

INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

28th May 2024

Subject SP8 – General Insurance: Pricing

Time allowed: 3 Hours 15 Minutes (14.45 – 18.00 Hours)

Total Marks: 100

- Q. 1)** The Government of a large country has asked all the non-life insurers in the country to design a standard insurance product for the rural population. The standard product will cover their Property, Crop, Health and Personal Accident. A part of the premium will be paid by the insured and the balance amount will be paid by the Government as premium subsidy.

It is proposed that the overall Sum Insured may be fixed at 5 lakhs with appropriate sub limits for each of the covers provided.

- i) List the perils that will be covered by such a product. (4)
 - ii) What do you mean by insurability of a risk. What are the conditions that needs to be satisfied for a risk to be insurable. (4)
 - iii) You work in the pricing team of an insurance company. The appointed actuary of your company has asked you to list the data points that you will need to price each of the covers and possible source of the same. (6)
 - iv) List the issues in general that you will face with the data before using it for pricing. (6)
 - v) Discuss what do you mean by credibility of data. How will you ascertain the same for the internal data available with your company. (6)
 - vi) What do you mean by climate change. How does it affect the insurance industry at large. (8)
 - vii) How is climate change likely to impact each of the above risks covered by the package policy. (4)
 - viii) What are the challenges associated with this product that are likely to affect the claims uncertainty with reference to this product. (4)
 - ix) Briefly discuss the periodic actuarial investigations that needs to be carried out after the launch of this product. (8)
- [50]**

- Q. 2)** You work in the actuarial department of a reinsurer. You have been asked to review the experience of an insurer with the following terms.

The insurer reinsures 10% of all business underwritten on quota share basis and retains 90% to their net.

In addition, your reinsurance company is providing an Excess of loss cover with Attachment point INR 1 Crore and upper limit of 5 Cr. for a particular class of business.

Your underwriter has informed you that this XL treaty pertains to a manufacturing company insured by the insurer on all risk basis with the following terms.

Aggregate deductible: 25 Lakhs
 Individual deductible (ranking): 7 Lakhs
 Trailing deductible: 5 Lakhs
 Per occurrence limit: 1 Crore
 Annual aggregate limit: 3 Crore

- i) Define the terms Aggregate deductible, Individual deductible, Trailing deductible, Per occurrence limit and Annual aggregate limit. (5)
- ii) At the end of the financial year, you have called for the ground up claims amount to verify the claims reported to you (reinsurer) by the ceding insurer.

You have been supplied with the following 5 claim amounts reported by the manufacturing company to the insurer.

Loss No	Claim amount reported to the insurer (INR Lakhs)
1	56
2	123
3	133
4	156
5	32
Total	500

Calculate the following amounts.

- a) Claim amount paid by the insurer.
 b) Claim amount recovered from the reinsurer by the insurance company.
 c) Loss retained by the manufacturing company.

(6)
 [11]

Q. 3) Briefly discuss the original loss curves, the issues related to them and how they are used in pricing an insurance / reinsurance contract. [6]

Q. 4) You are the pricing actuary of startup insurance company that has a standard health insurance product which is distributed through multiple channels.

Recently your company has tied with an online platform that sells health insurance products to young tech savvy IT professionals. Visitors to the platform can compare your product with three other health insurance products from competitors.

The online platform has created sufficient awareness about Health insurance among the target population. However, your marketing team is concerned about lower-than-expected conversion rate of your health product.

- i) List the reasons why standard product may not achieve expected conversion rate. (6)
- ii) What steps your company can undertake to ensure that your product is competitive for each of the prospective customer visiting the platform to purchase a health cover.

(You may assume that sufficient datapoints about customers are available from the online platform than that is usually collected through an offline proposal form.) (6)

iii) Briefly explain the two main approaches to machine learning and give two examples of machine learning models which can be used in future. (4)

[16]

Q.5) You are working in the actuarial department of an insurance company reporting to the actuary in charge of quarterly valuations. The senior management of your company is concerned about the increasing trend in the incurred loss ratios and combined ratios during the last few years.

Your CFO has requested the actuarial team to explore the possibility of purchasing a whole account stop loss cover for the company. She also mentioned that “Reinsurers usually shy away from providing a stop loss cover”.

Define stop loss reinsurance cover and briefly discuss the reasons why reinsurers in general provide / not provide a whole account stop loss cover. [7]

Q.6) An insurer has large property portfolio, is planning to use a GLM model to price property insurance contracts. One of the factors used in the GLM is Postcode. As the factor has too many levels, there is a need to group some of the codes with similar experience.

i) In the context of grouping of factors what do you mean by Spatial smoothing? (2)

ii) Explain the two main forms of spatial smoothing? (4)

iii) Discuss the relevance of the spatial smoothing for the factor ‘Postcode’ in the context of pricing property contracts. (4)

[10]
