INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

07ᵗʰ May 2015

Subject ST7 – General Insurance: Reserving & Capital Modeling

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 have then three hours to complete the paper.*
3. *You must not start writing your answers in the answer sheet unless instructed to do so by the supervisor.*
4. *The answers are not expected to be any country or jurisdication 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 a new set of Question paper from the Invigilator.*

Q. 1) A large growing insurer currently writes both residential and commercial property insurance business only in the Indian sub-continent. The property book is protected by a combination of risk excess of loss treaty reinsurance and quota share reinsurance.

    i) Outline the main advantages to the company of buying quota share reinsurance to protect its property book. (4)

The company has been offered a large book of business comprising of household insurance in the US. The business is being fronted by a US insurance company.

    ii) Explain why an insurer may use a fronting arrangement rather than underwriting a risk directly. (2)

    iii) Discuss suitability of existing available reinsurance arrangements for protecting this new business and suggest concerns if any from reinsurers' perspective. (3)

    iv) Suggest alternative reinsurance arrangements that could be used to protect the new book of business and appropriateness of each reinsurance arrangement. (4)

[13]

Q. 2) List the disadvantages associated with restrictions and regulations that a regulatory authority might put in place. **[4]**

Q. 3) A company underwrites Motor insurance and Professional Indemnity insurance classes of business. The actuary establishes total claims reserves such that the probability of the actual losses exceeding the best estimate does not exceed 30%.

    i) List the sources of uncertainty in respect of establishing the ultimate claim reserves. (5)

    ii) List the key assumptions when bootstrapping the over-dispersed Poisson (ODP) method in the context of claim reserving. (2)

    iii) Explain the steps an actuary must take to establish the reserves for the above classes of business using Bootstrapping ODP method. (5)

    iv) Discuss issues surrounding stochastic reserving for the above classes of business (7)

[19]

Q. 4) Two general insurance companies A and B operate in the same country. Each company writes primarily personal lines motor and property business. The following information relates to the year ending 31st December 2014.

	A	B
Gross Written Premium	45,165	68,560
Additional Unexpired Risk Reserve c/fwd	1,165	3,807
Gross Outstanding Claims Reserve b/fwd	23,964	47,121
Gross Claims Paid	18,645	37,248
Gross Outstanding Claims Reserve c/fwd	27,337	54,105
Non Acquisition Expenses	8,362	12,145
Investment Income	4,700	6,800

Current Assets at 31/12/2014	14,354	38,050
Current Liabilities at 31/12/2014	12,085	26,855
Investments at 31/12/2014	60,178	93,090
Share Capital at 31/12/2014	1,102	4,450
Acquisition Costs as a % of Gross Written Premium	18.50%	21.20%

    i)   Construct balance sheet on accrual basis for each of the two companies as at 31st December 2014, stating any assumptions made. (4)

    ii)   Derive underwriting, solvency and return on capital employed ratios for each of the companies, stating any assumptions made. Taxation should be ignored. (6)

    iii) Comment on the results in part (ii). (4)

    [14]

Q. 5) In respect of general insurance business,

    i)   Define long tail business and list factors affecting the tail of business. (2)

    ii)   State and describe the various coverages provided by a comprehensive motor insurance policy and comment about the tail of each of the coverage described. (6)

    iii) If you are designing a general insurance product, what all could you consider to limit the tail of claims of your proposed product (2)

    [10]

Q. 6) After qualifying as an actuary, you plan to set up your own consultancy company. However, you feel there is no single insurance policy covering the needs of professionals setting up their business. You want to develop a package policy that will cover all of their insurance needs. What types of peril would your package cover? **[5]**

Q. 7) **i)**   Describe the working of securitized protection like catastrophe bonds and comment on the credit risk in such arrangements. (5)

    ii)   What impacts do you think the growth of catastrophe bonds will have on traditional catastrophe re-insurance market and reinsurance companies? (4)

    [9]

Q. 8) You are a consulting actuary. A commercial line insurer writing mainly commercial property and energy lines of businesses has approached you to build a capital model to assess its economic capital requirement.

    i)   In context of economic capital, define and give example of risk profile, risk measure and risk tolerance (6)

    ii)   For below scenarios with equal probability determine following based on risk tolerance of 70 percentile:

Scenario	Insurance Risk	Market Risk	Credit Risk	Operational Risk
1	68	-26	-9	0
2	50	-14	-11	-2
3	61	-19	-4	0
4	-177	-6	-6	2
5	47	35	-5	0
6	-73	26	-10	-1
7	-59	57	-5	-6
8	-28	62	-7	-2
9	81	-24	-7	-6
10	-65	39	-3	0

a) Stand-alone capital requirement by risk type using VaR as risk measure.   (2)

b) Capital requirement of the company using VaR as risk measure.   (2)

c) Allocate the capital into risk types using Co-TVaR approach.   (2)

[For probability level q, $Co - TVaR(x_i) = E[x_i | F(x) > q]$,
where $F(x) = \sum x_i$]

iii) Describe methodology you will apply to model insurance risk.   (8)

iv) As a next step to this assignment, the company would like to understand how their capital model could be embedded in their business decision making. Your client has suggested to start with support on investment decisions.

a) Suggest the areas in which the company could use its model for investment decision making.   (2)

b) What are the factors which affect investment decision of insurance company?   (4)

[26]

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