INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

12th May, 2015

Subject SA6 – Investment

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 expected to be India Specific application for the syllabus and corresponding core reading. However, substantially the core reading material is still taken from material supplied by Actuarial Education Company which is meant for UK Fellowship examination. The core reading also contains some material which is India Specific, mostly the IRDA regulation. In view of this, it should be noted that focal point of answers is expected to be India Specific application. However, if application specific to any other country is quoted in the answer the Candidate should answer the question with reference to Indian environment.*
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 are the Chief Actuary of a mid sized life insurance company in India. The company has been in operations for 6-7 years and sells different types of life insurance and pension products on traditional [participating (par) & non-participating (non-par)] and also unit linked (ULIP) platforms. It also sells guaranteed annuities (life annuity and life annuity with return of premium) on non-par platforms.

On the assets/investments side the company largely holds government securities (g-secs) in the par and non-par portfolio. It also holds some equities of large companies. In the ULIP portfolio the equities have a dominant share. The company seems to be well capitalized and wants to grow the business. With signs of political stability in the country due to newly elected government the inflationary pressures are likely to reduce in the economy and chances of interest rates going up are very low. Residential property investment is being seen as a good investment.

i) Its been proposed to study the feasibility of designing an annuity product with pay-outs linked to increase in real estate prices of residential property. The product would be a single pay product and would be offered along with the existing participating pension product and also as a standalone product.

Describe in detail the issues that would need to be handled before launch of the annuity product? (6)

ii) As an additional selling point the annuity product would offer a guaranteed return of premium after 10 years. Its been suggested to invest in options to meet this guarantee. Assuming that there is no regulatory restriction on hedging the portfolio risks through investment in options please state what options can be purchased by the company to reduce its risks and state the payoff from the option. (4)

iii) The interest rates look like moving downwards and inflation is also reducing. In a low inflation environment, please state the impact on life insurance business for different lines of business given below.

a) Traditional Non-participating business
b) Traditional Participating Business
c) Unit Linked business
d) Annuity Business (6)

iv) You find that the liabilities under participating product (which provides cover upto the age of 100 years and also gives money-back every year after the premium payment term) accounts for more than 40% of overall liabilities of the company. The duration of such liabilities is much higher than the duration of assets available in the market. The break even interest rate of this product is 5% per annum.

a) Please highlight what would be a good asset mix for such participating product portfolio and what are the major risks in managing such product? (4)

b) Assuming that the OTC interest rate swaps are available you decide to enter into long duration swap to meet the fixed pay-outs of your liabilities. This is based on some demographic and economic assumption holding true. The swap would be fixed-floating swap. Please describe the risks and possible losses the fund has been exposed to through this investment and its impact on management of the par business? (5)

v) The company holds a significant amount of Equities in its ULIP portfolio. Currently the company has only passive funds available under the ULIP umbrella and the approach is to track the index.

Explain in detail why the fund manager will not include every index stock to achieve the sector weight. (3)

vi) You are launching a new "active fund" whose aim is to generate returns greater than CNX Nifty by 5% on a rolling 3-year period.

a) Explain why CNX Nifty is the appropriate benchmark to use. (3)

b) What are the advantages and the challenges of the active fund proposed by you? (4)

c) Explain what approach you would use for stock selection in this case. (2)

d) What would a typical investment mandate contain? (3)

vii) The investment team expects the stock markets to go up in the near future and wants to use options to take advantage of its view. Depending on how high the stock prices are likely to go and the timeframe in which the rally will occur, analyze the following option strategies, along with pay-off diagram.

a) Bull Call Spread - Buy 1 call; sell 1 call at higher strike (3)

b) Bull Put Spread - Sell 1 put; buy 1 put at lower strike with same expiry (3)

viii) There have been some arbitrage opportunities available in the past. Assume that the interest rate is 5%, and consider call and put options of both American and European style expiring in 6 months on non-dividend paying stock. For each of the following scenarios please check if there is an arbitrage opportunity and, if available, please describe it:

a) The strike price of a European put option is Rs 300 and the option is traded at Rs 400. (1)

b) The shares are traded at Rs 300 and the American call option is traded at Rs 320. (1)

c) The shares are traded at Rs 300 and a European call option with strike price of Rs 200 is traded at Rs 50. (2)

d) The shares are traded at Rs 100 and a European put option with strike price of Rs 200 is traded at Rs 90. (2)

ix) Recently the Regulator has allowed Life Insurance Companies to trade in interest rate derivatives.

a) Please state the purpose for which dealing in Interest Rate Derivatives can be allowed (2)

b) Please state with examples how could notional amount be derived for entering into derivative (given the regulations on derivatives) (3)

c) The current interest rate scenario and the likely drop in future interest rates, has compelled you to conduct an asset liability matching of your existing statutory reserves. Your finding says that there is no additional requirement of assets if interest rate drops by 1%.

The Company CIO however finds that there is a shortfall in matching and there is a need to look at Interest Rate Futures investment. Please state with reason if the CIO's view is justified and if so under what conditions? (3)

d) The life insurance company is contemplating on investing in structured product in alternate asset class to the extent allowed in the Regulations.

Please state with reasons as to whether a structured product is a good fit in the life insurance company's portfolio and list the key issues that you would like to address before investing? (4)

x) There is a likelihood of a new set of investment guidelines advising the insurer to value the assets at the lower of market or book value. Please discuss the likely impact of the proposed regulation on the following:

- Investment Strategy
- Solvency Ratio
- Reserves held against non-par products
- Asset Shares of the participating products

(6)
[70]

Q. 2) One of the Public Sector Banks (PSB) in India is offering defined benefit retirement scheme for its employees wherein all employees are eligible to receive 50% of the last drawn salary as pension for their life, provided they have completed 20 years of service in the organization. The bank has set up a trust to manage the assets set aside for meeting its obligation under the defined benefit scheme. You have been hired as a consultant actuary to advise the bank on their investment strategy and provision for this liability along the risks associated with such liability.

i) What are the important responsibilities of an actuary advising on a DB scheme? (3)

ii) Why ALM is very important in such defined benefit pension schemes. (2)

iii) Highlight problems with an "asset-centric" investment approach. What ALM solutions do you propose? (4)

iv) The bank requests you to suggest a desired asset allocation between Equity and Debt (g-secs) for such scheme. What is the additional information you may like to ask for and what would be your recommendation. (5)

v) Immunization of pension plan liabilities is a risk management technique that coordinates the movement in values of both assets and liabilities. Compare the following immunization strategies:

- Matching of cashflows
- Duration match
- Combination of cash flow match in earlier years and duration match in subsequent years

(6)

vi) What risks would you consider when choosing an immunization approach? (4)

vii) How would the duration hedge ratio differ for an over-funded and an under-funded pension scheme? (2)

viii) The bank has a lot of fixed benefit obligations and it is worried about decline in interest rates. It wants to enter into a swap whereby it can receive fixed returns and pay in floating interest rates. A foreign bank is willing to offer a fixed rate in exchange of a floating rate payment. Both banks can borrow for a five-year term at the following rates:

	Bank (PSB)	**Foreign Bank**
Moody's credit rating	Aa	Baa
Fixed-rate borrowing cost	10.5%	12.0%
Floating-rate borrowing cost	MIBOR	MIBOR + 1%

a) Calculate the quality spread differential (QSD) (1)

b) Develop an interest rate swap in which both banks have an equal cost savings in their borrowing costs. No investment bank etc is involved in this transaction. (3)

[30]

****