INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

22nd November 2019

Subject SP8 – General Insurance: Pricing

Time allowed: 3 Hours 15 Minutes (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. *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.*

3. *Attempt all questions, beginning your answer to each question on a separate sheet.*

4. *Mark allocations are shown in brackets.*

5. *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.*

Q. 1) Define the following terms:

   i) Underinsurance
   ii) Subrogation

                                                                                                              [3]

Q. 2) **i)** Define deductible, Excess and franchise, stating the key differences between these three policy terms.   (5)

   ii) A product UW is looking to minimize the number of small claims and ensure that policyholders retain some level of risk. Describe which policy term is most likely to achieve the above.   (4)
                                                                                                              [9]

Q. 3) Describe two types of reinsurance used to reinsure a closed book of business.   **[5]**

Q. 4) List the benefits of Spatial smoothing and explain the different methods of spatial smoothing.   **[6]**

Q. 5) LiabSure, a general insurance company operating in a large country, underwrites all non-life products. The Company over the years has built a sizeable portfolio of Jewellers Block policies. The management of the Company has decided not to underwrite any new business under this product. The Company is open to renew the existing policies whenever they are due for renewal. You are the chief Actuary of the Company and the management has asked for your suggestions relating to this matter.

   i) Outline briefly the uncertainties faced by LiabSure with respect to Claims on Jewellers Block product.   (4)

   ii) The Management has suggested monitoring the claims on each and every policy in force. Explain why the insurer would want to do this?   (2)

   iii) Define "policy lapse rate" and explain the risks faced by the Company in respect of lapses.   (3)
                                                                                                              [9]

Q. 6) Your company sells car insurance policies. The Company categorizes policies into high-risk and low-risk groups. In the high-risk group, the number of claims in a year is poisson with a mean of 30. The number of claims for the low-risk group is poisson with a mean of 10. The amount of each claim is pareto distributed with $\Theta = 200$ and $\alpha = 2$.

   i) Find the expected aggregate loss and variance of aggregate loss.   (2)

   The Company plans to build a GLM model to set pure risk premium rates base on the following rating factors:

Rating Factor Description	Levels
Insured Age	Below 25, 25-40, 41-55, Above 55
Gender	Male, Female
Car Color	White, Black
Area	Metro, Non-Metro

A Log link function is used to model frequency and severity separately with Poisson and Gamma error structures respectively. The model parameters estimates are as per table below:

Frequency Model		Severity Model	
Parameter	Model Estimate	Parameter	Model Estimate
Intercept	-2.5	Intercept	10.5
Age_Below 25	0.5	Age_Below 25	0.4
Age_25-40	-0.35	Age_25-40	0.07
Age_Above 55	-0.45	Age_Above 55	0.09
Gender_Female	-0.28	Gender_Male	0.29
CarColor_While	0.98	CarColor_Black	-0.55
Area_Non-Metro	0.80	Area_Non-Metro	-0.78

ii) Determine the Base estimates and relativities for each of the above rating factor levels for both frequency and severity. (6)

iii) Calculate the pure risk premium for a Female with Age 45 owning a Black Color car based in a Non-metro location. (2)

iv) List the different component to be considered to determine the office premium. (2)

[12]

Q. 7) A large established general insurance company currently underwrites only commercial lines of business. The management of the company has decided to start underwriting personal lines of business from next financial year. The Company does not have any experience in personal lines of business.

i) Discuss briefly the sources of data that the company can use for pricing appropriately. (5)

ii) Explain the challenges that the insurer could have due to inadequate data in respect of pricing and sourcing business. (6)

iii) Outline how the Company can mitigate the effects of inadequate or poor quality data. (5)

[16]

Q. 8) A Pricing actuary in a reinsurance company have been provided the below data of past 5 years from a cedant's property line of business on underwriting year basis. Cedant wants to purchase RI cover for 2020 for this line of business.

Year	Written Premium	Attritional Claims	Large Claims	NAT CAT Claims	Premium rate change	Inflation
2015	150	85	0	50		
2016	200	110	30	0	-5%	5%
2017	275	150	50	100	-3%	6%
2018	350	200	70	0	0%	7%
2019	450	270	30	0	3%	6%
2020					5%	6%

You can assume the expected cost of catastrophic claims is 5% of estimated written premium for 2019 and Reinsurance Company's expense ratio to be 7%. Rate change and inflation shown in year X in the table are from year (X-1) to X.

  i) Estimate the maximum ceding commission that can be paid to the cedant if the minimum profit target is 2% of the reinsurance premium. (8)

  ii) Calculate the reinsurer's profit % for each year after adjusting and indexing the premium rates and claims if the ceding commission is 15%. (4)

  iii) Cedant is open to have another option of lowering ceding commission but with profit commission provided to him. Calculate the reinsurer's profit % for each year after adjusting and indexing the premium rates and claims if the ceding commission is 5% and profit commission is 20%. (4)

  iv) As a costing actuary for reinsurance company which option you will prefer to offer and why? (2)

  [18]

Q. 9) **i)** What are the basic assumptions required for Increased Limit Factors (ILFs). (2)

  ii) Where is the flaw in below table and why?

Limit	100	200	300	500	1000	2000	5000
ILF	1.00	1.30	1.45	1.70	2.50	3.00	4.20

  (3)

  [5]

Q. 10) A large company specializing in home furniture has approached your company for an insurance quotation. The Company has about 50 stores located in different parts of the country where they sell furniture, other wooden items, artefacts and other home décor items.

  The Company has one central facility wherein all the wooden furniture is manufactured and transported to the stores through Company owned fleet of vehicles. The basic raw material "wood" is sourced from few plantations and is transported to the company's manufacturing unit using its own fleet of trucks.

  The Company has on an average 20 people in each store to sell the products. The staff at manufacturing facility includes about 25 carpenters and 75 support and other staff. The management and other administration staff are also based at the Company's manufacturing facility.

  i) List Eight key risks that this Company is exposed to and suggest for each risk a type of insurance that shall be suitable to cover the risk. (8)

  ii) The company has requested a discount on its premium due to its operations being spread around the country. Outline the points you would make in response to this request. (5)

  One of your Finance colleague has suggested that since expenses as percentage of premium are not much significant when compared to claim cost, the analysis around this is not much important. He further suggested that expense ratio for property class of business is known and the same ratio can be used to load this product as well.

  iii) Discuss briefly the method proposed by your colleague. (4)

  [17]

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