NOTE THE FOLLOWING
1) There are four questions and you are required to answer all of them.
2) Deadline for submission is Saturday; 31st August, 2015
3) The total marks is 50.
4) To get full credit do your calculations carefully.

Question 1:
   a) A financial institution has just sold 1,000 7-month European call options on the Japanese yen.
   Suppose that the spot exchange rate 1s 0.80 cent per yen, the .exercise price is 0.81 cent per
   yen, the risk-free interest rate in the United States is 8% per annum, the risk-free interest rate
   in Japan is 5% per annum, and the volatility of the yen is 15% per annum. Calculate the delta,
   gamma, vega, theta, and rho of the financial institution's position. Interpret each number.

   b) A fund manager has a well-diversified portfolio that mirrors the performance of the S&P 500
   and is worth $360 million. The value of the S&P 500 is 1,200, and the portfolio manager would
   like to buy insurance against a reduction of more than 5% in the value of the portfolio over the
   next 6 months. The risk-free interest rate is 6% per annum. The dividend yield on both the
   portfolio and the S&P 500 is 3%, and the volatility of the index is 30% per annum.
      i)   If the fund manager buys traded European put options, how much would the insurance
              cost?
      ii)   Explain carefully alternative strategies open to the fund manager involving traded
              European call options, and show that they lead to the same result.
      iii)   If the fund manager decides to provide insurance by keeping part of the portfolio in
              risk-free securities, what should the initial position be? If the fund manager decides to
              provide insurance by using 9-month index futures, what should the initial position be?

Question 2:
   a) A financial institution has the following portfolio of over-the-counter options on sterling:

Type	Position	Delta of option	Gamma of option	Vega of option
Call	-1,000	0.50	2.2	1.8
Call	-500	0.80	0.6	0.2
Put	-2,000	-0.40	1.3	0.7
Call	-500	0.70	1.8	1.4

   A traded option is available with a delta of 0.6, a gamma of 1.5, and a vega of 0.8.
      i)   What position in the traded option and in sterling would make the portfolio both gamma
              neutral and delta neutral?
      ii)   What position in the traded option and in sterling would make the portfolio both vega
              neutral and delta neutral?

   b) Suppose the spot price of the Canadian dollar is US $0.85 and that the Canadian dollar/US
   dollar exchange rate has a volatility of 4% per annum. The risk-free rates of interest in
   Canada and the United States are 4% and 5% per annum, respectively. Calculate the value of
   a European call option to buy one Canadian dollar for US $0.85 in nine months. Use put-call
   parity to calculate the price of a European put option to sell one Canadian dollar for US $0.85
   in nine months. What is the price of a call option to buy US $0.85 with one Canadian dollar in
   nine months?

Question 3:
  a) Consider a forward start option which, 1 year from today, will give its owner a 1-year European call option with a strike price equal to the stock price at that time.
     You are given:
     (i)   The European call option is on a stock that pays no dividends.
     (ii)   The stock's volatility is 30%.
     (iii)   The forward price for delivery of 1 share of the stock 1 year from today is 100.
     (iv)   The continuously compounded risk-free interest rate is 8%.
     Under the Black-Scholes framework, determine the price today of the forward start option. Show your working clearly. Make necessary assumptions for data. You may keep the answer in form of an expression. Marks will be allocated only for correct formulation of the problem.
     (Given, the values from the Z table are as follows: N (0.417) = 0.661, N (0.117) = 0.546. The variables used are in their standard form)

  b) Near market closing time on a given day, you lose access to stock prices, but some European call and put prices for a stock are available as follows:

Strike Price	Call Price	Put Price
$40	$11	$3
$50	$6	$8
$55	$3	$11

     All options have the same expiration date. After reviewing the information above, John tells Mary and Peter that no arbitrage opportunities can arise from these prices. Mary disagrees with John. She argues that one could use the following portfolio to obtain arbitrage profit: Long one call option with strike price 40; short three call options with strike price 50; lend $1; and long some calls with strike price 55. Peter also disagrees with John. He claims that the following portfolio, which is different from Mary's, can produce arbitrage profit: Long 2 calls and short 2 puts with strike price 55; long 1 call and short 1 put with strike price 40; lend $2; and short some calls and long the same number of puts with strike price 50.
     Which of the following statements is true?
        (i) Only John is correct.
        (ii) Only Mary is correct.
        (iii) Only Peter is correct.
        (iv) Both Mary and Peter are correct.
        (v) None of them is correct.

Question 4:
  a) According to Altman's Z-score the chances of bankruptcy is high when the Z-score is:
     i)   Below 1.81
     ii)   Between 1.81-2.99
     iii)   Above 2.99
     iv)   None of these
  b) Which of the following is not a type of credit risk?
        i)   Default risk
        ii)   Credit spread risk
        iii)   Intrinsic risk
        iv)   Basis risk
  c) In order to develop an capability to actively manage an credit portfolio one must have in place the following:

(I) Credit Rating Model (or models for different categories of loans and advances)

(II) Develop and maintain necessary data on defaults of borrowers rating category wise, i.e., 'Rating Migration'.

    i)   Both 1 and 2 are required

    ii)   Only 1 is required

    iii)   Only 2 is required

    iv)   None of the above

d) The model that combines five financial ratios using reported accounting information and equity values to produce on objective measure of borrower's financial health is

    i)   Altman's 2 score

    ii)   'Credit Metrics'

    iii)   Credit Risk +

    iv)   None of the above

e) A bank holds a security that is rated A+. The rating of the security migrates to A. What is the risk that the bank has faced ?

    (i)   Market risk

    (ii)   Operational risk

    (iii)   Market liquidation risk

    (iv)   Credit risk