# INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

## 11th November 2011

## Subject ST7 - General Insurance: Reserving & Capital Modelling

**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 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)** State the requirements of a good business model

**[4]**

**Q. 2)** **i)** Define free reserves (1)

**ii)** List the methods a general insurer might use to increase its level of free reserves. (5)

**[6]**

**Q. 3)** Describe the factors that should be considered in setting the level of granularity when modeling capital requirements.

**[8]**

**Q. 4)** For a number of years a reinsurer has written a working layer per event risk XL treaty with unlimited reinstatements. The cedant placed this treaty to protect the liability element of a large book of private motor vehicle insurance. The reinsurer has recently introduced a stability clause and an aggregate deductible to the layer.

**i)** Define each of these new features and explain the impact of their introduction on the expected cost of claims to the layer. (6)

**ii)** State the advantages and disadvantages to both the reinsurer and the cedant of the addition of each of these new features to the layer. (7)

**[13]**

**Q. 5)** A medium sized general insurance company writes only motor insurance business. Explain how the following should be taken into account in a reserving exercise to ensure that the estimation process continues to be robust.

**i)** Case reserving changes (4)

**ii)** Changing net retentions (3)

**[7]**

**Q. 6)** You are an actuary working for a small, general insurance company that writes only long-tailed insurance risks in its local insurance market. The company has a moderate level of free assets. The Board, who require a risk averse investment strategy, has asked for a review of the investment guidelines given to the company's investment managers. It is assumed that there are no regulatory investment restrictions.

**i)** Outline the instructions that would be given to the investment managers in respect of the assets that they may or may not hold, including any relevant limits. (8)

At a recent Board meeting, one of the members suggested that, given the long-tailed nature of the risks insured and that the stock indices are close to a 52 week low, the equity proportion of the investment portfolio should be increased to benefit from future stock market increases.

**ii)** Explain the advantages and disadvantages of this suggestion for the company. (4)

Another Board member has suggested increasing the proportion invested in index linked Government bonds.

**iii)** Explain the advantages and disadvantages of this suggestion compared with those given to the previous Board member. (4)

**[16]**

**Q. 7)** A large Indian general insurance company writes most classes of business. Because of increasing competition from new entrants the volume of business sold has fallen substantially in the last few years. To counter its falling market share the insurer has set up a telephone-based operation to sell private motor insurance directly to the public. The telephones based operation commenced on 1st January 2011 and key figures for the first six months are given in the table below

| ***Month*** | ***Number of Policies Sold 000s*** | ***Annualized Premium Written Rs 000s*** | ***Number of Claims Reported*** | ***Number of Claims Settled*** | ***Claim Payments Rs 000s*** | ***Reported Claims Outstanding as at 30 June 2011 Rs 000s*** |
|---|---|---|---|---|---|---|
| Jan-11 | 30 | 4,440 | 1,190 | 736 | 258 | 175 |
| Feb-11 | 34 | 5,185 | 1,837 | 1,044 | 355 | 296 |
| Mar-11 | 38 | 5,719 | 2,116 | 1,298 | 451 | 313 |
| Apr-11 | 52 | 7,748 | 2,983 | 2,125 | 754 | 334 |
| May-11 | 60 | 8,970 | 4,148 | 3,067 | 1,079 | 418 |
| Jun-11 | 84 | 11,970 | 6,275 | 4,554 | 1,585 | 659 |
| *Total* | 298 | 44,032 | 18,549 | 12,824 | 4,482 | 2,195 |

You also have the following information:

- All premiums are paid monthly by direct debit and the insurer receives the first monthly premium on the date of issue.
- Claims are reported, on average, half a month after occurrence
- Claims are settled, on average, for 5% less than the amounts reported.
- Claims are settled, on average, six months after being reported.
- Claims handling expenses are Rs 50 per claim settled.
- Expenses of 1% of the annualized premium are incurred upon policy issue.
- The company invests all money in cash deposits which earn 0.5% per month.

Calculate the contribution that the new operation has made to fixed expenses and profit for the year to 30 June 2011, stating the assumptions made.

**[20]**

**Q. 8)** A general insurance company writing motor third party business has reason to believe that the claims settlement rates are changing. The company wants to use a stochastic reserving method as compared to a traditional link ratio approach in order to determine the range of possible results for motor third party liability.

The following are the cumulative and incremental claims paid triangles for the company's motor third party liability business.

Cumulative Claims:

| Accident Year | Years of Development | | | | |
|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 |
| 2006 | 4,200 | 6,700 | 7,100 | 7,300 | 7,400 |
| 2007 | 5,500 | 9,000 | 9,600 | 9,900 | |
| 2008 | 6,600 | 10,800 | 11,600 | | |
| 2009 | 7,200 | 12,300 | | | |
| 2010 | 7,700 | | | | |

Incremental Claims

| Accident Year | Years of Development | | | | |
|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 |
| 2006 | 4,200 | 2,500 | 400 | 200 | 100 |
| 2007 | 5,500 | 3,500 | 600 | 300 | |
| 2008 | 6,600 | 4,200 | 800 | | |
| 2009 | 7,200 | 5,100 | | | |
| 2010 | 7,700 | | | | |

**i)** Use the bootstrapping method in its simplest form to estimate one scenario for use in obtaining a range of ultimate claims cost for the motor third party liability class of business. (17)

**ii)** Explain why the approach used in part (i) may not give reasonable results and give suggestions as to how to modify the bootstrapping method to overcome these obstacles.
(9)

**[26]**

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