INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

24th May 2024

Subject SA3 – General Insurance

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

Total Marks: 100

Q. 1) A general insurance company that predominantly writes Motor and Health businesses is evaluating its line of business (LOB) wise capital requirements for the upcoming year. The Board of the company has suggested that, in addition to the regulatory solvency and economic capital requirements, the company also needs to have an internal process to meaningfully allocate capital across the LOBs by assessing capital adequacy at a desired level of confidence using an appropriate risk measure.

The Chief Actuary who is overseeing the capital allocation exercise between the two lines Motor and Health, has suggested the EPD (Expected Policyholder Default) risk measure and an allocation method wherein the capital is to be allocated such that the EPD is the same in all the lines of business. Besides, the threshold set for measuring expected loss under EPD is that the quantum of available assets (capital available) is at a level such that the probability of adequacy is at least 99.5% (i.e., ruin probability should be below 0.5%).

A preliminary investigation has led to the following information to be used in the capital allocation exercise.

<u>Total Assets available:</u> INR 2700 Crore
Note that Total Assets denote the overall capital available for allocation.

<u>Ultimate liability estimates</u>: Three probabilistic scenarios are given below:

<u>Optimistic Estimates – Probability 8%</u>
Motor – INR 600 Crore
Health – INR 500 Crore
<u>Base Estimates – Probability 85%</u>
Motor – INR 1000 Crore
Health – INR 800 Crore
<u>Pessimistic Estimates – Probability 7%</u>
Motor – INR 2000 Crore
Health – INR 1400 Crore

i) Define Expected Policyholder Default (EPD) and Probability of Ruin. (4)

ii)

a) Calculate the EPD separately for Health and Motor lines of business, assuming that capital is allocated equally between the two lines. *Hint: You may estimate the default in each scenario and then the overall expected default for each LOB.* (9)

b) Assuming the two lines of business are independent (and hence uncorrelated), calculate the EPD and ruin probability for the combined portfolio of Health and Motor. *Hint: You may estimate potential default under 3x3 scenarios and then the overall expected default & ruin probability.* (12)

c) Based on your calculations above, ascertain whether, and if yes how much, additional capital would be needed to meet the probability of adequacy criterion to be achieved as set out in the question above. (2)

d) As per the company's internal guidelines, the capital is to be allocated such that EPD is the same in all the lines of business. Demonstrate capital allocation in each of the two lines using your calculations in (b) & (c) above and comment on the results. (8)

iii) What further steps and investigations would you suggest so that the above capital allocation process may be made more robust? (9)

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Q. 2) Reinsurance operations across the globe have been witnessing significant changes in the recent years both in terms of market prospects and the regulatory landscape. Whereas the reinsurance market participants are trying to streamline their operations through cost corrections, customised solutions and capacity calibrations, the Indian regulations are also constantly evolving with market developments through revisions and amendments with an aim to promote enhanced capacity, healthy competition and a stable environment for insurers and reinsurers alike.

i) State the objectives of a reinsurance programme, the main principles of an insurer's retention policy and considerations for the Board while formulating the insurer's retention policy that are to be complied by Indian insurers as per the IRDAI (Reinsurance) Regulations, 2018 and any amendments thereof. (10)

Historically, the most commonly used risk management strategy adopted by insurers to protect themselves from the uncertainties and volatilities arising from risks accepted by them is *reinsurance*.

However, with reinsurance prices hardening in the recent years and reinsurance market struggling to meet market expectations both in terms of cost and capacity in view of new and emerging risks, climate change challenges and catastrophe incidences, more and more insurance companies are exploring alternative arrangements like *reinsurance captives* and *self-insurance*.

A reinsurance captive is an ART solution which is effectively a risk-retention strategy whereby the parent insurance company retains risk however by passing on risks to a wholly owned subsidiary company established as an exclusive reinsurance vehicle for the ceding parent company to manage the risks retained with an aim to achieve cost efficiency and capacity for any uninsurable risks.

Self-insurance is also a self-financed risk-retention strategy whereby the insurance company instead of diverting funds to another legal entity, earmarks own funds inhouse to cover potential losses through reserves and provisions.

ii) Compare the implications of each of the risk management strategies, i.e., reinsurance, captive insurance and self-insurance, for an insurance company in each of the following areas:

a) Set-up process
b) Compliance & Solvency issues
c) Accounting treatment
d) Tax consequences
e) Investment freedom
f) Premium flexibility

g) Profit considerations
h) Exit feasibility (24)

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Q. 3) The management of a general insurance company that has been in operation for a few years has till date been cautious about accepting large commercial risks despite possessing adequate actuarial and underwriting expertise inhouse, appropriate products and the necessary capital and reinsurance support. Considering this theoretical readiness, in a recent meeting with the Board of Directors, the Board has advised the management to explore venturing into this area however conforming with sound actuarial and underwriting principles.

i) State the areas in which actuaries can involve and contribute in the process of underwriting large commercial risks. (6)

The underwriters have approached the management with a proposal from a large and reputed manufacturing conglomerate that are venturing into installation of electric vehicle (EV) charging stations looking to have their risks insured. The underwriters believe this would be an opportunity to enter the area of large commercial risks with a renowned client and alongside gain advantages of being one of the first movers in this category in the market.

ii) What are the common coverages the client is likely to seek in their venture? (8)

Given that this portfolio is a new and emerging one with no comparable data and performance indicators available to assess if this would a sustainable and cashflow generating portfolio, the management and the Board have given a go ahead however in a guarded and watchful way to avoid unpleasant surprises.

iii) Explore the options available to the insurer that allows them to accept the risks cautiously and not jeopardising insurer interests. (8)

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