INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

19th September 2017

Subject SA3 – General Insurance
Time allowed: Three Hours (14.45* – 18.00 Hours)

Total Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1.   *Please read the instructions inside the cover 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 a new set of Question paper from the Invigilator.*

AT THE END OF THE EXAMINATION

> **Please return your answer booklet and this question paper to the supervisor separately. You are not allowed to carry the question paper in any form with you.**

Q. 1) The state of Waterland in the country has experienced excessive rains earlier this year causing flooding across large areas and widespread damage to property. There has been a lot of anger against the Government authorities for failing to provide adequate protection to the public in time and subsequently for the poor pace of relief work. The Hon. Prime Minister of the country has set up a special committee to review the situation and suggest how homes in Waterland could be provided flood insurance for the times to come. The committee is considering making it mandatory for insurance companies selling home insurance to include flood cover.

i) You are the pricing actuary for an insurance company selling household cover all over the country. Discuss the likely impact of including flood cover on the premiums charged for policies sold in future. (7)

ii) The committee is also considering if purchase of home insurance, including flood cover, should be made mandatory for all homeowners of Waterland. Review the merits and demerits of this proposal. (5)

To reduce the burden on insurers of compulsory exposure to homes in the state of Waterland, which are susceptible to flooding nearly every year, the Government will allow them to charge a loading in their rates reflective of the flood risk. The loading is expected to vary across areas within Waterland, being high for areas with higher risk of flooding relative to other areas with a lower risk.

There is a maximum limit on the overall premium loading for a risk within Waterland, with the committee proposing that the Government subsidise the premiums for the excess exposure above the maximum limit. The Hon. Finance Minister has suggested that this subsidy be funded with an additional cess on all home insurance premiums across the country.

iii) Discuss the proposal to have the Government subsidise premiums for very high flood risk properties in Waterland and comment on the Hon. Finance Minister's suggestion to impose a countrywide cess to fund the subsidy. (7)

iv) A recent publication by the Ministry of Environment warns long-term climate change and increased rainfall in the state of Waterland. Suggest some short-term measures that general insurers could take each year in response to the resulting adverse claims experience, if flood cover was made compulsory in Waterland. (3)

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Q. 2) Company XYZ is a general insurer writing standard liability covers on a loss-occurring basis up to a policy limit of Rs. 1,00,000 for the past several years. The reinsurance covers purchased by the company historically have been excess of loss (XoL) treaties, written on a risk-attaching basis, providing cover up to the full policy limit written by XYZ.

The attachment of the reinsurance treaties was originally Rs. 10,000 and the company had been gradually increasing it over the years. Currently XYZ retains all losses on its portfolio and does not cede anything externally. The historical reinsurance structure is detailed below:

Effective Date	Expiry Date	Attachment Point	Participating Reinsurer(s)	Signed Line (%)
1-Jan-11	31-Dec-11	10,000	Q Re	40%
			T Re	10%

1-Jan-12	31-Mar-13	10,000	Q Re	30%
			S Re	5%
			T Re	5%
1-Apr-13	31-Mar-14	20,000	Q Re	25%
			S Re	5%
			T Re	5%
1-Apr-14	30-Apr-15	20,000	Q Re	25%
			S Re	5%
1-May-15	30-Apr-16	30,000	Q Re	20%
			S Re	5%
1-May-16	30-Apr-17	30,000	Q Re	20%

Aggregate gross losses for a twelve month exposure period have been statistically modelled by fitting a compound loss distribution to the loss portfolio from ground-up and simulating within loss layers.

Modelled mean aggregate gross loss for the portfolio up to policy limit is estimated at Rs. 10,00,000 per annum. 80% of the modelled mean aggregate loss is within the retained loss layer up to Rs. 10,000, 90% within the layer up to Rs. 20,000 and 93% within the layer up to Rs. 30,000.

The modelled ceded loss amounts for the XoL treaties purchased are earned for each accident year period (running from January to December) assuming an even spread of risk. The modelled ceded-to-gross loss factors thus estimated, are applied to the selected ultimate loss gross of reinsurance to derive the ceded ultimate loss for each accident year.

The below information is available as at year-end 2016:

Accident	Gross of Reinsurance Loss			Ceded Loss - Q Re		Ceded Loss - S Re		Ceded Loss - T Re	
Year	Paid	Incurred	Ultimate	Paid	Incurred	Paid	Incurred	Paid	Incurred
2011	8,00,000	8,55,000	9,00,000	29,600	33,600	0	0	7,400	8,400
2012	7,00,000	7,75,000	9,50,000	42,778	50,556	3,056	3,611	9,167	10,833
2013	7,50,000	8,10,000	11,00,000	29,791	37,239	5,104	6,381	5,104	6,381
2014	5,00,000	6,00,000	9,50,000	10,438	12,674	2,063	2,504	1,500	1,821
2015	3,15,000	4,50,000	10,50,000	4,943	8,238	1,023	1,705	34	57
2016	85,000	1,85,000	10,00,000	419	2,517	81	483	0	0

Gross loss percent developed:

		Year X	Year X+1	Year X+2	Year X+3	Year X+4	Year X+5	Year X+6
Incurred	Year X	25%	45%	60%	75%	85%	95%	100%
Paid	Year X	15%	35%	50%	65%	80%	90%	100%

i) Calculate the modelled ceded-to-gross loss factors and use these to estimate the ceded ultimate loss earned as at year-end 2016, for accident years 2011 through 2016. (14)

As a part of the capital assessment process, company XYZ wishes to investigate the financial soundness of its reinsurers so a bad debt provision may be held in respect of doubtful recoveries.

The following probabilities of default have been provided for the three reinsurers by an external agency based on their credit ratings:

	2017	2018	2019	2020	2021	2022	2023
Q Re	1.0%	1.0%	0.9%	0.9%	0.9%	0.8%	0.8%
S Re	0.7%	0.8%	0.8%	0.8%	0.7%	0.7%	0.6%
T Re	2.0%	2.5%	2.0%	1.5%	1.4%	1.3%	1.2%

ii) Briefly outline how you would estimate the RI bad debt provision for the earned ceded loss calculated above. You may assume the following:

- No discounting of liabilities is permitted
- No explicit margin is to be kept for adverse development
- Ceded loss development lags the gross loss development pattern by 6 months
- Recovery rates upon default are estimated to be 40% for Q Re, 50% for S Re and zero for T Re   (3)

iii) Illustrate by estimating the RI bad debt provision only in respect of ceded recoveries due on accident year 2014 as at year-end 2016.   (8)

iv) Discuss the issues that may arise and practical limitations that need to be considered when analysing and estimating RI bad debt.   (13)

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Q. 3) ABC General Insurance Company Limited is working on refilling their Motor Insurance policy with the regulator with increased number of rating factors. The company has also used multivariate approach to determine the base premium and relativity of levels by each factor. Before filling with the regulator the company has approached an actuarial consultancy company to review their work and suggest other improvements that the company could incorporate to have competitive advantage in the market place.

i) Discuss the criteria that could be used to evaluate the appropriateness of the selected rating factors.   (10)

ii) Comment on the difference between risk and rating factor. How could company use well understood risk factors to their competitive advantage for any general insurance product?   (8)

iii) Discuss validation that could be carried out to check the appropriateness of the multivariate model developed by the company?   (6)

One of the observations of the consultant is that the company has not considered trending the risk cost while arriving at the premium rates.

iv) Why should risk cost be trended?   (2)

v) Differentiate between 'trending' and 'development' of loss cost.   (2)

vi) Discuss the factors to consider while trending.   (12)

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