INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

28th April 2016

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 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 a 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 have been appointed as a Peer Reviewer for a large international company currently writing all classes of business within the Indian market. The Peer review is to be carried on the reserves established by the company at March 31, 2016.

You are reviewing the reserves as a part of the Peer Reviewer process and report preparation, you are required to review and comment on the company's reserving methodology, and to re-project some of the key classes of business, in order to form a view on the company's year-end reserve figures.

You have reviewed the 2016 year-end reserving methodology of the Appointed Actuary of the company and have the following observations:

- Incurred claims data are used for projections.
- Projections are performed gross of reinsurance recoveries and a factor applied to derive net of reinsurance reserves.
- For the Bornhuetter-Ferguson (B-F) method, the expected loss ratio (ELR) is calculated as a rolling average of the ultimate loss ratios, using the chain ladder method, for the previous three accident years.
- The incurred claims data from all the classes are converted into $US prior to projecting. Due to recent concerns of possible depreciation of Indian currency, only the latest diagonal is adjusted. All previous diagonals are equal to the data in $US from the previous year reserve calculations. This is done using the latest exchange rates and by converting the movements in paid and outstanding claims only.

i) Discuss advantages and disadvantages of the approaches taken by the company's Appointed Actuary and highlight any recommendations that you would make in the report. (11)

The company started writing cyber risks during 2015 and the Appointed Actuary has determined reserves based on the underwriter's view of ELR.

ii) Comment on suitability of this method and recommendations, if any. (3)

The table below summarizes premium and incurred claims information for three classes of business underwritten by the company during 2016. The Appointed Actuary's view of ELR and claims development factor for each of these classes based is also shown in the table.

Currency INR, All figures in INR mn						
Line of Business	Premium P	Incurred Claims C	Expected Loss Ratio ELR	Development Factor to Ultimate df	Claim Ladder Ultimate	Bornhuetter -Ferguson Ultimate
Motor OD	35,000	31,500	70%	1.25	39,375	36,400
Product Liability	200	20	45%	3.2	64	82
Crop	1,100	2,200	90%	0.8	1,760	1,953

iii) Comment on appropriateness of the Chain Ladder and Bornhuetter-Ferguson Ultimates as better measures of the expected ultimate claims for each of these lines of business. (7)

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Q. 2) **i)** Explain the terms "reinstatements" and "reinstatement premiums" in the context of excess of loss reinsurance (3)

ii) Define the term "rate on line". (1)

[4]

Q. 3) State the reasons why a reinsurer would analyze claims data. **[5]**

Q. 4) The table below provides a financial statement summary for two general insurance companies based in the same country.

Balance Sheet as at 31/3/2016		
	All figures in INR mn	
	Company A	**Company B**
Outstanding claims and IBNR	3,500	4,700
Unearned Premium Reserves	800	450
Current Liabilities	100	150
Free Reserves	1,200	1,800
Total Liabilities	5,600	7,100
Broker balances	50	75
Deferred Acquisition Costs	120	150
Cash	1,510	1,685
Government Bonds	3,360	4,200
Equities	560	990
Total Assets	5,600	7,100

Profit and Loss Account as at 31/3/2016		
	All figures in INR mn	
	Company A	**Company B**
Gross Earned Premium	1,200	1,500
Net Earned Premium	840	1,450
Commission	100	100
Gross Claims Incurred	800	1,400
Net Claims Incurred	720	800
Other Expenses	180	105
Investment Income	180	300

i) Calculate the following ratios for each of the Companies A and B, stating any assumptions made:

a) Solvency ratio
b) Gross claim ratio
c) Net claim ratio
d) Return on capital employed

(6)

ii) Comment on the performance and financial condition of the two companies, including possible reasons for the differences. (14)

[20]

Q. 5) XYZ General Insurance Company Ltd has recently been licensed to write insurance business. They are planning to start with 2 lines of business, Motor and Health. Simple representation of company's balance sheet as at 31st March 2016 is as below:

Assets	**2015-16**
	(figure in Rs. Cr)
Investments	
Bonds	150
Equity	50
Other Assets	50
Total Assets	**250**
Liabilities	
Reserves	0
Other Liabilities	0
Total Liabilities	**0**
Equity	**250**
Total Liabilities & Equity	**250**

The company's business plan for next financial year beginning 1st April 2016 is as below:

Business Plan for FY 2016-17		
	Motor	**Health**
(figure in Rs. Cr)		
Gross Written Premium	250	250
Net Written Premium	250	250
Gross Earned Premium	125	125
Net Earned Premium	125	125
Loss Ratio	75%	60%
Operating expense (percentage of Gross Written Premium)	18%	18%

Further business plan team has provided following information:

- Loss Ratio of the motor and health class follow a log-normal distribution with 40% and 35% standard deviation
- Investment
  - o All bonds are invested in Zero Coupon Government Bond maturing on 31st March 2026
  - o Interest rate and equity scenario expected for next year is as below:

Percentile	**0.5**	**5**	**25**	**50**	**75**	**95**	**99.5**
10 Year Govt. ZCB Rate	6%	7%	8%	9%	10%	11%	12%
Equity Market Index Return	-10%	-5%	0%	12%	17%	22%	25%

- Beta of the equity portfolio is 1.2 and there are no idiosyncratic risk
- Nominal Value of the bonds are 325 cr.
- Correlation between motor and health line of business is expected to be 20%
- Correlation between equity and bond returns is expected to be 60%
- Correlation between premium risk and investment return is expected to be 30%

Risk appetite of the company is to remain solvent for 199 in 200 scenarios.

Based on the current financial information and proposed business plan provided above, calculate following making appropriate assumptions:

i) Premium risk for motor, health and combined business (12)

ii) Market risk (7)

iii) Calculate overall capital requirement (2)

iv) Calculate the diversification benefit between market and premium risk. Comment on why it arises. (5)

v) Name and describe two capital allocation methods. Allocated capital to risk types using both methods. (8)

[34]

Q. 6) For a multiline general insurance company

i) Describe the basic approach for carrying out ALM. (3)

ii) Suggest different metrics you could use to evaluate alternative strategies along with criteria for selection of optimal strategy. (4)

[7]

Q. 7) 'Actuaria', an emerging economy is going through an economic slowdown leading to defaults on the loans provided to large corporate borrowers. This has resulted in severe decline in valuations of banks on stock exchange, which has led to legal actions taken by the activist investors against the directors' of listed banking companies for their breach of duty and negligence in oversight.

i) What type of insurance product could have been bought by banking companies to protect their directors? (1)

ii) For the product above

a) What all could have been the coverages? (3)

b) List common exclusions (3)

c) What coverage basis do you think is best suited and why? (2)

[9]

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