INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

5th November 2015

Subject ST5 - Finance and Investment A

Time allowed: Three hours (14.45* – 18.00 Hrs.)

Total Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. ***Please read the instructions on the front page of answer booklet and instructions to examinees sent along with hall ticket carefully and follow without exception.***
2. **** You have 15 minutes at the start of the examination in which you are required to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.***
3. ***You must not start writing your answers in the answer sheet until instructed to do so by the supervisor.***
4. ***The answers are not expected to be any country or jurisdiction specific. However, if Examples/illustrations are required for any answer, the country or jurisdiction from which they are drawn should be mentioned.***
5. ***Attempt all questions, beginning your answer to each question on a separate sheet.***
6. ***Mark allocations are shown in brackets.***
7. ***Please check if you have received complete Question Paper and no page is missing. If so, kindly get new set of Question Paper from the Invigilator.***

AT THE END OF THE EXAMINATION
Please return your answer book and this question paper to the supervisor separately.

Q. 1) You work as an analyst in a mutual fund

i) Explain the process of bootstrapping to construct a zero coupon yield curve. (4)

ii) The Chief Investment Officer has enquired whether you can create a 10 year return distribution of BSE Sensex (30 stocks index of Bombay Stock Exchange) using historical simulation. How would you go about the process? BSE Sensex was created in 1979 and you are currently in 2015. You may exclude dividends for the purpose of analysis. (5)

[9]

Q. 2) The stock market of an emerging economy has witnessed a strong rally over last 3 years primarily driven by Foreign Fund Inflows. The government is considering a move to impose income tax on unrealized gains too (currently only realized gains are taxed). Critique the suggestion. **[10]**

Q. 3) You are the fund manager of an Indian long term equity fund. Your investment universe is BSE 200 (200 stocks index of Bombay Stock Exchange). The index has more or less been flat throughout the last 2 years and the fund's returns have remained in line with the index. The Chief Investment Officer who has recently taken charge of the company has asked you during the performance review to explore the possibility of enhancing the returns by selling out of money call options on the stocks in the portfolio.

i) What do you think is the rationale for CIO's suggestion? (3)

ii) Draw the payoff diagram for the strategy with appropriate labeling. (3)

iii) What factors will you consider when you prepare your reply to the CIO? (7)

[13]

Q. 4) You are an investment actuary working in a "fund of funds"

i) What are the uses to which indices can be put? (6)

ii) Your fund's management has recently decided to recruit a boutique investment house that specializes in investing in high quality stocks (loosely defined as companies with a durable business model resulting in sustained margins and returns) as one of the fund managers. Your Management has asked you to design a custom index comprising 30 high quality stocks to benchmark the performance of the boutique investment house. Explain how you would go about the process. (11)

[17]

Q. 5) ABC Industries Limited is a leading manufacturer of chemical X an intermediary in the petrochemical chain. The company buys the raw material and converts it to chemical X and the profitability depends on the spread between the price of raw material and finished product which like in other commodities expand or contract depending on the demand supply dynamics.

Recently the company received a proposal from a long term customer who uses chemical X as one of the ingredients to manufacture a leading detergent brand to enter into a 3 year supply arrangement at a fixed price which was at a small premium to the current market price on a take or pay basis. The CFO of the company had suggested that the company can enter into the agreement as the commodity exchanges have recently allowed futures trading in chemical X. He is of the opinion that the company can hedge the risk by taking a short position in the one month futures and rolling the position over every month depending on the remaining exposure. He added that the deal will be lucrative as the futures price ever since the trading in chemical X started has been at a discount to spot.

The CEO is not convinced with the idea as the company has never taken any exposure to derivatives in the past. You are a consultant actuary and the CEO has sought your opinion on the CFO's suggestion.

i) Explain what is meant by contango and backwardation. (2)

ii) What could be the reasons that the customer insisting on a fixed price long term supply arrangement? (3)

iii) Why does ABC Industries need a hedging programme if they have to accept the deal? (3)

iv) Explain how the hedging programme as suggested by the CFO work under ideal circumstances? (5)

v) Why do you think the CFO suggested that deal will be lucrative as futures are at a discount to spot? (3)

vi) What are the points that you would make in the report that you submit to the CEO? (7)

[23]

Q. 6) You are an Investment Actuary of an established life insurance company. Your company has been writing a deferred annuity product for last 10 years. The deferred annuity product has two phases – accumulation phase and annuity payout phase. The accumulation phase ends on the policy anniversary following the policyholder completes 60 years of her age. Thereafter the annuity payout phase starts, the first payment would be on the next policy anniversary and would continue throughout the remaining lifetime of the policyholder. The policyholder has to choose the annuity amount she wishes to receive and based on this and the policyholder's age the level premium is calculated which she is expected to contribute yearly during the accumulation phase.

i) Outline the major financial risks associated with this type of product for the

a) Company (4)

b) Policyholder (2)

ii) What steps can be taken by the Company to control/mitigate the risks that you have identified? (8)

iii) As per the latest valuation, the assets held for this line of business by the company is less than its liability. Briefly discuss how you would modify the investment objectives in this case. (4)

iv) The head of products has come with an idea of WPI (Wholesale Price Index) linked deferred annuity product which would be similar to the existing deferred annuity product with only change in amount of annuity payouts. In this product the first annuity payout would be the amount chosen by policyholder. From next payout the annuity payouts would change on the basis of WPI of last financial quarter. Discuss the possible ways in which liability hedge strategy can be developed for this product. (10)

[28]

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