Paper 2

MBEIII - 12 – Securities, Portfolio and Risk Management

Unit I: Valuation of Securities:

Bond Valuation – Types of Bonds - Dated Securities and Zero CouponBonds; Strips, Valuation of bonds; Yield, Current Yield, YTM, Yield to Call. Shares Valuation –Features of equity, valuation of shares- asset backing method, EPS method, Market value, Yield based methods, Fair value of shares, Dividend discount models- with constant dividend, with constan tgrowth, multistage growth models. P/E based valuation.

Unit II: Equity Analysis:

Fundamental Analysis – Concept, process, Economy Analysis, Sector Analysis, Company Analysis; Tools and Techniques of Fundamental Analysis, Business Cycle andIndustry Analysis.Technical Analysis -– Fundamental Principles, Dow Theory, EMH, Random Walk Hypothesis, Indian Markets and Efficiency Charts – Line Charts, Bar Charts, Japanese CandlestickChart; Moving Averages – Simple; Momentum Analysis/Relative Strength Index (RSI); MACD.

Unit III: Portfolio Theory:

Risk and return for one security, two security and portfolio. EfficientFrontier, Investor utility.

Capital Market Theory - Background, risk free asset, the market portfolio;Capital Asset Pricing Model (CAPM), systematic and unsystematic risk, Arbitrage Pricing Theory (APT).

PortfolioManagement – Passive v/s. Active, Value v/s. Growth.Understanding the Stock Index – Constructionand composition of SENSEX and NIFTY, Calculation of indices. Free float Market capitalization.

Unit-IV: Futures and Option Derivatives:

Types of Futures – On the basis of Maturity, On the basisof the underlying asset; Futures Pricing – Cost of Carry Model; Mark to market.Definition of Options,Types of Options – CallOptions, Put Options; Option Pay–Offs; Option Pricing – BinomialModel andBlack & Scholes Model; Option Greeks.Risk Management and Hedging with Derivatives.

Suggested Readings:

1. Strategic Financial Management – Dr. J.B. Gupta – Taxmann’s, New Delhi

2. Financial Management – Rajiv Shrivastava, Anil Misra – Oxford Higher Education

3. Financial Management- Ravi Kishore, Taxmann’s, New Delhi.

4. Financial Management: Problems and Solutions, Ravi Kishore, Taxmann’s, New Delhi

5. Financial Management – Theory & Practice by Prasanna Chandra, TMH Publishers 2004

6. Financial Management-I.M. Pandey, Vikas publishing house, New Delhi.

7. Options Futures and other Derivatives – John C.Hull, PHI-EEE, 2011

8. Reference Material of NCFM from www.nseindia.com

Course Objectives

1. Given the excerpts from the balance sheet, profit and loss account, dividend and earnings history a student will be able to ***apply*** asset backing method, dividend valuation method or earnings capitalization method to ***estimate*** the fair value of a share.
2. Given the coupon rate, maturity and par value of a fixed income instrument the future manager shall be able to **compute** the value of a bond.
3. Given the financial statements, sector overview and the economic indicators available in Economic Survey of India a student will be able to **perform** fundamental analysis to **argue** whether to buy, hold or sell a particular share.
4. Given the Price and traded volume history a student will be able to ***construct*** price-volume charts(line chart, bar chart, candlestick chart & moving averages) using MS Excel tools, ***identify*** patterns in order to ***predict*** future price trends.
5. Given historical returns for two securities, the student will be able to ***evaluate*** portfolio risks and ***choose*** the best portfolio combination.
6. Given the strike price, spot, time to expiry, risk free rate of return, the student will be able to **apply** cost of carry model, Binomial model and black and Scholes model to **calculate** price of futures and options.

Bond Valuation and Management

Current Yield Bond

1. Find out the current yield of the Rs 100 bond if the selling price of the bond is Rs.90/- and is currently offering 15% annual interest.
2. Find out the current yield of Pawan enterprise bond if the selling price of the bond is at Par Rs. 1000 and is offering 12 percent coupon rate annually.
3. Face value of a bond Rs 1000, coup
4.
5. on rate 6% Current market Price Rs 900. Find out current yield.

Yield to Maturity

1. A 4 year debenture with 10% coupon rate Rs 1000, is currently selling at 900. YTM?
2. A company has Outstanding 8% debenture of RS 10,00,000 on which interest payable annually on 31 December. The debenture are due for redemption at par on 1.1.1993. the market price of debenture on 31.12.1989 was Rs 103 cum-interest. What do you estimate to be current market rate of interest?
3. Arun is considering the purchase of a bond currently selling at Rs. 878.50/- The bond has four years to maturity. Face value of Rs. 1000/- and 8% Coupon rate. The next annual interest payment is due after one year from today. The required rate of return is 10%.
   a) Calculate the intrinsic Value (Present Value) of the bond. Should Arun buy the bond
   b)Calculate the yield to maturity of the bond.
4. Vikram purchased at par a bond with a face value of Rs. 1000/- The bond had five years to maturity and a 10 percent coupon rate. The bond was called two years later for a price of Rs. 1,200, after making its second annual interest payment. Vikram

then reinvested the proceeds in a bond selling at its face value of Rs. 1000/- with three years to maturity and a 7 % coupon rate. What was Vikram actual YTM over the five-year period?

5. R.S Verma is considering investing in a bond currently selling for Rs. 8785.07. The bond has four years to maturity, a Rs. 10,000 Face value, and an 8 percent coupon rate. The next annual interest payment is due one tear from today. the approximately discount factor for investments of similar risk is 10%
   a) Calculate the intrinsic value of the bond. Based on this calculation, should verma purchased the bond?
   b) Calculate YTM of the bond. Based on this calculation, should verma purchased the bond?
6. There is 9% 5 – year bond issue in the market. The issue price is Rs 90 and the redemption price is Rs 105. For an investor with marginal tax rate of 30 % and the capital gain tax rate is 10%.(assuming no indexation) what is the post tax yield to maturity
7. A company issue Zero coupon bond of 10 years maturity. Issue price Rs 260. Maturity value Rs 1000. Ignore tax. YTM.
8. What is YTM of Rs 1000 10 year zero coupon bond if the issue price is Rs 190.
9. A bond pays interest annually and sell for Rs 835. It has six years left to maturity and a par value of Rs 1000. What is the coupon rate if its promised YTM is 12%

Yield to Call

1. A bond is currently traded at Rs 950. If it face value is Rs 1000. Coupon rate is 10%. If it is rededembale at par after 5 years from today. However the company has an option of calling it after 3 years from today at 5% premium. Find Yield to call.
2. R.D Gupta recently purchased a bond with an Rs 1000 face value, a10 percent coupon rate, and four years to maturity. The bond makes annual interest payments, the first to be received one year from today. Mr. Gupta paid Rs. 1032.40 for the bond.
   a) What is the bond's yield-to-maturity?
   b) If the bond can be called two years from now at a price of Rs.1, 100/- . What is its yield-to-call?

Duration and Modified Duration of Bond

1. A.D Sachdev is considering buying a 13 percent, five year bond that pays interest once per year. The bond sells for Rs. 1036/- , which represent a 12% yield to maturity. What is the bond's duration?
   Calculate the value and duration for the following bonds.

Bond	Years of Maturity	Annual Interest	Maturity Value
ABC	10	Rs. 80	Rs 1000
XYZ	15	Rs.65	Rs. 1000

2. Find the duration of 6% coupon bond with a face value of Rs 1000 making annual interest payment, if it has 5 years until maturity. The bond is redeemable at 5% premium at maturity. The market interest rate is currently 8%

3. Suppose a person lends Rs 3,20,000 to his friend on interest free basis. The friend returns him RS 10,000 at the end of the year , at the end of second year Rs 10,000 and 3,00,000 at the end of third year. What is the average period of the loan?
4. The following data are available for the bond. Face value Rs 1000. Coupon rate 6%. Years to maturity 6 redemption at par YTM = 17%. Find the current price and duration of the bond.
5. A 3 year maturity zero coupon bond is currently sold at Rs 816. Its maturity value is Rs 1000. Find its duration.
6. Determine the duration of a bond which has face value of Rs 1000, coupon rate 8% annual, maturity 4 years, YTM 10%. What is the modified duration? If the YTM goes up from 10% to 11%, determine the new price of the bond.

Mixed Numerical

1. Jaya Ltd. Has a 14% debenture with face value of Rs 100 that mature at par 15 years. The denture is callable in five year at Rs 114. It is currently sells for Rs 105. Calcualte each of the following for this debenture.
   Current Yield, YTC, YTM
2. A Person owns aRs 1000 face value bond with five years to maturity. The bond makes annual interest payments of Rs 80. The bod is currently priced at Rs 960. Given the market interest rate is 10%, should the investor hold or sell the bonds?

3. An investor purchases for Rs 5555 a zero coupon bond whose face value is Rs 7000 and the maturity period is three years. Calculate the spot interest rate of the bond?
4. Find the current market price of the bond having the face value of Rs 1,00,000 redeemable after 6 years maturity with YTM at 16% payable annually 4.3203 years. Given $1.16^6 = 2.4364$
5. Duration of the bond is 4.50 years. YTM = 8% p.a payable half yearly. Find the % change in its price if the YTM declines from 8% to 7%.
6. Current price of the bond is Rs 950. Current rate 10%. Duration of the bond is 3 years. If the interest rate changes to 11% what will be the price of the bond?

VALUATION OF SHARES

Net Asset Method or Intrinsic Value Method Steps:-

1. Add all the assets at market value.
2. Deduct: All liabilities (Including debenture and Preference shares)
3. Result= Net Asset
4. Divided Net Asset by No. of equity shares
5. Ascertain the value of shares = (Net Value of Asset –Liabilities- Pref. Shareholding claim)/No. of equity shares

Factors should be consider while evaluating assets:-

1. Goodwill should be values at current cost and book value should be eliminated.
2. Inventory:- 1) Raw material, WIP & stock should be valued at cost price.
   2) Finished goods should be valued at market Price.

3. Fictitious assets should be eliminated e.g. debit balance of P&L a/c, preliminary expenses, discount on issue of shares and debentures.
4. Non Trading assets should be valued at market Price.
5. Book debts should be valued after earmarking provisions for bad and doubtful debts.
6. Fixed assets should be valued at market Price
7. All other assets should be valued at book value.

Factors should be consider while evaluating liabilities.

1. Share Capital: - Both equity and preference share capital should be deducted from assets.
2. Provisions: - Taxation and dividend provision should be included in liabilities.
3. O/S Expenses: - Adequate Provision should be made.
4. Contingent Liabilities: - Adequate Provision should be made for all contingent liabilities.

Yield Basis Steps:-

1. Future maintained Profit are ascertained.
2. The normal rate of return is computed.
3. The multiplier or the capitalization factor is to be ascertained – (100/ Normal rate of Return)
4. Capitalized value of maintainable Profit= Future maintained Profit * Capitalization factor.
5. Finally the yield value of the share is compared by dividing the capitalized value of maintainable profit by No. of equity share

Market Value

1. Given Profit (PAT) – Preference Dividend
2. Capitalization Factor = 100/Normal rate of return
3. Capitalization Profit = Profit * Capitalization factor
4. Value of equity Shares = Capitalization factor / No. of equity shares

Fair Value Method.

1. Intrinsic Value + Yield Value OR Market Value /2

P/E ratio

1. P/E ratio = Market Price of Shares/ Earning per share
2. Market price of shares = P/E ratio* EPS
3. Normal rate of return is the earning rate of return of the company which is determined using the following formula
   Earning rate = (EPS/ Market Price of Shares) * 100
4. Studying this formula we can understand that P/E ratio is the reciprocal of normal rate of return.
   PE ratio = 1/ NRR
   Normal rate of return is expresses in percentage
   P/E ratio = (1*100)/ NRR

Valuation of Shares

1. **Net Asset Method**

Liabilities	Amount	Asset	Amount
5,000 Equity Shares of Rs .100	5,00,000	Goodwill	1,20,000
Profit and Loss a/c	50,000	Investment	4,80,000
General Reserve	1,50,000	Stock	5,00,000
10% Debenture	4,50,000	Debtors	3,00,000
Sundry Creditors	1,50,000	Cash at bank	1,00,000
Workmen's saving bank account	2,00,000		
Total	**15,00,000**	**Total**	**15,00,000**

1. The following balance sheet of raj Ltd. As on 31st March 2010

Market Value of investment was 4, 00,000/- Find out the intrinsic value of shares. Current cost of goodwill is 1, 50,000/-

Yield Basis or Market Value Method

2. From the following information calculate the value of share – yield basis, dividend basis of yield value and earning per share basis.
    - The paid-up share capital of a company consist of 2,000 12% Preference Shares of Rs. 100/- each and 50,000 equity shares of Rs. 10 each
    - The average annual profits of the company after providing for depreciation and taxation amounted to Rs 64,000/-
    - The normal return expected by investors on equity shares from the type of business carried on by the company is 10%

3. Assumed Profit available after deducting interest and tax and before paying preference dividend is 18, 00,000.
   The capital basis consist of:-

- 1, 00,000 equity shares of Rs 100/- each. Rs. 75 Fully Paid up
- 30,000 10% cumulative redeemable preference share of Rs. 100 each, fully paid up

Enquires in the stock market reveal that shares of companies engaged in similar business and declaring dividend of 15% on equity shares are quoted at a premium of 20% Based on your working on the yield method, what do you expect the market value of the company's shares to be at 20% Dividend ?

Fair Value of Equity Share

4. From the following particulars, calculate the fair value of an equity share assuming that out of the total assets. Those amounting to Rs.19, 00,000 are fictitious.

- Share Capital:-
  2, 00,000 15% Preference Share of Rs. 100/- each, fully paid
  20, 00,000 equity shares of Rs. 10/- each fully paid.
- Liabilities to Outsiders :- 34,50,000/-
- Reserves and Surplus 17,50,000/-
- The average annual profit after taxation earned every year by the company during the last 5 years 40,00,000/-
- The normal profit earned on the market value of fully paid shares of similar companies is 10%.

Dividend Valuation Model

With Constant Dividend Model or No Growth Model

1. A company is presently paying dividend of Rs. 6 per share and is expected not to deviated from future .Calculate the value of share if required rate of return is 15%.
2. A company is presently paying a dividend of Rs. 9 per share and is expected not to be deviated from this in future. Calculate the value of the shares if the required rate of return is 15%.
3. If the firm has future dividend pattern with no growth or where the dividend remain constant over times. The value of the share shall be the capitalization of perpetual streams of constant dividend.

Constant Growth Case

4. A company is expected to pay a dividend of Rs. 6 per share next year. The dividends are expected to grow perpetually at the rate of 9%. What is the value of its share if the required rate of return is 15%.
5. The company ABC's next year dividend per share is expected to be Rs. 3.50 The dividend in subsequent years is expected to grow at rate of 10% per year. If the required rate of return is 15%per year. What should be its price? The prevailing market price is Rs. 75
6. The current Price of the company's share id Rs. 74 and the dividend per share is Rs. 5. Calculate the dividend growth rate, if its capitalization rate is 12%.
7. Anil estimates that from investment in stock A he would get 15% dividend next year. It would continue to grow by 10% for the rest of the years. The selling price is Rs. 40 He need a return of 20% per year for his son educational expenses. Can he invest on stock "A"

Multistage Growth Model

8. A company is currently paying a dividend of Rs. 4.24 per share. The dividend is expected to grow at a 18% annual rate for five years and then at 12% forever. What is the present value of the share? if the capitalization rate is 14%
9. A company is currently paying dividend of Rs. 2 per share. The dividend is expected to grow at 15% for three years, then at 10% for the next three years, after which it is expected to grow at 5% forever. What is the present value of the share if the capitalization rate(Discounting Factor) is 9%

Price – Earnings Ratio

10. The Price of a company's share is Rs. 80 and the value of growth opportunities in Rs. 20. If the company capitalization rate is 15%, what is the Price earnings ratio? How much is the earning per share?
11. If the company share price is currently traded at Rs.15 and the earning per share is Rs. 1.25/- Find out the P/E ratio.
12. r_F = 8%, r_M = 16% , β = 1.0, *ROE* = 16% , *b* = 40% on the basis of given details find out the P/E ratio using Peter Lynch's formula.
13. Gujrat Bijali Ltd. Has earning of Rs. 80 Crore and it has 5 Crores shares outstanding. It has a project that will produced net earnings of Rs. 20 Crores after one year. Thereafter, earning are expected to grow at 8% per annum indefinitely. The company's required rate of return is 12.5%. Find out the P/E Ratio.

UNIT NO III

1. Calculate the rate of return for a portfolio having returns on securities as:

Probability	Returns on Investment
1/3	6%
1/3	30%
1/3	18%

2. The following information is available in respect of returns from security X under different economic conditions. Find out the expected return and risk associated with the security.

Economic Conditions	Returns	Probability
Good	20%	0.1
Average	16%	0.4
Bad	10%	0.3
Poor	3%	0.2

3. A mutual fund that had a net asset value of Rs.20 at the beginning of the month, made income and capital gain distribution of Rs.0.0375 and Rs.0.03 per unit respectively during a month, and then ended the month with a net asset value of Rs.20.06. Calculate monthly return on units.

4. (a) Ashoka Mutual fund had a net asset value of Rs.50 at the beginning of the year. During the year, a sum of Rs.4 was distributed as income (dividend).

Besides Rs.3 as capital gains distribution. At the end of the year, NAV was Rs.55. Then calculate total return for the year.

(b) Suppose, the aforesaid mutual fund, in the next year, gives a dividend of Rs.5 as income distribution and no capital gains distribution and NAV at the end of second year is Rs.50. What is the return for the second year?

5. In case of an open ended mutual fund scheme, the market price in the beginning of the year was Rs.21. A dividend of Rs.4 has just been paid and ex-dividend price now is Rs.23. What return has been earned over the past year?

6. An investor is seeking the price to pay for a security, whose standard deviation is 4%. The correlation coefficient for the security with the market is 0.9 and market standard deviation is 3.2%. Find out the beta coefficient.

7. An investor is seeking the price to pay for a security, whose standard deviation is 3%. The correlation coefficient for the security with the market is 0.8 and market standard deviation is 2.2%. Calculate the sensitivity of the security towards the market.

8. The distribution of return for security F and the market portfolio P is given below:

Probability	**Return on Security F**	**Return on Market Portfolio P**
0.3	30%	- 10%
0.4	20%	20%
0.3	0%	30%

You are required to calculate the expected return on Security F and Market Portfolio P, the covariance between market portfolio and security and beta for security.

9. Mr. X is presently concerned about the investment of Rs.1,00,000. He has two securities S1 & S2 for this purpose. The relevant information in respect of these two securities is as follows:

Particulars	**S1**	**S2**
Expected Return	12%	20%
Standard Deviation of Return	10%	18%

He has decided to consider only five portfolios of S1 capital and S2 capital as follows:

(i) All funds invested in S1.

(ii) 50% of funds in each of S1 & S2.

(iii) 75% of funds in S1 and 25% in S2.

(iv) 25% funds in S1 and 25% in S2.

(v) All funds in S2.

10. Calculate the standard deviation and expected returns of following securities:

Security	Returns	Probabilities
A	20%	0.15
B	21%	0.10
C	22%	0.60
D	23%	0.10
E	24%	0.05

11. Calculate coefficient of variation. Given:

	A	B
Expected Return	12%	20%
Standard Deviation	9%	10%

12. Calculate Capital Gains, Dividend Yield & Rate of Return for the following:

Year	Share Price (Pt)	Dividend per Share	Capital gain $Pt - P_{t-1} / P_{t-1}$	Dividend Yield (%)	Rate of return (%)
1991	24.75	-			
1992	55.50	6.30	124.24	25.46	149.70
1993	86.25	8.40			
1994	88.50	12.00			
1995	93.60	15.00			
1996	121.20	18.75			
1997	207.60	25.50			
1998	249.60	33.00			

13. From the following data calculate covariance between SENSEX and Stock S. Also calculate variance of the SENSEX and Beta of Security S.

Year	SENSEX	Security S
1991	15	16
1992	14	12
1993	17	19
1994	16	18

1995	13	15

Practice Numerical

Mean Return

1. Find out the mean return of the shares of particular company over 5 years

Year	2000	2001	2002	2003	2004
Return (%)	16	6	-5	30	42

2. Find out the mean return of the shares of a company

Return (%)	16	6	-5	30	42
42Probability	0.1	0.20	0.40	0.20	0.10

Standard Deviation

3. Find the SD of the rate of return on the shares of particular company over five years.

Year	2000	2001	2002	2003	2004
Rate of Return (%)	10	20	-5	12	13

4. Find the SD of the rate of return on the shares of particular company

Rate of return (%)	**10**	**20**	**30**	**20**	**10**
Probability	0.10	0.20	0.40	0.20	0.10

Co- efficient of variation

5. Share of A and B have the following probability distribution of possible future returns.

Probability	A (%)	B (%)
0.1	16	-20
0.2	06	10
0.4	-5	20
0.2	30	30
0.1	42	50

Calculate the expected rate of return for each share and standard deviation for each share. Calculate coefficient of variation for each share. Which share would you prefer?

Standard Deviation V/S Beta

6. Using the following data regarding two securities C and D , find which of the two securities is more risky? Why?

Particulars	C	D
Average Return	15%	18%
Standard deviation of return of past	0.20	0.15
Correlation coefficient with	0.50	0.50

market		
Beta	0.65	0.78
Find market portfolio variance		

7. **Total Risk of Investment**

The following are the estimates of two stocks

Stock	Expected Return	Beta	Residual Variance SD
A	13%	0.80	30%
B	18%	1.20	40%

Market SD is 20%. What are the standard deviation of A and B?

Capital Asset Pricing Model

8. Beta = 1.08, Risk Free 10%, return from market = 15% , dividend per share expected from the end Rs. 2.00 . Dividend is likely to grow at 11% percent per annum for year to come. Calculate the market price of share?
9. Covariance of return between market and equity shares of XYZ Ltd. Is 10%. Market standard deviation is 40%. Return from market = 20% .risk free is 12%. Calculate Ke of XYZ Ltd.
10. Security Standard Deviation = 3%. Market Standard Deviation = 2.20%
    Coefficient of correlation for security with market = 0.80
    Return from market Portfolio = 9.80%. Risk free rate of return = 5.20%
    Find the required return from the security

Overall Beta

11. The capital structure of Madhav Ltd. Is as follows.

Particulars	Beta	Amount Rs. Million
Debt	0	150
Preference Share	0.20	50
Equity Share	1.20	200

12. A company capital structure comprises equity share capital having market value of Rs. 80 crores plus Rs. 50 Crores debentures. The debt beta coefficient may be assumed to be 0.25. the current risk-free is 8% and the market rate of return is 16%. Equity Beta + 1.40. Find out Ko . Ignore Tax.

Portfolio :-

13. Two Securities

Year	Return From Security A (%)	Return from Security B (%)
2001	11	15
2002	13	9
2003	-8	27
2004	27	-3
2005	17	12

Suppose we have invested 50% of funds in A and balance in B. Calculate the return and risk of Portfolio.

14. Return from equity shares of two companies for last five years :-

Year	Lalita Ltd. Return (%)	Sakshi Ltd. Return (%)
2001	10	20
2002	20	10
2003	30	-5
2004	-10	15
2005	10	20

- An investor invest 50% of his investible funds in Lalita and balance in Sakshi . Find out the expected return and standard deviation of each of stock.
- Find out the co-variance between Lalita and Sakshi Ltd.
- Find out the correlation between the two.
- Find portfolio risk , by indirect method if 40% is invested in Lalita and balance in Sakshi Ltd.
- Find Portfolio Risk , by direct method, if 40% invested in the Lalita and remaining in Sakshi Ltd.

15. Calculate the expected return and standard deviation of each of following two investment P and Q. Also Calculate the expected return and standard deviation of a portfolio in which 50% of funds are invested in P and balance in Q. What will be the result if 40% is invested in P and balance in Q?

State of Monsoon	Probability	Return from P (%)	Return From Q (%)
Poor	0.10	10	20
Below Normal	0.20	20	30
Normal	0.40	30	40
Above Normal	0.20	35	50
Excellent	0.10	40	70

Minimum and Maximum Portfolio Standard Deviation

16. Find the minimum and maximum portfolio standard deviation for varying level of coefficient of correlation between the following two securities assuming that the investment are in the ratio of 6:9.

	Return	Standard Deviation
A	10%	20
B	20%	10

Gain of Portfolio

17. The co-efficient of correlation between returns of two securities A & B is 0.06. There standard deviation are 0.06 and 0.09 respectively. Calculate the % of diversification gain if the portfolio is constitute of these two securities with weighted of 0.40 and 0.60 respectively.

CAPM Model

18. As an investment manager you are given the following information

	Initial Price	Dividend (Rs)	Market Price of the share at the end of the year (Rs.)	Beta risk factor

Cement Ltd	25	2	50	0.8
Steel Ltd.	35	2	60	0.7
Liquor Ltd.	45	2	135	0.5
Govt. of India Bond Ltd.	1000	140	1005	0.99

Rf = 14% you are required to calculate:

1) Expected rate of return of investment in each case using CAPM
2) Average rate of return on Portfolio

19. Your client is holding the following securities.

	Cost (Rs)	Dividend/ Interest	Market Price	Beta
E Share of Gold Ltd.	10,000	1725	9800	0.60
E Share of Silver Ltd.	15,000	1000	16200	0.80
E share of Broze Ltd.	14.000	700	20000	0.60
GOI Bonds	36.000	3600	34500	1

Average rate of return of the portfolio is 15. 75 %. Calculate the expected return of each of security using CAPM 2) RF

Beta of Portfolio

20. The result of four portfolio managers for a 5 year period are as follws(RD 10% , RM 16%)

Portfolio Manager	Average Return 9%)	Beta
Warren	14	0.80
King	17	1.05
Tony	17	1.25
Gates	15	0.90

Select the manager with the best performance.

UNIT NO. 4

Future Terminologies

Spot Price-

The price at which an underlying asset trades in the spot market.

Futures price-

The price that is agreed upon at the time of the contract for the delivery of an asset at a specific future date.

Contract cycle-

It is the period over which a contract trades. The index futures contracts on the NSE have one-month, two-month and three-month expiry cycles which expire on the last Thursday of

the month. Thus a January expiration contract expires on the last Thursday of January and a February expiration contract ceases trading on the last Thursday of February. On the Friday following the last Thursday, a new contract having a three-month expiry is introduced for trading.

Expiry date-

It is the date on which the final settlement of the contract takes place.

Contract size-

The amount of asset that has to be delivered under one contract. This is also called as the lot size.

Basis-

Basis is defined as the futures price minus the spot price. There will be a different basis for each delivery month for each contract.

Cost of carry-

Cost of carry is the measure of the storage cost plus the interest that is paid to finance the asset less the income earned on the asset.

Initial margin-

The amount that must be deposited in the margin account at the time a futures contract is first entered into is known as initial margin.

Marking-to-market-

In the futures market, at the end of each trading day, the margin account is adjusted to reflect the investor's gain or loss depending upon the futures closing price.

Maintenance margin-

Investors are required to place margins with their trading members before they are allowed to trade. If the balance in the margin account falls below the maintenance margin, the investor receives a margin call and is expected to top up the margin account to the initial margin level before trading commences on the next day.

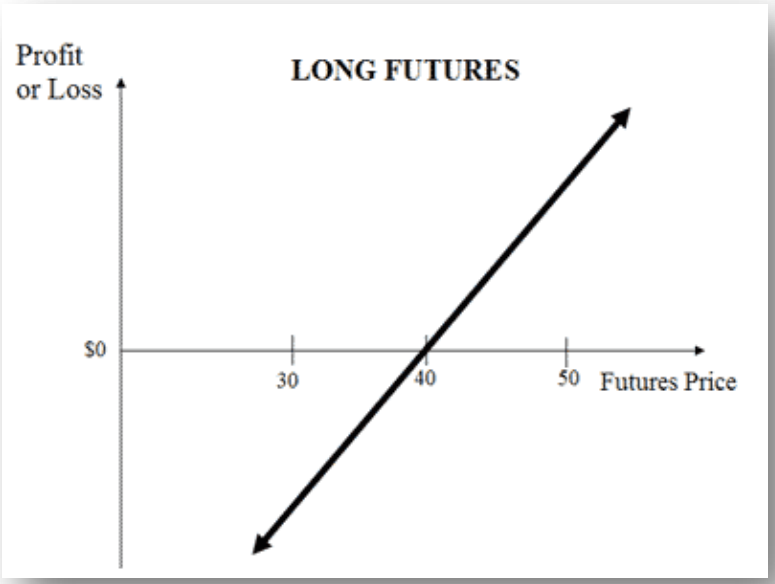
Long Position-

Long position means buying of future contract.

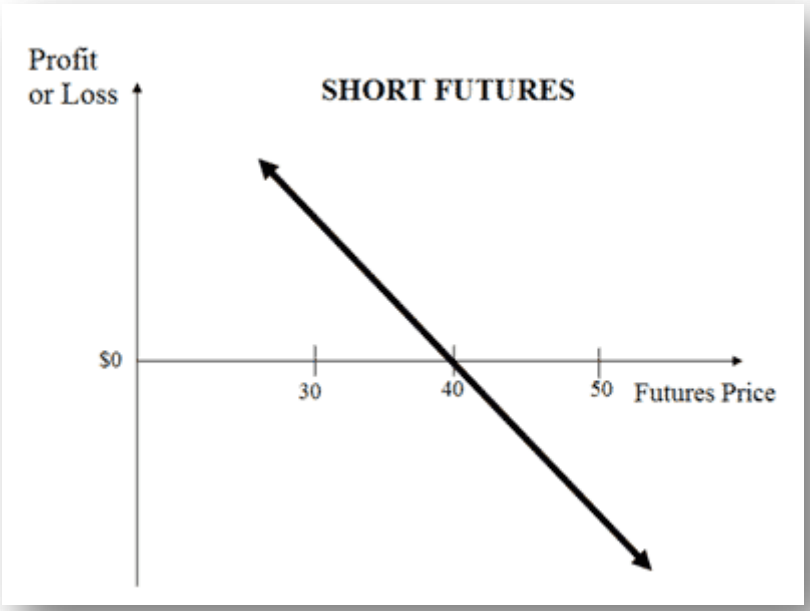
Short Position-

Short position means selling of future contract.

Pay-off Chart for futures buyer –



Pay-off chart for future seller-



1. The seller of future is called----------.

2. The process by which a futures contract is terminated by a transaction that is equal and opposite from the one that initiated the position is called ----------.

3. Similar futures can be traded on----------.

4. ---------- is the standardized item in future contract.

5. Futures contract can be settled by----------

6. Futures ---------- depend on the exchange, the underlying assets, whether the investor is initiating a new position or maintaining a current one.

7. Once a futures contract has risen to its price limit, it may not rise any higher through the expiration date. T/F.

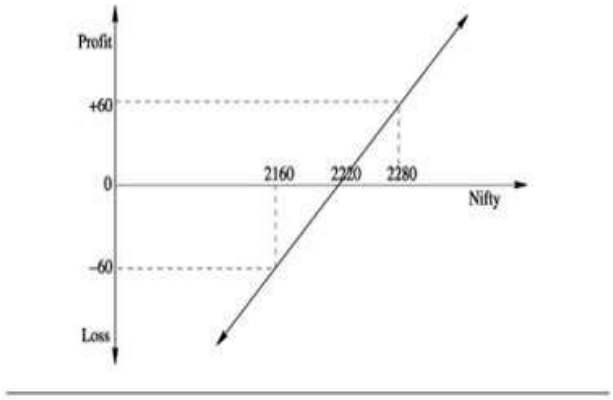
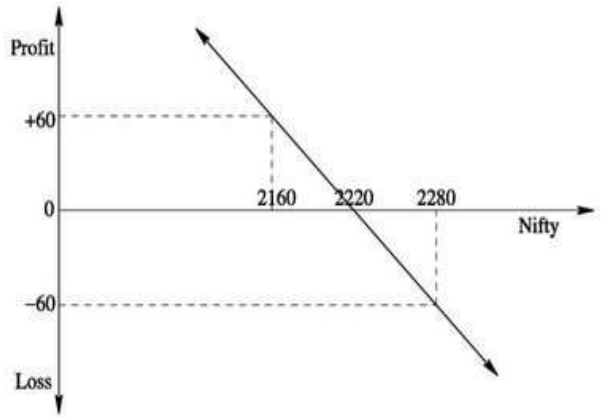
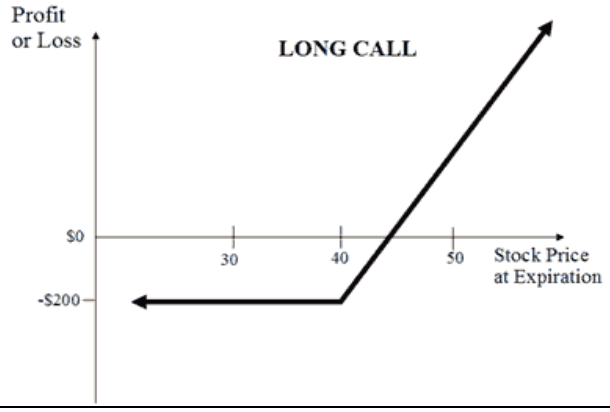
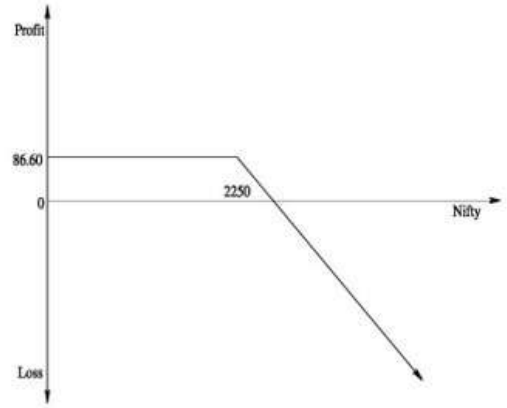
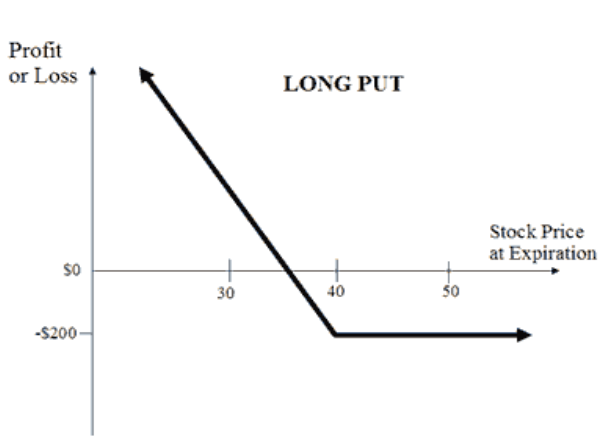
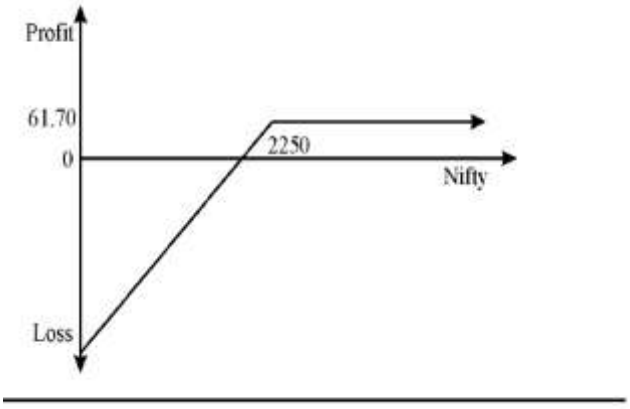
MATERIAL ON OPTIONS

- ✓ **Index Options:** Have the index as the underlying. They can be European or American. They are also cash settled.
- ✓ **Stock Options:** They are options on individual stocks and give the holder the right to buy or sell shares at the specified price. They can be European or American.
- ✓ **Buyer of an Option:** The buyer of an option is the one who by paying the option premium buys the right but not the obligation to exercise his option on the seller/ writer.
- ✓ **Writer of an option:** The writer of a call/put option is the one who receives the option premium and is thereby obliged to sell/buy the asset if the buyer exercises on him. There are two basic types of options, call options and put options.
- ✓ **Call option:** It gives the holder the right but not the obligation to buy an asset by a certain date for a certain price.
- ✓ **Put Option:** It gives the holder the right but not the obligation to sell an asset by a certain date for a certain price.
- ✓ **Option Price/Premium:** It is the price which the option buyer pays to the option seller. It is also referred to as the option premium.
- ✓ **Expiration Date:** The date specified in the options contract is known as the expiration date, the exercise date, the strike date or the maturity.
- ✓ **Strike Price:** The price specified in the options contract is known as the strike price or the exercise price.
- ✓ **American Options:** These can be exercised at any time upto the expiration date.
- ✓ **European Options:** These can be exercised only on the expiration date itself. European options are easier to analyze than American options and properties of an American option are frequently deduced from those of its European counterpart.
- ✓ **In-The-Money Option:** An in-the-money (ITM) option would lead to a positive cash flow to the holder if it were exercised immediately. A call option on the index is said to be in-the-money when the current index stands at a level higher than the strike price (i.e. spot price > strike price). If the index is much higher than the strike price, the call is said to be deep ITM. In the case of a put, the put is ITM if the index is below the strike price.
- ✓ **At-The-Money Option:** An at-the-money (ATM) option would lead to zero cash flow it was exercised immediately. An option on the index is at-the-money when the current index equals the strike price (i.e. spot price = strike price).
- ✓ **Out-of-The-Money Option:** An out-of-the-money (OTM) option would lead to a negative cash flow if it were exercised immediately. A call option on the index is out-of-the money when the current index stands at a level which is less than the strike price (i.e. spot price < strike price). If the index is much lower than the strike price, the call is said to be deep OTM. In the case of a put, the put is OTM if the index is above the strike price.
- ✓ **Intrinsic Value of an Option:** The option premium has two components – intrinsic value and time value. Intrinsic value of an option at a given time is the amount the holder of the option will get if he exercises the option at that time. The intrinsic value of a call is Max [0, (St — K)] which means that the intrinsic value of a call is the greater of 0 or (St — K).

Similarly, the intrinsic value of a put is Max [0, K — St], i.e. the greater of 0 or (K — St). K is the strike price and St is the spot price.

- ✓ **Time Value of an Option:** The time value of an option is the difference between its premium and its intrinsic value. Both calls and puts have time value. The longer the time to expiration, the greater is an option's time value, all else equal. At expiration, an option should have no time value.

PAY-OFF for OPTIONS:

Pay-off profile for buyer of an asset	**Pay-off profile for seller of an asset**
	
Pay-off profile for Buyer of a Call Option - Long Call	**Pay-off profile for Writer of a Call Option - Short Call**
	
Pay-off profile for Buyer of a Put Option - Long Put	**Pay-off profile for Writer of a Put Option - Short Put**
	

Quiz:

1. A call option is a right to --------
2. A put option is right to ----------
3. Premium is to be paid by----------
4. One who receives premium is ----------
5. Short put signifies----------
6. Long call signifies----------
7. The execution of option contract in American option can be at----------
8. An European option can be----------
9. Loss is ---------- in put option.
10. Profit is ---------- in call option.

Numerical

1. Current Nifty is 1800 and minimum lot is 100. R_f is 8% and the futures period is 3 months. The fair value of 3 months Nifty futures would be?
2. A share is selling at Rs. 900. Dividend of Rs. 40 is expected after 6 months. The R_f is 9%. What is the price of the 12 month futures?
3. Market Price of a share at present is Rs. 930 with transaction cost of 2%. A dividend yield of 5% is expected. R_f is 10%. Find out 3 months futures price.
4. The price of equity shares of Onida Picture Ltd. (a non dividend paying company) is Rs. 30. The R_f is 12% p.a. with continuous compounding. An investor wants to enter into a 6 months forward contract. Find out the forward price.
5. The stock index is currently 350 and the R_f is 8%. Find out the futures price for a 4 months contrat if the dividend yield is 4%.
6. The market price of equity shares of ABC Ltd. is Rs. 40. It has not been paying any dividend. The R_f for the investor is 5%. The 3 month forward rate for the share is Rs. 42. Should the investor enter into the 3 months futures contract?
7. A person buys a put option at a strike price of Rs. 30 for a premium of Rs. 6. The current market price of the asset is Rs. 28. Find out the profit/loss profile if the market price of the asset on the strike date is Rs. 18, Rs. 24, Rs. 26, Rs. 28, Rs. 31, Rs. 36 or Rs. 39. What will be his position if he buys the call option?
8. The debentures of ABC Ltd. are currently selling at Rs. 930 per debenture. The 4 months futures contract on this debenture is available at Rs. 945. There is no interest due during this 4 months period. Should the investor buy this future if the R_f is 6%?
9. The spot price of a bond is Rs. 900 and one year's futures rate is Rs. 930. Interest payments of Rs. 40 are due after 6 months and after 1 year from today. The R_f for 6 months and 1 year period are 9% and 10% respectively. Find out the profit of the investor. What should be his strategy if he holds one bond and the futures price is Rs. 905.
10. The NIFTY is 1800 at present. The stock underlying this index provides a yield of 3% p.a. the continuously compounding rate of interest is 8%. What should be the futures value of 3 months NIFTY?
11. An investor buys a SENSEX future at 5500 in market lot of 200 futures. On the settlement date, the SENSEX is 5600. Find out is profit or loss for one lot of futures. What would be his position, if the SENSEX is 5450 on the settlement date?
12. An investor buys a NIFTY Futures contract for Rs. 2,80,000 (lot size 200 futures). On the settlement date, the NIFTY closes at 1,378. Find out his profit or loss, if he pays

Rs. 1,000 as brokerage. What would be his position, if he has sold the futures contract?

13. The shares of Yellow Pages Ltd. are being traded at Rs. 250 on the BSE. Its futures for 1 month, 2 months and 3 months are also available on the BSE. If the risk-free rate is 12% p.a. and no dividends are expected during this period, what should be the equilibrium price of these futures?
14. Ram buys 10, 000 shares of X Ltd. at Rs. 22 and obtains a complete hedge of shorting 400 Nifty at Rs. 1, 100 each. He closes out his position at the closing price of the next day at which point the share of X Ltd. has dropped 2% and the Nifty Future has dropped 1.5%. What is the overall profit/loss of this set of transaction?
15. The market price of equity share of ABC Co. Ltd. is Rs 40. It has been not paying any dividend. The risk free rate for the investor is 5%. The 3-month forward rate for the share is Rs 42. Should the investor entered into the 3- month future contract?.

Problems on Payoff

1. Shares of ABC Ltd. are presently trading at Rs 67 (F.VRs 10 each). 3 month call option for a strike price of Rs 65 is available at apremium of Rs 5. Find out the net payoff position of a call option holder if the spot price on maturity is Rs 60, 62,65,67,70,72 or 80.
2. The equity share price of Ramacast Ltd. are being sold at Rs 210. A 3 month call option is available for a premium of Rs 6 per share and a 3 month put option is available for a premium of Rs 5 per share. Find out the net payoff of the option holder of the call option and the put option given that1) the strike price in both the cases is Rs 220 and

   2) the share price on the exercise day is rs 200 or Rs 210 or rs 22o or Rs230 or Rs 240.

3. Equity share of Casino Ltd. are being currently sold for Rs 90 per share. Both the call option and the put option for 3 month period are available for a strike price of Rs 97 at a premium of Rs 3 per share and Rs 2 per share respectively. An investor wants to create a position by buying a call as well as put option in this share. Find out his net payoff at the expiration of the option period, if the share price on that day happen to be Rs 90 or Rs 105.

4. A Call option has an exercise price of Rs 90 and a cost of Rs 100 whereof the underlying stock trades at Rs 95. What profits can result if

a) The buyer exercises the call.

b) The buyer does not exercise the call.

c) If the stock price is Rs 103 at expiration, what is the value of the call?

d) If the price is Rs 107, what is the value of the call?

5. The Nifty index on November 10, 2000, is 1310. An investor is bullish about the stock market, but does not want to take a downside risk. What position should he take when options are quoted as under –

Nifty	**Call**			**Put**		
(Rs 200 per point)	**Jan**	**Feb**	**Mar**	**Jan**	**Feb**	**Mar**
1300	50	55	60	5	7	10

1315	20	25	29	20	30	35
1330	5	7	9	70	75	80

If spot value on maturity is as under, what would be the profit or loss for the investor if:

Jan - 1340	**Feb -** 1290	**Mar -** 1370

6. The share of Intro Chemical Ltd. are currently traded at Rs 42. An investor buys a put option for rs 3 at the strike price of rs 40. Under what situation, the investor would be able to make profit? When he would exercise the option? Show the profit/loss profile of the investor with the help of the diagram.
7. The share of Blue Ink Ltd. is currently traded at Rs 47. An investor writes a call option for a strike price of rs 50 for a premium of Rs 5. Under what circumstances does the investor make the profit? Show the profit/Loss profile of the investor.

Practice Problems on Binomial Model

1) A stock price is currently Rs. 40. It is known that at the end of 1 month it will be either Rs. 42 or Rs. 52. The risk-free interest rate is 8% per annum with continuous compounding. What is the value of a 1-month European call option with a strike price of Rs. 39?
2) (a) A stock price is currently Rs. 100. Over each of the next two 6-month periods it is expected to go up by 10% or down by 10%. The risk-free interest rate is 8% per annum with continuous compounding. What is the value of a 1-year European call option with a strike price of Rs. 100?

   (b) For the situation considered in problem above, what is the value of a 1-year European put option with a strike price of Rs. 100?
3) A stock price is currently Rs. 40. It is known that at the end of 3 months it will be either Rs. 45 or Rs. 35. The risk-free rate of interest with quarterly compounding is 8% per annum. Calculate the value of 3-month European put option on the stock with an exercise price of Rs. 40.
4) Calculate the value of a call option using binomial model:
   Spot Price: Rs. 100/-
   Exercise Price (of a 3 month call option): Rs. 95/-
   Possible prices at the end of 3 months: Rs. 150/- or Rs. 70/-
   Risk free Rate: 12% p.a. (not compounded continuously)

Practice Problems on Black and Scholes Model

5) From the following data, find the value of a call option using BSM Model:
   Spot Price: Rs. 80/-; Std. Dev.: 0.40; Exercise Price: Rs. 75/-; Time to expiry: Rs. 6 mths; R_f: 12%. [Given: $e^{(-0.12*0.5)} = 0.9417$ & $\ln(80/75) = 0.0645$]

Number of SD from Mean (Z)	Area to the left or right of one tail
0.25	0.4013
0.30	0.3821
0.55	0.2912
0.60	0.2578

6) What is the price of a Europeancall option on a non-dividend-paying stock when the stock price is Rs. 52, the strike price is Rs. 50, the risk-free interest rate is 12% per annum, the volatility is 30% per annum, and the time to maturity is 3 months?
7) Calculate the price of a 3 month European call option on the spot value of silver. The 3 month futures price is Rs. 12, the strike price is Rs. 13, the risk-free rate is 4% and the volatility of the price of silver is 25%.
8) What is the price of a European put option on a non-dividend-paying stock when the stock price is Rs. 69, the strike price is Rs. 70, the risk-free interest rate is 5% per annum, the volatility is 35% per annum, and the time to maturity is 6 months?
9) Calculate the price of a 6 month European put option on the spot value of the S&P 500. The 6 month forward price of the index is 1400, the strike price is 1450, the risk-free rate is 5%, and the volatility of the index is 15%.
10) A call has 91 days until expiration. The risk-free interest rate is 10% p.a. The strike price of the call is Rs 60. The spot price is Rs 64. The standard deviation of the stock's monthly return is 0.144. Compute the value of the calls using B-S Model.
11) Consider a put with the following details

X = Rs. 70	R_f = 0.60	T = 90 days	Std. Dev. = 0.40	S = Rs. 60

Compute the price of the put option. If a call is also available on the same strike price, will the call value be same? Discuss.

Practice Problems on Option Pay-Offs

12) A Call option has an exercise price of Rs 90 and a cost of Rs 100 whereof the underlying stock trades at Rs 95. What profits can result if
   e) The buyer exercises the call.
   f) The buyer does not exercise the call.
   g) If the stock price is Rs 103 at expiration, what is the value of the call?
   h) If the price is Rs 107, what is the value of the call?

13) The Nifty index on November 10, 2000, is 1310. An investor is bullish about the stock market, but does not want to take a downside risk. What position should he take when options are quoted as under –

Nifty (Rs 200 per point)	**Call**			**Put**		
	Jan	**Feb**	**Mar**	**Jan**	**Feb**	**Mar**
1300	50	55	60	5	7	10
1315	20	25	29	20	30	35
1330	5	7	9	70	75	80

If spot value on maturity is as under, what would be the profit or loss for the investor if:

Jan	1340
Feb	1290
Mar	1370

14) Suppose that a portfolio is worth Rs. 60 million and the S&P 500 is at 1,200. If the value of the portfolio mirrors the value of the index, what options should be purchased to provide protection against the value of the portfolio falling below Rs. 54 million in one year's time?

15) Assume that you buy a call with an exercise price of Rs 100 at a cost of Rs 9, and at the same time, you sell a call with an exercise price of Rs 110 at a cost of Rs 5. The two calls have the same underlying asset and the same expiration.

a) Explain the behavior of the ***STRANGLE*** for the stock price between Rs 98 and Rs 112 in steps of Rs 2 each.

b) What is the best outcome and in what range or stock price does it occur?

c) A stock trades at Rs 100. The first call option has one exercise price of Rs 75 and a cost of Rs 10. The second call option has an exercise price of Rs 105 and a cost of Rs 3.

When will the long position profit?

When will the short position profit?

Comment on the profitability, if the stock price exceeds Rs 105.

Practice Problems on Black and Scholes Model (Dividend Yield)

16) Calculate the value of the three month at-the-money European call option on a stock index when the index is at 250, the risk-free rate is 10% per annum, the volatility of the index is 18% per annum and the dividend yield on the index is 3% p.a.
17) Consider a stock index is currently standing at 250. The dividend yield on the index is 4%p.a. and the risk free rate is 6%p.a. A three month European call option on the index with a strike price of 245 is currently worth Rs. 10. What is the value of a three month put option on the index with the strike price of 245?
18) An index currently stands at 696 and has a volatility of 30%p.a. The risk free rate of interest is 7%p.a. and the index provides a dividend yield of 4%p.a. Calculate the value of the three month European put option with an exercise price of 700.
19) Consider a European call option on the S&P 500that is two months from maturity. The current value of the index is 930, the exercise price of 900, the risk free rate of interest is 8%p.a. and the volatility is 20%p.a. Dividend yield of 0.2% and 0.3% are expected in the first and the second month respectively. Calculate the price of the call option.