD	262.40 Million
Forward Rate of 30.06.2019	USD	1.30331/ GBP
Amount to be Remitted back to London Gain = GBP 201.3335 – GBP 200	GBP GBP	201.3335 Million 1.3335 Million

Decision:

The equivalent amount at the end of 6 months shall be almost same in both the options. The bank can go for any of the options.

However, from risk perspective, the investment in fixed income desk of US is more beneficial as the chance of variation in fixed income securities is less as compared to Equity Desk.

SOLUTION 7

Though Company IB has an advantage in both the markets but it has comparative more advantage in the INR floating-rate market. Company Zaki has a comparative advantage in the JPY fixed interest rate market.

However, company IB wants to borrow in the JPY fixed interest rate market and company Zaki wants to borrow in the INR floating-rate market. This gives rise to the swap opportunity.

IB raises INR floating rate at BPLR + 0.50% and Zaki raises JPY at 2.25%

Total Potential Gain = (INR interest differential) - (Yen rate differential)

= (BPLR + 2.50% - BPLR + 0.50%) + (2% - 2.25%) = 1.75%

Less Banker's commission (To be shared equally) = 0.25%

Net gain (To be shared equally: 0.75% each) = 1.50%

(i) Yes, a beneficial swap can be arranged

(ii) Effective cost of borrowing = pays to lenders + pays to other party -receives from other party + banker's commission

IB = BPLR + 0.50% +1.125%* - (BPLR + 0.50%) + 0.125% = 1.25%

(* has been arrived as 2% - 0.75% - 0.125%)

Zaki = 2.25% + BPLR + 0.50% - 1.125% + 0.125% = BPLR + 1.75%

Note: Candidates can also present the above Swap arrangement in a different manner. In such case they should be awarded due marks provided solution be ended up in correct answer.

Bond Valuation

Study Session 10

SOLUTION 1

Since the bonds were sold at par, the original YTM was 10%.

YTM = $\frac{\text{Interest}}{\text{Principal}} = \frac{₹\,100}{₹\,1000}$ = 10%

Price of the bond as on 1st July, 2018 = ₹ 50 x 9.712 + ₹ 1,000 x 0.417
= ₹ 485.60 + ₹ 417
= ₹ 902.60

Total value of the bond on the next date = ₹ 902.60 +₹50 interest = ₹952.60

Value of bond at purchase date = ₹ 952.60 x $\frac{1}{(1+0.06)^{2/3}}$
= ₹ 952.60 x 0.9620 (by using excel)
= ₹ 916.40†

The amount to be paid to complete the transaction is ₹916.40. Out of this amount ₹ 16.67 represent accrued interest* and ₹899.73 represent the bond basic value.

† Alternatively, it can also be calculated as follows:

= ₹ 952.60 x $\frac{1}{\left(1+0.06\times\frac{2}{3}\right)}$

= ₹ 952.60 x $\frac{1}{(1+0.04)}$

= ₹ 915.96

The amount to be paid to complete the transaction is ₹915.96. Out of this amount ₹ 16.67 represent accrued interest* and ₹899.29 represent the bond basic value.

* Accrued Interest can also be calculated as follows:

Accrued Interest on Bonds = 1,000 x $\frac{10}{100}$ x $\frac{2}{12}$ = 16.67

SOLUTION 2

(i) Current yield = $\frac{7}{90} \times \frac{12}{6}$ = 0.1555 or 15.55%

YTM can be determined from the following equation

7 × PVIFA (YTM, 10) + 100 × PVIF (YTM, 10) = 90

Let us discount the cash flows using two discount rates 7.50% and 9% as follows:

Year	Cash Flows	PVF@7.50%	PV@7.50%	PVF@9%	PV@9%
0	-90	1	-90	1	-90
1	7	0.930	6.51	0.917	6.419
2	7	0.865	6.055	0.842	5.894
3	7	0.805	5.635	0.772	5.404
4	7	0.749	5.243	0.708	4.956
5	7	0.697	4.879	0.650	4.550
6	7	0.648	4.536	0.596	4.172
7	7	0.603	4.221	0.547	3.829
8	7	0.561	3.927	0.502	3.514
9	7	0.522	3.654	0.460	3.220
10	107	0.485	51.90	0.422	45.154
			6.560		-2.888

Now we use interpolation formula

= 7.50% + $\frac{6.560}{6.560-(-2.888)}$ × 1.50%

7.50% + $\frac{6.560}{9.448}$ ×1.50% =7.50% + 1.041%

YTM = 8.541% say 8.54%

Note: Students can also compute the YTM using rates other than 15% and 18%.

(ii) The duration can be calculated as follows:

Year	Cash Flow	PVF@ 8.54%	PV @ 8.54%	Proportion of NCD value	Proportion of NCD value × time
1	7	0.921	6.447	0.0717	0.0717
2	7	0.849	5.943	0.0661	0.1322
3	7	0.782	5.474	0.0608	0.1824
4	7	0.721	5.047	0.0561	0.2244
5	7	0.664	4.648	0.0517	0.2585
6	7	0.612	4.284	0.0476	0.2856
7	7	0.563	3.941	0.0438	0.3066
8	7	0.519	3.633	0.0404	0.3232
9	7	0.478	3.346	0.0372	0.3348
10	107	0.441	47.187	0.5246	5.2460
			89.95		7.3654

Duration = 7.3654 half years i.e. 3.683 years.

(iii) Realized Yield can be calculated as follows:

$\frac{(7\times10)+100}{(1+R)^{10}} = 90$

$(1+R)^{10} = \frac{170}{90}$

R= $\left(\frac{170}{90}\right)^{1/10}$ -1= 0.06380 or 6.380% for half yearly and 12.76% annually.

SOLUTION 3

1. Conversion Value of Debenture

= Market Price of one Equity Share × Conversion Ratio = ₹ 25 × 30 = ₹ 750

2. Market Conversion Price

$= \frac{Market\ Price\ of\ Convertible\ Debenture}{\text{Conversion Ratio}} = \frac{900}{30} =$ ₹ 30

3. Conversion Premium per share

= Market Conversion Price - Market Price of Equity Share

= ₹ 30 - ₹ 25 = ₹ 5

4. Ratio of Conversion Premium

$= \frac{Conversion\ Premium\ per\ share}{\text{Market Price of Equity Share}} = \frac{5}{25} = 20\%$

5. Premium over Straight Value of Debenture

$= \frac{Market\ Price\ of\ Convertible\ Debenture}{\text{Straight Value of Debenture}} - 1 = \frac{900}{700} - 1 = 28.6\%$

6. Favourable income differential per share

$= \frac{Coupon\ Interest\ from\ Debenture - Conversion\ Ratio \times Dividend\ Per\ Share}{\text{Conversion Ratio}}$

$= \frac{85 - 30 \times 1}{30} =$ ₹ 1.833

7. Premium pay back period

$= \frac{Conversion\ Premium\ per\ Share}{\text{Favorable Income differential per share}} = 5\ 1.833 = 2.73$ Years

SOLUTION 4

1. Calculation of initial outlay:-	₹ (lakhs)
a. Face Value	200.00
Add : Call premium	10.00
Cost of calling old bonds	210.00

b.	Gross proceed of new issue	200.00
	Less : Issue costs	2.50
	Net proceeds of new issue	197.50
c.	Tax savings on call premium and unamortized cost 0.30 (10+3)	₹ 3.90 lakhs
	∴ Initial outlay = ₹210 lakhs - ₹ 197.50 lakhs - ₹ 3.90 lakhs	8.60 lakhs
2.	**Calculation of net present value of refunding the bond:-**	₹ (lakhs)
	Saving in annual interest expenses	
	[₹ 200 x (0.11 - 0.09)]	4.000
	Less:-Tax saving on interest and amortization 0.30 x [4+(3-2.5)/10]	1.215
	Annual net cash saving	2.785
	PVIFA (7%, 10 years)	7.024
	∴ Present value of net annual cash saving	₹ 19.56 lakhs
	Less : Initial outlay	₹ 8.61 lakhs
	Net present value of refunding the bond	₹ 10.96 lakhs

Decision : The bonds should be refunded

SOLUTION 5

i) Forward Rates for year 2 & years 3:

For year 2: $\frac{1}{(1+0.1050)(1+X)} = \frac{1}{(1+0.1125)^2} \rightarrow (1+0.1050)(1+X) = (1+0.1125)2 = 12\%$

For year 3: $\frac{1}{(1+0.1050)(1+0.12)(1+X)} = \frac{1}{(1+.12)^3} \rightarrow (1+.1050)(1+.12)(1+X) = (1+1.12)3$

$\rightarrow X = 13.52\%$

ii) Percentage Change in the Price of the Bond: $B0 = \frac{1000 \times (1+.12)^5}{(1+.125)^5} = 978$

Therefore, % change in the price of the bond $= \frac{978-1000}{1000} \times 100 = -2.2\%$

SOLUTION 6

(a) Calculation of Bond Duration

Bond A

Year	Cash flow	P.V. @ 9%		Proportion of bond value	Proportion of bond value x time (years)
1	10	0.917	9.17	0.086	0.086
2	10	0.842	8.42	0.079	0.158
3	10	0.772	7.72	0.073	0.219
4	10	0.708	7.08	0.067	0.268
5	10	0.650	6.50	0.061	0.305
6	10	0.596	5.96	0.056	0.336
7	10	0.547	5.47	0.051	0.357
8	10	0.502	5.02	0.047	0.376
9	10	0.460	4.60	0.043	0.387
10	110	0.4224	46.46	0.437	4.370
			106.40	1.000	6.862

Duration of the bond is 6.862 years or 6.86 year

Bond B

Year	Cash flow	P.V. @ 9%		Proportion of bond value	Proportion of bond value x time (years)
1	11	0.917	10.087	0.091	0.091
2	11	0.842	9.262	0.083	0.166
3	11	0.772	8.492	0.076	0.228

4	11	0.708	7.788	0.070	0.280
5	11	0.650	7.150	0.064	0.320
6	11	0.596	6.556	0.059	0.354
7	11	0.547	6.017	0.054	0.378
8	111	0.502	55.772	0.502	4.016
			111.224	1.000	5.833

Duration of the bond B is 5.833 years or 5.84 years

Bond C

Year	Cash flow	P.V. @ 9%		Proportion of bond value	Proportion of bond value x time (years)
1	9	0.917	8.253	0.082	0.082
2	9	0.842	7.578	0.076	0.152
3	9	0.772	6.948	0.069	0.207
4	9	0.708	6.372	0.064	0.256
5	109	0.650	70.850	0.709	3.545
			100.00	1.000	4.242

Duration of the bond C is 4.242 years or 4.24 years

(ii) Amount of Investment required in Bond B and C

Period required to be immunized	6.000 Year
Less: Period covered from Bond A	3.087 Year
To be immunized from B and C	2.913 Year

Let proportion of investment in Bond B and C is b and c respectively then

$b + c = 0.55$ (1)

$5.883b + 4.242c = 2.913$ (2)

On solving these equations, the value of b and c comes 0.3534 or 0.3621 and 0.1966 or 0.1879 respectively and accordingly, the % of investment of B and C is 35.34% or 36.21% and 19.66 % or 18.79% respectively.

(iii) With revised yield the Revised Duration of Bond stands

$0.45 \times 7.15 + 0.36 \times 6.03 + 0.19 \times 4.27 = 6.20$ year

No portfolio is not immunized as the duration of the portfolio has been increased from 6 years to 6.20 years.

(iv) New percentage of B and C bonds that are needed to immunize the portfolio.

Period required to be immunized	6.0000 Year
Less: Period covered from Bond A	3.2175 Year
To be immunized from B and C	2.7825 Year

Let proportion of investment in Bond B and C is b and c respectively, then

$b + c = 0.55$

$6.03b + 4.27c = 2.7825$

$b = 0.2466$

On solving these equations, the value of b and c comes 0.2466 and 0.3034 respectively and accordingly, the % of investment of B and C is 24.66% or 25% and 30.34 % or 30.00% respectively.

SOLUTION 7

(i) Current Market Price of Bond

= ₹ 850 (PVIAF 10%, 5) + ₹ 10,000 (PVIF 10%, 5)

= ₹ 850 (3.79) + ₹ 10,000 (0.621) = ₹ 3,221.50 + ₹ 6,210 = ₹ 9,431.5

(ii) Macaulay's Duration

Year	Cash flow	P.V. @ 10%		Proportion of bond value	Proportion of bond value x time (years)
1	850	0.909	772.65	0.082	0.082

2	850	0.826	702.10	0.074	0.148
3	850	0.751	638.35	0.068	0.204
4	850	0.683	580.55	0.062	0.248
5	10,850	0.621	6,737.85	0.714	3.57
			9431.50	1.000	4.252

Duration of the Bond is 4.252 years

(iii) Volatility of Bond

Volatility of Bonds $= \frac{Duration}{(1+YTM)} = \frac{4.252}{1.10} = 3.865$

(iv) Convexity of Bond

C* x $(\Delta y)^2$ x100

$C^* = \frac{V_+ + V_- - 2V_0}{2V_0(\Delta^2)}$

Year	Cash flow		P.V. @ 8%		P.V @12%
1	850	0.926	787.10	0.892	758.20
2	850	0.857	728.45	0.797	677.45
3	850	0.794	674.90	0.712	605.20
4	850	0.735	624.75	0.636	540.60
5	10,850	0.681	7388.85	0.567	6,151.95
			10204.05		8,733.40

$C^* = \frac{10,204.05+8733.40-2\times9431.50}{2\times9431.50\times0.02^2}$

$= \frac{74.45}{7.5452} = 9.867$

Convexity of Bond = 9.867 x 0.02^2x 100 = 0.395%

(v) The expected market price if decrease in YTM by 200 basis points.

(A) By Macaulay's duration-based estimate

= ₹ 9431.50× 2 (3.865/100) = ₹ 729.05

Hence expected market price is ₹ 9431.50 + ₹ 729.05 = ₹ 10,160.55

Hence, the market price will increase.

(B) By Intrinsic Value method

Intrinsic Value at YTM of 10%	₹ 9,431.50
Intrinsic Value at YTM of 8%	₹ 10,204.05
Price increased by	₹ 772.55

Hence, expected market price is ₹ 10,204.05

SOLUTION 8

The XYZ Bank shall choose those CTD (Cheapest-to-Deliver) Bonds from the basket of deliverable Bonds which gives maximum profit computed as follows:

Profit = Future Settlement Price x Conversion Factor – Quoted Spot Price of Deliverable Bond

Accordingly, the profit of each bond shall be computed as follows:

Security (1)	Future Settlement Price (2)	Conversion Factor (3)	(4) = (2) x (3)	Quoted Price of Bonds (5)	Profit (6)
7.96 GOI 2023	1000	1.0370	1037.00	1037.40	- 0.40
6.55 GOI 2025	1000	0.9060	906.00	926.40	- 20.40
6.80 GOI 2029	1000	0.9195	919.50	877.50	42.00
6.85 GOI 2026	1000	0.9643	964.30	972.30	- 8.00
8.44 GOI 2027	1000	1.1734	1173.40	1146.30	27.10
8.85 GOI 2028	1000	1.2428	1242.80	1201.70	41.10

Since maximum profit to the Bank is in case of 6.80 GOI 2029, same should be opted for.

SOLUTION 9

(i) For finding expected market price first we shall calculate PV of Interest + PV of Maturity Value of Bond Intrinsic Value of Bond as follows:

Forward rate of interests

1st Year	12%
2nd Year	11.62%
3rd Year	11.33%
4th Year	11.06%
5th Year	10.80%

PV of interest $= \frac{90}{(1+0.12)^1} + \frac{90}{(1+0.1162)^2} + \frac{90}{(1+0.1133)^3} + \frac{90}{(1+0.1106)^4} + \frac{90}{(1+0.1080)^5}$

= ₹ 90 x 0.8929 + ₹ 90 x 0.8026 + ₹ 90 x 0.7247 + ₹ 90 x 0.6573 + ₹ 90 x 0.5988

= ₹ 80.36 + ₹ 72.23 + ₹ 65.22 + ₹ 59.16 + ₹ 53.89

= ₹ 330.86

PV of Maturity Value of Bond = $\frac{1000}{(1+0.1080)^5}$

= ₹ 1,000 x 0.5988 = ₹ 598.80

Intrinsic value of Bond = ₹ 330.86 + ₹ 598.80 = ₹ 929.66

Expected Price = Intrinsic Value x Beta Value

= ₹ 929.66 x 1.10 = ₹ 1,022.63

(ii) The given yield curve is inverted yield curve.

The main reason for this shape of curve is expectation for forthcoming recession when investors are more interested in Short-term rates over the long term.

Portfolio Management

Study Session 11

SOLUTION 1

(i) Computation of Beta of Portfolio

Investment	No. of shares	Market Price	Market Value	Dividend Yield	Dividend	Composition	β	Weighted β
I.	60,000	4.29	2,57,400	19.50%	50,193	0.2339	1.16	0.27
II.	80,000	2.92	2,33,600	24.00%	56,064	0.2123	2.28	0.48
III.	1,00,000	2.17	2,17,000	17.50%	37,975	0.1972	0.90	0.18
IV.	1,25,000	3.14	3,92,500	26.00%	1,02,050	0.3566	1.50	0.53
			11,00,500		**2,46,282**	**1.0000**		**1.46**

Return of the Portfolio $\frac{2,46,282}{11,00,500} = 0.2238$

Beta of Port Folio 1.46

Market Risk implicit

$0.2238 = 0.11 + \beta \times (0.19 - 0.11)$

Or, $0.08\ \beta + 0.11 = 0.2238$

$\beta = \frac{0.2238 - 0.11}{0.08} = 1.42$

Market β implicit is 1.42 while the port folio β is 1.46. Thus the portfolio is marginally risky compared to the market.

(ii) The decision regarding change of composition may be taken by comparing the dividend yield (given) and the expected return as per CAPM as follows:

Expected return R_S as per CAPM is:

$R_S = I_{RF} + (R_M - I_{RF})\ ß$

For Investment I $R_S = I_{RF} + (R_M - I_{RF})\ ß$

$= .11 + (.19 - .11)\ 1.16$

$= 20.28\%$

For Investment II $R_S = .11 + (.19 - 11)\ 2.28 = 29.24\%$

For Investment III, $R_S = .11 + (.19 - 11)\ .90$

$= 18.20\%$

For Investment IV, $R_S = .11 + (.19 - .11)\ 1.50$

$= 23\%$

Comparison of dividend yield with the expected return Rs shows that the dividend yields of investment I, II and III are less than the corresponding Rs,. So, these investments are over-priced and should be sold by the investor. However, in case of investment IV, the dividend yield is more than the corresponding Rs, so, XYZ Ltd. should increase its proportion.

SOLUTION 2

Working Notes:

(i) Decomposition of Funds in Equity and Cash Components

	D Mutual Fund Ltd.	K Mutual Fund Ltd.
NAV on 31.12.14	₹ 70.71	₹ 62.50
% of Equity	99%	96%
Equity element in NAV	₹ 70	₹ 60
Cash element in NAV	₹ 0.71	₹ 2.50

(ii) Calculation of Beta

(a) D Mutual Fund Ltd.

Sharpe Ratio = 2 $= \frac{E(R) - R_f}{\sigma_D} = \frac{E(R) - R_f}{11.25}$

E(R) - R_f = 22.50

Treynor Ratio = 15 $= \frac{E(R) - R_f}{\beta_D} = \frac{22.50}{\beta_D}$

β_D = 22.50/15= 1.50

(b) K Mutual Fund Ltd.

Sharpe Ratio = 3.3 $= \frac{E(R) - R_f}{\sigma_K} = \frac{E(R) - R_f}{5}$

$E(R) - R_f = 16.50$

Treynor Ratio = 15 $= \frac{E(R) - R_f}{\beta_K} = \frac{16.50}{\beta_K}$

β_K = 16.50/15= 1.10

(iii) Decrease in the Value of Equity

	D Mutual Fund Ltd.	K Mutual Fund Ltd.
Market goes down by	5.00%	5.00%
Beta	1.50	1.10
Equity component goes down	7.50%	5.50%

(iv) Balance of Cash after 1 month

	D Mutual Fund Ltd.	K Mutual Fund Ltd.
Cash in Hand on 31.12.14	₹ 0.71	₹ 2.50
Less: Exp. Per month	₹ 0.25	₹ 0.25
Balance after 1 month	₹ 0.46	₹ 2.25

NAV after 1 month

	D Mutual Fund Ltd.	K Mutual Fund Ltd.
Value of Equity after 1 month		
70 x (1 - 0.075)	₹ 64.75	-
60 x (1 - 0.055)	-	₹ 56.70
Cash Balance	0.46	2.25
	65.21	58.95

SOLUTION 3

(i) Variance of Returns

$Cor_{i,j} = \frac{Cov\,(i,j)}{\sigma_j \sigma_j}$

Accordingly, for MFX

$1 = \frac{Cov\,(X,X)}{\sigma_X \sigma_X}$

$\sigma_X^2 = 4.800$

Accordingly, for MFY

$1 = \frac{Cov\,(Y,Y)}{\sigma_Y \sigma_Y}$

$\sigma_Y^2 = 4.250$

Accordingly, for Market Return

$1 = \frac{Cov\,(M,M)}{M\sigma_M}$

$\sigma_M^2 = 3.100$

(ii) Portfolio return, beta, variance and standard deviation

Weight of MFX in portfolio $= \frac{1,20,000}{2,00,000} = 0.60$

Weight of MFY in portfolio $= \frac{80,000}{2,00,000} = 0.40$

Accordingly Portfolio Return

$0.60 \times 15\% + 0.40 \times 14\% = 14.60\%$

Beta of each Fund

$\beta = \frac{\text{Cov (Fund,Market)}}{\text{Variance of Market}}$

$\beta_X = \frac{3.370}{3.100} = 1.087$

$\beta_Y = \frac{2.800}{3.100} = 0.903$

Portfolio Beta

0.60 x 1.087 + 0.40 x 0.903 = 1.013

Portfolio Variance

$\sigma_{XY}^2 = W_X^2\sigma_X^2 + W_Y^2\sigma_Y^2 + 2w_X w_Y Cov_{X,Y}$

= (0.60)2 (4.800) + (0.40)2 (4.250) + 2(0.60) (0.40) (4.300)

= 4.472

Or Portfolio Standard Deviation

$\sigma_{XY} = \sqrt{4.472} = 2.115$

(iii) Expected Return, Systematic and Unsystematic Risk of Portfolio

Portfolio Return	= 10% + 1.0134(12% - 10%)	= 12.03%		
MF X Return	= 10% + 1.087(12% - 10%)	= 12.17%		
MF Y Return	= 10% + 0.903(12% - 10%)	= 28.06%		
Systematic Risk	= $\beta^2\ \sigma^2$			
Accordingly,				
Systematic Risk of MFX	= (1.087)2 x 3.10	= 3.663		
	Systematic Risk of MFY	= (0.903)2 x 3.10	=	2.528
Systematic Risk of Portfolio	=	(1.013)2 x 3.10	=	3.181
Unsystematic Risk	= Total Risk - Systematic Risk			
Accordingly,				
Unsystematic Risk of MFX	= 4.80 - 3.663	= 1.137		
UnSystematic Risk of MFY	= 4.250 - 2.528	= 1.722		
UnSystematic Risk of Portfolio	=	4.472 - 3.181	=	1.291

(iv) Sharpe and Treynor Ratios and Alpha

Sharpe Ratio

MFX $= \frac{15\%-10\%}{\sqrt{4.800}} = 2.282$

MFY $= \frac{14\%-10\%}{\sqrt{4.250}} = 1.94$

Portfolio $= \frac{14.6\%-10\%}{2.115} = 2.175$

Treynor Ratio

MFX $= \frac{15\%-10\%}{1.087} = 4.60$

MFY = $\frac{14\%-10\%}{0.903}$ = 4.43

Portfolio = $\frac{14.6\%-10\%}{1.0134}$ = 4.54

Alpha

MFX = 15% - 12.17% = 2.83%

MFY = 14% - 11.81% = 2.19%

Portfolio = 14.6% - 12.03% = 2.57%

SOLUTION 4

(i) Mr. X's position in the two securities are +1.50 in security A and -0.5 in security B. Hence the portfolio sensitivities to the two factors:-

b prop. 1 =1.50 x 0.80 + (-0.50 x 1.50) = 0.45

b prop. 2 = 1.50 x 0.60 + (-0.50 x 1.20) = 0.30

(ii) Mr. X's current position:-

Security A ₹ 3,00,000 / ₹ 1,00,000 = 3

Security B -₹ 1,00,000 / ₹ 1,00,000 = -1

Risk free asset -₹ 100000 / ₹ 100000 = -1

b prop. 1 = 3.0 x 0.80 + (-1 x 1.50) + (- 1 x 0) = 0.90

b prop. 2 = 3.0 x 0.60 + (-1 x 1.20) + (-1 x 0) = 0.60

(iii) Expected Return = Risk Free Rate of Return + Risk Premium Let $\lambda 1$ and $\lambda 2$ are the Value Factor 1 and Factor 2 respectively. Accordingly

15 = 10 + 0.80 $\lambda 1$ + 0.60 $\lambda 2$

20 = 10 + 1.50 $\lambda 1$ + 1.20 $\lambda 2$

On solving equation, the value of $\lambda 1$ = 0, and Securities A & B shall be as follows:

Security A

Total Return = 15%

Risk Free Return = 10%

Risk Premium = 5%

Security B

Total Return = 20%

Risk Free Return = 10%

Risk Premium = 10%

SOLUTION 5

(i) Expected Return on X Ltd.'s Share

Average % Annual Capital Gain [197÷ 95] $^{1/4}$ -1 = 0.20 i.e. 20%

Average % dividend yield = $\frac{10\%+12\%+8\%+10\%+10\%}{5}$ = 10%

Therefore, expected return on share of X Ltd. = 20% + 10% = 30%

(ii) Expected Return on Market Index

Average Annual % Capital gain

$[2182 \div 1490]^{1/4}$ - 1 = 0.10 i.e. 10%

Average % of dividend yield = $\frac{16\%+15\%+16\%+10\%+18\%}{5}$ = 15%

Thus, expected return on Market Index = 10% + 15% = 25%

(iii) Return from Central Govt. Securities

$\frac{15\%+15\%+16\%+14\%+15\%}{5}$ = 15%

Thus, Risk Free Rate of Return = R_f = 15%

(iv) Beta Value of X Ltd.

$E(Rx) = R_f + [E(R_m) - R_f]\ \beta_x$

$30 = 15 + [25 - 15]\ \beta_x$

β_x = 1.5 times

SOLUTION 6

Particulars of Securities	Cost ₹	Dividend	Capital gain
Gold Ltd.	10,000	1,725	-200
Silver Ltd.	15,000	1,000	1,200
Bronz Ltd.	14,000	700	6,000
GOI Bonds	36,000	3,600	-1,500
Total	75,000	7,025	5,500

Expected rate of return on market portfolio

$$\frac{\text{Dividend Earned+ Capital appreciation}}{\text{Initial investment}} \times 100$$

$$= \frac{₹\,7,025 + ₹\,5,500}{₹\,75,000} \times 100 = 16.7\%$$

Risk free return

Average of Betas $= \frac{0.6 + 0.8 + 0.6 + 0.01}{4}$

Average of Betas* = 0.50

Average return = Risk free return + Average Betas (Expected return – Risk free return)

15.7 = Risk free return + 0.50 (16.7 – Risk free return)

Risk free return = 14.7%

* Alternatively it can also be calculated through Weighted Average Beta.

Expected Rate of Return for each security is

Rate of Return	= Rf + B (Rm – Rf)	
Gold Ltd.	= 14.7 + 0.6 (16.7 – 14.7)	= 15.90%
Silver Ltd.	= 14.7 + 0.8 (16.7 – 14.7)	= 16.30%
Bronze Ltd.	= 14.7 + 0.6 (16.7 – 14.7)	= 15.90%
GOI Bonds	= 14.7 + 0.01 (16.7 – 14.7)	= 14.72%

* Alternatively it can also be computed by using Weighted Average Method.

SOLUTION 7

Characteristic line is given by

$\alpha + \beta R_m$

$\beta_i = \frac{\sum xy - nxy}{\sum x^2 - n(x)^2}$

$\alpha i = y - \beta_x$

Return on B (Y)	Return on Market (X)	XY	X^2	$(x - \bar{x})$	$(x - \bar{x})^2$	$(y - \bar{y})$	$(y - \bar{y})^2$
10	8	80	64	1.50	2.25	1.50	2.25
12	10	120	100	3.50	12.25	3.50	12.25
9	9	81	81	2.50	6.25	0.50	0.25
3	-1	-3	1	-7.50	56.25	-5.50	30.25
34	26	278	246		77.00		45.00

$Y = {}^{34}/_{4} = 8.50$

$X = {}^{26}/_{4} = 6.50$

$\beta = \frac{\sum xy - nxy}{\sum x^2 - n(x)^2} = \frac{278 - 4(6.50)(8.50)}{246 - 4(6.50)^2} = \frac{278 - 221}{246 - 169}$

$= \frac{57}{77} = 0.74$

$\alpha = y - \beta x = 8.50 - 0.74\ (6.50) = 3.69$

Hence the characteristic line is 3.69 + 0.74 (R_m)

Total Risk of Market = σ m^2 = $\frac{\sum(X-X)^2}{n}$ = $\frac{77}{4}$ = 19.50(%)

Total Risk of Stock = $\frac{45}{4}$ = 11.25 (%)

Systematic Risk = β_i^2 σ_m^2 = $(0.74)^2$ x 19.25 = 10.54(%)

Unsystematic Risk is = Total Risk – Systematic Risk

= 11.25-10.54 = 0.71(%)

SOLUTION 8

Maximum decline in one month = $\frac{5326-4793.40}{5326}$ x 100 = 10%

(1) Immediately to start with

Investment in equity = Multiplier x (Portfolio value – Floor value) = 2 (3,00,000 – 2,70,000) = ₹ 60,000

Indira may invest ₹ 60,000 in equity and balance in risk free securities.

(2) After 10 days

Value of equity	= 60,000 x 5122.96/5326	= ₹ 57,713
Value of risk free investment		= ₹ 2,40,000
Total value of portfolio		= ₹ 2,97,713
Investment in equity = Multiplier x (Portfolio value – Floor value)		
	= 2 (2,97,713 – 2,70,000)	= ₹ 55,426

Revised Portfolio:

Equity	=	₹ 55,426
Risk free Securities = ₹ 2,97,713 – ₹ 55,426	=	₹ 2,42,287

(3) After another 10 days

Value of equity	= 55,426 x 5539.04/5122.96	= ₹59,928
Value of risk free investment		= ₹ 2,42,287
Total value of portfolio		= ₹ 3,02,215
Investment in equity = Multiplier x (Portfolio value – Floor value)		
	= 2 (3,02,215 – 2,70,000)	= ₹ 64,430

Revised Portfolio:

Equity	=	₹ 64,430
Risk Free Securities = ₹ 3,02,215 –₹64,430	=	₹ 2,37,785

The investor should off-load ₹ 4502 of risk free securities and divert to Equity.

SOLUTION 9

(i) Equilibrium price of Equity using CAPM

= 5% + 1.5(11% - 5%)

= 5% + 9%= 14%

P= $\frac{D_1}{K_e-g}$ = $\frac{2.00(1.08)}{0.14-0.08}$ = $\frac{2.16}{0.06}$ = ₹ 36.00

(ii) New Equilibrium price of Equity using CAPM (assuming 3% on 5% is inflation increase)

= 5.15% + 1.3(11% - 5.15%)

= 5.15% + 7.61%= 12.76%

P= $\frac{D_1}{K_e-g}$ = $\frac{2.00(1.05)}{0.1276-0.05}$ = ₹ ₹ 27.06

Alternatively, it can also be computed as follows, assuming it is 3% in addition to 5%

= 8% + 1.3(11% - 8%)

= 8% + 3.9%= 11.9%

P= $\frac{D_1}{K_e-g}$ = $\frac{2.00(1.05)}{0.119-0.05}$ = ₹30.43

Alternatively, if all the factors are taken separately then solution of this part will be as follows:

(i) Inflation Premium increase by 3%.
This raises RX to 17%. Hence, new equilibrium price will be:

$$P = \frac{D_1}{K_e - g} = \frac{2.00(1.08)}{0.17 - 0.08} = ₹\ 24$$

(ii) Expected Growth rate decrease by 3%.
Hence, revised growth rate stand at 5%:

$$P = \frac{D_1}{K_e - g} = \frac{2.00(1.05)}{0.14 - 0.05} = ₹23.33$$

(iii) Beta decreases to 1.3.
Hence, revised cost of equity shall be:
= 5% + 1.3(11% - 5%)
= 5% + 7.8%= 12.8%
As a result New Equilibrium price shall be:

$$P = \frac{D_1}{K_e - g} = \frac{2.00(1.08)}{0.128 - 0.08} = ₹45$$

International Financial Management

Study Session 12

SOLUTION 1

Calculation of NPV

Year	0	1	2	3
Inflation factor in India	1.00	1.10	1.21	1.331
Inflation factor in Africa	1.00	1.40	1.96	2.744
Exchange Rate (as per IRP)	6.00	7.6364	9.7190	12.3696
Cash Flows in ₹ '000				
Real	-50000	-1500	-2000	-2500
Nominal (1)	-50000	-1650	-2420	-3327.50
Cash Flows in African Rand '000				
Real	-200000	50000	70000	90000
Nominal	-200000	70000	137200	246960
In Indian ₹ '000 (2)	-33333	9167	14117	19965
Net Cash Flow in ₹ '000 (1)+(2)	-83333	7517	11697	16637
PVF@20%	1	0.833	0.694	0.579
PV	-83333	6262	8118	9633

NPV of 3 years = -59320 (₹ '000)

NPV of Terminal Value = $\frac{16637}{0.20} \times 0.579 = 48164$ (₹ '000)

Total NPV of the Project = -59320 (₹ '000) + 48164 (₹ '000) = -11156 (₹ '000)

SOLUTION 2

Working Notes:

1. Calculation of Cost of Capital (GDR)

Current Dividend (D_0)	2.50
Expected Dividend (D_1)	2.75
Net Proceeds (₹ 200 per share – 1%)	198.00
Growth Rate	10.00%

$K_e = \frac{2.75}{198} + 0.10 = 0.1139$ i.e.11.39%

2. Calculation of Expected Exchange Rate as per Interest Rate Parity

Year	Expected Rate
1.	$= 9.50 \times \frac{(1+0.12)}{(1+0.10)} = 9.67$
2.	$= 9.50 \times \frac{(1+0.12)^2}{(1+0.10)^2} = 9.85$

3. Realization on the disposal of Land net of Tax

	CN¥
Sale value at the end of project	3500000.00
Cost of Land	3000000.00
Capital Gain	500000.00
Tax paid	125000.00
Amount realized net of tax	3375000.00

4. Realization on the disposal of Office Complex

	(CN¥)
Sale value at the end of project	500000.00

WDV	0.00
Capital Gain	500000.00
Tax paid	125000.00
Amount realized net of tax (A)	375000.00

5. Computation of Annual Cash Inflows

Year	**1**	**2**
Annual Units	10000	10000
Price per bottle (CN¥)	540.00	583.20
Annual Revenue (CN¥)	5400000.00	5832000.00
Less: Expenses		
Variable operating cost (CN¥)	2160000.00	2332800.00
Depreciation (CN¥)	750000.00	750000.00
Fixed Cost per annum (CN¥)	2376000.00	2566080.00
PBT (CN¥)	114000.00	183120.00
Tax on Profit (CN¥)	28500.00	45780.00
Net Profit (CN¥)	85500.00	137340.00
Add: Depreciation (CN¥)	750000.00	750000.00
Cash Flow	835500.00	887340.00

(a) Computation of NPV of the project in CN¥

Year	**0**	**1**	**2**
Initial Investment	-4500000.00		
Annual Cash Inflows		835500.00	887340.00
Realization on the disposal of Land net of Tax			3375000.00
Realization on the disposal of Office Complex			375000.00
Total	-4500000.00	835500.00	4637340.00
PVF @11.39%	1.000	0.898	0.806
PV of Cash Flows	-4500000.00	750279.00	3737696.00
NPV			**-12,025**

(b) Evaluation of Project from Opus Point of View

(i) Assuming that inflow funds are transferred in the year in which same are generated i.e. first year and second year.

Year	**0**	**1**	**2**
Cash Flows (CN¥)	-4500000.00	835500.00	4637340.00
Exchange Rate (₹/ CN¥)	9.50	9.67	9.85
Cash Flows (₹)	-42750000.00	8079285.00	45677799.00
PVF @ 12%	1.00	0.893	0.797
	-42750000.00	7214802.00	36405206.00
NPV			**870008.00**

(ii) Assuming that inflow funds are transferred at the end of the project i.e. second year

Year	**0**	**2**
Cash Flows (CN¥)	-4500000.00	5472840.00
Exchange Rate (₹/ CN¥)	9.50	9.85
Cash Flows (₹)	-42750000.00	53907474.00
PVF @ 12%	1.00	0.797
	-42750000.00	42964257.00
NPV		**214257.00**

Though in terms of CN¥ the NPV of the project is negative but in ₹ it has positive NPV due to weakening of ₹ in comparison of CN¥. Thus Opus can accept the project.

SOLUTION 3

(i) Equity Beta

To calculate Equity Beta first we shall calculate Weighted Average of Asset Beta as follows:

= 1.45 x 0.74 + 1.20 x 0.26

= 1.073 + 0.312 = 1.385

Now we shall compute Equity Beta using the following formula:

$$\beta_{Asset} = \beta_{Equity} \times \frac{Equity}{Equity+Debt\ (1-tax)} + \beta_{Debt} \times \frac{Debt\ (1-tax)}{Equity+Debt\ (1-tax)}$$

$$1.385 = \beta_{Equity} \left[\frac{410}{410+170}\right] + \beta_{Debt} \left[\frac{170}{410+170}\right]$$

$$1.385 = \beta_{Equity} \left[\frac{410}{580}\right] + 0.24 \left[\frac{170}{580}\right]$$

$\beta_{Equity} = 1.86$

(ii) Equity Beta on change in Capital Structure

Amount of Debt to be raised:

Particulars	Value
Total Value of Firm (Equity ₹ 410 cr + Debt ₹ 170 cr)	₹ 580 Cr
Desired Debt Equity Ratio	1.90 : 1.00
Desired Debt Level = Total Value x Debt Ratio Debt Ratio +Equity Ratio	₹ 380 Cr
Less: Value of Existing Debt	(₹ 170 Cr)
Value of Debt to be Raised	₹ 210 Cr

Equity after Repurchase = Total value of Firm – Desired Debt Value

= ₹ 580 Cr – ₹ 380 Cr

= ₹ 200 Cr

Weighted Average Beta of KGFL:

Source of Finance	Investment (₹ Cr)	Weight	Beta of the Division	Weighted Beta
Equity	200	0.345	β(E = X)	0.345x
Debt – 1	170	0.293	0.35	0.103
Debt – 2	210	0.362	0.40	0.145
	580	Weighted Average Beta		0.248 + (0.345x)

$\beta_{KGFL} = 0.248 + 0.345x$

$1.385 = 0.248 + 0.345x$

$0.345x = 1.385 - 0.248$

$X = 1.137/0.345 = 3.296$

$\beta_{KGFL} = 3.296$

(iii) Yes, it justifies the increase as it leads to increase in the Value of Equity due to increase in Beta.

SOLUTION 4

(i) Calculation of Annual CFAT

	Scenario 1	Scenario 2	Scenario 3
Annual Sales (in units) (A)	10,00,000	10,00,000	10,00,000
	US $	US $	US $
Selling price p.u.	10.00	10.00	10.00

Cost p.u.	6.00	5.70	5.55
Profit p.u. (B)	4.00	4.30	4.45
Total Profit (A x B)	40,00,000	43,00,000	44,50,000
Less: Depreciation	10,00,000	9,00,000	8,50,000
PBT	30,00,000	34,00,000	36,00,000
Less: Tax @30%	9,00,000	10,20,000	10,80,000
PAT	21,00,000	23,80,000	25,20,000
Add: Depreciation	10,00,000	9,00,000	8,50,000
Expected CFAT (US$)	31,00,000	32,80,000	33,70,000

(ii) Expected Value of CFAT

= US$ 31,00,000 x 0.4 + US$ 32,80,000 x 0.4 + US$ 33,70,000 x 0.2

= US$ 32,26,000

(iii) Viability of proposal:

Expected CFAT = US $ 32,26,000

Expected Growth Rate = 3%

Expected Value of inflow in perpetuity $= \frac{US\$\ 32,26,000\ (1.03)}{0.11-0.03}$

$= \frac{33,22,780}{0.08}$ = US$ 4,15,34,750

	US $
Value of Inflows	4,15,34,750
Less: Initial Outlay	2,50,00,000
NPV of project	1,65,34,750

Since NPV is positive, project is viable.

Miscellaneous Topic (Old + New)

Study Session 13

SOLUTION 1

(a) Price At Which the Shares Can Be Repurchased:

Let P be the buyback price decided by Abhishek Ltd.

MPS After Buyback x No. of shares After Buyback = 400,00,000.

→ 1.15 x P x [Existing Number of Share – Buy Back Share] = 400,00,000

→ $1.15 \times P \times \left[20,00,000 - \frac{\text{Total amount available for Buyback}}{\text{Buy Back price}}\right] = 400,00,000$

→ $1.15 \times P \times \left[20,00,000 - \frac{50\ \%\ \text{of}\ 180,00,000}{\text{Buy Back price}}\right] = 400,00,000$

→ P = 21.89

(b) Number of shares to be bought back:

$= \frac{90}{21.89}$ = 4.11 Lacs (approx)

(c) EPS After Buy back :

New Equity Shares i.e Equity Share After Buy back =(20-4.11) lacs = 15.89 lacs

EPS after Buy Back = (5 × 20) / 15.89 = 6.29

SOLUTION 2

Working Notes:

Calculation of Cost of Capital

$ke = \frac{D0(1+g)}{Po} + g$

D1 = ₹1.40

P0 = ₹22.60 – ₹1.40 = ₹21.20

$Ke = \frac{1.40(1+0.06)}{21.20} + 0.06 = 13\%$

(a) NPV of the Project

This ke shall be used to value PV of income stream

$V = \frac{₹15.30\ crore}{ke-g} = \frac{₹15.30\ crore}{0.13-0.04}$ = ₹170 crore

PV of Cash Inflows from Expansion Project	₹ I 70 crore
Less: PV of Initial Outlay	₹ I 50 crore
NPV	₹ 20 crore

Since NPV is positive we should accept the project.

(b) By right issue new number of equity shares to be issued shall be:

50 crore (Existing) + 10 crore(Right Issue) = 60 crore

Market Value of Company = PV of existing earnings + PV of earnings from Expansion

$= \frac{₹\ 1.40 \times 50\ crore \times (1+0.06)}{0.13-0.06}$ + ₹170 crore

= ₹ 1060 crore + ₹ 170 crore

= ₹ 1230 crore

Price Per Share = ₹ 1230 crore / 60 crore = ₹ 20.50

(c) Let n be the number of new equity shares to be issued then such shares are to be issued at such price that new shareholders should not suffer any immediate loss after subscribing shares.

Accordingly,

$\frac{n}{50\ crore+n} \times$ ₹ 1230 crore = ₹ 150 crore

1230 n = 7500 + 150n

n = 7500/1080 = 6.9444 crore

Issue Price Per Share $= \frac{₹150\ crore}{6.9444\ crore}$ = ₹21.60

or

Ex - Dividend Price Per Share $= \frac{₹1230\ crore}{56.9444\ crore} = ₹21.60$

(d) Benefit from expansion

(i) Right Issue

		₹ Crore
Shareholder's Current Wealth (₹ 22.60 x 50 crore)		1130
Less:	₹ Crore	
Value of 60 crore shares @ ₹ 20.50	1230	
Cash Dividend Received @ ₹ 1.40 per share on 50 crore shares	70	
Cash paid to subscribe Right Shares (₹15 x 10 crore)	(150)	1150
Net Gain		20
or		
		₹ Crore
Shareholder's Current Wealth (₹21.20 x 50 crore)		1060
Less:	₹ Crore	
Value of 60 crore shares @ ₹ 20.50	1230	
Cash paid to subscribe Right Shares (₹ 15 x 10 crore)	(150)	1080
Net Gain		20

(ii) Fresh Issue

		₹ Crore
Shareholder's Current Wealth (₹22.60 x 50 crore)		1130
Less:	₹ Crore	
Value of existing 50 crore shares @ ₹21.60	1080	
Cash Dividend Received @ ₹1.40 per share on 50 crore shares	70	1150
Net Gain		20
or		
		₹ Crore
Shareholder's Current Wealth (₹21.20 x 50 crore)		1060
Value of existing 50 crore shares @ ₹21.60		1080
Net Gain		20

SOLUTION 3

Effective Interest $= \left[\frac{F-P}{P}\right] \times \frac{12}{M} \times 100$

Where

F = Face Value

P = Issue Price

$= \frac{1,00,000-97,550}{97,550} \times \frac{12}{3} \times 100 = 0.025115 \times 4 \times 100 = 10.046 = 105\%$ p.a.

∴ Effective interest rate = 10.5% p.a.

Cost of Funds to the Company

Effective Interest	10.05%
Brokerage (0.150 x 4)	0.60%
Rating Charge	0.50%
Stamp duty (0.175 x 4)	0.70%
	11.85%

SOLUTION 4

	₹
Issue Price	50,00,000
Less: Interest @ 12.5% for 4 months	2,08,333
Issue Expenses	2,500
Minimum Balance	1,50,000
	46,39,167

Cost of Funds = $\frac{2,10,833\ (1-30)}{46,39,167}\ x\ \frac{12}{4}$ x 100 = 9.54%

SOLUTION 5

Date	Closing Sensex	Sign of Price Charge
1.10.07	2800	
3.10.07	2780	-
4.10.07	2795	+
5.10.07	2830	+
8.10.07	2760	-
9.10.07	2790	+
10.10.07	2880	+
11.10.07	2960	+
12.10.07	2990	+
15.10.07	3200	+
16.10.07	3300	+
17.10.07	3450	+
19.10.07	3360	-
22.10.07	3290	-
23.10.07	3360	+
24.10.07	3340	-
25.10.07	3290	-
29.10.07	3240	-
30.10.07	3140	-
31.10.07	3260	+

Total of sign of price changes (r) = 8
No of Positive changes = n_1 = 11
No. of Negative changes = n_2 = 8

$$\mu_r = \frac{2n_1n_2}{n_1 + n_2} + 1$$

$$\mu = \frac{2 \times 11 \times 8}{11 + 8} + 1 = \frac{176}{19} + 1 = 10.26$$

$$\hat{\sigma_r} = \sqrt{\frac{2n_1n_2\ (2n_1n_2 - n_1 - n_2)}{(n_1 + n_2)^2\ (n_1 + n_2 - 1)}}$$

$$\hat{\sigma_r} = \sqrt{\frac{(2 \times 11 \times 8)\ (2 \times 11 \times 8 - 11 - 8)}{(11 + 8)^2\ (11 + 8 - 1)}} = \sqrt{\frac{176 \times 157}{(19)^2\ (18)}} = \sqrt{4.252} = 2.06$$

Since too few runs in the case would indicate that the movement of prices is not random. We employ a two- tailed test the randomness of prices.

Test at 5% level of significance at 18 degrees of freedom using t- table
The lower limit
$= \mu - t \times \hat{\sigma_r} = 10.26 - 2.101 \times 2.06 = 5.932$
Upper limit
$= \mu + t \times \hat{\sigma_r} = 10.26 + 2.101 \times 2.06 = 14.588$
At 10% level of significance at 18 degrees of freedom
Lower limit
$= 10.26 - 1.734 \times 2.06 = 6.688$
Upper limit
$= 10.26 + 1.734 \times 2.06 = 13.832$
As seen r lies between these limits. Hence, the market exhibits weak form of efficiency.
*For a sample of size n, the t distribution will have n-1 degrees of freedom.

SOLUTION 6

Cornett, GMBH. – Break-up valuation

Business Segment	Capital-to-Sales	Segment Sales	Theoretical Values
Consumer wholesaling	0.75	€1,500,000	€1,125,000
Specialty services	1.10	€800,000	€880,000
Assorted centers	1.00	€2,000,000	€2,000,000
Total value			**€4,005,000**

Business Segment	Capital-to-Sales	Segment Sales	Theoretical Values
Consumer wholesaling	0.60	€750,000	€450,000
Specialty services	0.90	€700,000	€630,000
Assorted centers	0.60	€3,000,000	€1,800,000
Total value			**€2,880,000**

Business Segment	Capital-to-Sales	Segment Sales	Theoretical Values
Consumer wholesaling	10.00	€100,000	€1,000,000
Specialty services	7.00	€150,000	€1,050,000
Assorted centers	6.00	€600,000	€3,600,000
Total value			**€5,650,000**

Average theoretical value $= \frac{4,005,000 + 2,880,000 + 5,650,000}{3} = 4,178,333.33$ say 4,178,000
Average theoretical value of Cornett GMBH. = €4,178,000

SOLUTION 7

Period 1	Closing Prices	Change	Period 2	Closing Prices	Change
1	33453.99		11	33251.53	
2	33434.83	-19.16	12	33285.89	34.36
3	33431.93	- 2.90	13	33329.28	43.39
4	33383.41	- 48.52	14	33284.17	- 45.11
5	33370.93	- 12.48	15	33298.78	14.61
6	33340.75	- 30.18	16	33325.38	26.6
7	33330.98	-9.77	17	33329.95	4.57
8	33335.08	4.1	18	33319.67	-10.28
9	33301.97	- 33.11	19	33302.32	-17.35
10	33259.03	- 42.94	20	33319.61	17.29

X	Y	X2	Y2	XY
-19.16	34.36	367.11	1180.61	-658.34
-2.90	43.39	8.41	1882.69	-125.83
-48.52	-45.11	2354.19	2034.91	2188.74
-12.48	14.61	155.75	213.45	-182.33
-30.18	26.6	910.83	707.56	-802.79
-9.77	4.57	95.45	20.88	-44.65
4.1	-10.28	16.81	105.68	-42.15
-33.11	-17.35	1096.27	301.02	574.46
-42.94	17.29	1843.84	298.94	-742.43
$\sum X$ = -194.96	$\sum Y$ = 68.08	$\sum X^2$ = 6848.66	$\sum Y^2$ = 6745.74	$\sum XY$ = 164.68
$\bar{X}$ = - 21.66	$\bar{Y}$ = 7.56			

$$\beta = \frac{\sum x\,y - n\,\bar{x}\,\bar{y}}{\sum x^2 - n\,\bar{x}^2}$$

$= \frac{164.68 - 9(-21.66)(7.56)}{6848.66 - 9(-21.66)^2} = 0.624$

a = $\bar{Y}$ - b $\bar{X}$ = 7.56 – 0.624(-21.66) = 21.08

$r^2 = \frac{a\sum Y + b\sum XY - n(\bar{Y})^2}{\sum Y^2 - n(\bar{Y})^2} = \frac{21.08(68.08) + 0.624(164.68) - 9(7.56)^2}{6745.74 - 9(7.56)^2}$

r^2 = 0.164

r = 0.405

There is moderate degree of correlation between the returns of two periods hence it can be concluded that the market does not show the weak form of efficiency.

SOLUTION 8

(i) Dirty Price

= Clean Price + Interest Accrued

(ii) First Leg (Start Proceed)

= Nominal Value x $\frac{Dirty\ Price}{100} \times \frac{100 - Initial\ margin}{100}$

= ₹ 5,00,00,000 x $\frac{102.63}{100} \times \frac{100-1.50}{100}$ = ₹ 5,05,45,275

Second Leg (Repayment at Maturity) = Start Proceed x(1+ Repo rate × $\frac{No.of\ days}{360}$)

= ₹ 5,05,45,275 x (1+0.0610×$\frac{21}{360}$) = ₹ 5,07,25,132

SOLUTION 9

For calculating probability of financial difficulty, we shall calculate the area under Normal Curve corresponding to the Z Score obtained from the following equation (how many SD is away from Mean Value of financial difficulty):

$$z = \frac{x - \mu}{\sigma}$$

$$= \frac{-1.00 \text{ crore} - 2.00 \text{ crore}}{1.60 \text{ crore}}$$

= -1.875 say 1.875

Corresponding area from Z Score Table by using interpolation shall be found as follows:

Z Score	Area under Normal Curve
1.87	0.4693
1.88	0.4699
0.01	0.0006

The corresponding value of 0.005 Z score = $0.005 \times \frac{0.0006}{0.01}$ = 0.0003

Thus the Value of 1.875 shall be = 0.4693 + 0.0003 = 0.4696

Thus the probability the company shall be in financial difficulty is 46.96%.