

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

21 September 2022 (am)

Subject SP2 – Life Insurance Specialist Principles

Time allowed: Three hours and twenty minutes

<p>In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator.</p>
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If you encounter any issues during the examination please contact the Assessment Team on
T. 0044 (0) 1865 268 873.

- 1** A life insurance company has been considering the impact of climate change and has concluded that the following are the top four climate-related risks for its portfolio of liabilities:
- Policyholders requesting investment in Environmental, Social and Governance (ESG)-friendly investments
 - Impact on property prices from increased flood risk
 - Tax changes to limit levels of fossil fuel consumption affecting the value of unit-linked funds
 - Reduced longevity in cities due to higher air pollution.

Discuss which of the three main categories of climate-related risk each of the areas identified by the company falls into. [4]

- 2** A mutual life insurance company currently sells conventional with-profits policies that use an addition to benefits approach and provides a reversionary bonus using the simple approach, plus a terminal bonus.

The company is considering launching a new conventional with-profits product that uses a super-compound approach to reversionary bonus instead of a simple approach.

(i) Describe why the company may want to offer a new product using a different approach to reversionary bonus. [4]

(ii) Suggest possible issues associated with launching the new product. [4]
[Total 8]

- 3** (i) Define the three types of risk associated with mortality assumptions. [3]

A small life insurance company writes a variety of conventional products that provide a lump sum on death.

The company reviews its mortality assumptions annually based on mortality experience split by sex, age band and product. The company includes 3 years of historic data in the analysis.

The company has observed volatility in the mortality assumptions suggested by the analysis. It has performed an investigation and has determined that the number of lives exposed to risk in each cohort is not statistically credible.

(ii) State what type of mortality risk this is. [1]

(iii) Describe approaches the company could take to reduce the volatility in the mortality assumptions. [6]

[Total 10]

- 4 Over recent years, a life insurance company has experienced an increase in the number of surrenders of its term assurance policies.
- (i) Suggest possible reasons why there may have been an increase in the number of surrenders. [6]
- (ii) Discuss possible actions that the company may take to reduce the number of surrenders. [7]
- [Total 13]

- 5 A life insurance company sells and administers a large portfolio of policies for a certain product.

In setting the surrender assumptions for pricing this product, the company initially calculates the average of the experienced surrender rates in the most recent 3 years. These averages are then adjusted to reflect a number of factors before setting the pricing assumptions.

In 2021, the company set its pricing assumptions from the most recent 3 years of surrender experience for this portfolio as shown in the table below:

<i>Term outstanding (years)</i>	<i>Experienced surrender rates</i>			<i>2021 pricing assumption (%)</i>
	2018 (%)	2019 (%)	2020 (%)	
20–25	7.0	7.5	8.0	9.0
15–20	5.0	5.5	4.5	5.0
10–15	10.0	7.0	11.5	10.5
5–10	8.5	7.0	7.0	8.0
0–5	5.0	3.0	4.0	4.5

- (i) Suggest possible reasons for each of the 2021 pricing assumptions differing from the average of the experienced surrender rates. [6]

The company has now completed the 2021 experience investigation. There have been no changes to the product design over the year. The results of the investigation are shown in the table below:

<i>Term outstanding (years)</i>	<i>2021 experienced surrender rate (%)</i>
20–25	10.0
15–20	3.5
10–15	8.5
5–10	8.5
0–5	3.5

- (ii) Recommend, with reasons, a set of assumptions that could be used for pricing new policies. [7]
- [Total 13]

- 6 A life insurance company that primarily sells term assurance business is looking to introduce a new version of the product. This version would be offered online and via insurance intermediaries.

Two potential product designs are under consideration, Option A and Option B.

Option A:

A term assurance with a simplified underwriting process whereby customers are accepted provided they can answer a series of basic questions. The minimum term of a policy is 5 years.

Option B:

A term assurance using the company's standard underwriting process, but offering the option to convert the policy into a whole of life assurance at the end of the term with no further underwriting at that stage. The premium will be revised at the point of conversion to reflect the policyholder's age and the original underwriting decision.

Discuss the factors the company would consider in comparing the two designs. [16]

- 7 A life insurance company sells single-life whole of life insurance contracts, which provide accelerated benefits on a critical illness event. The benefit due on critical illness is 40% of the sum assured, with the remaining 60% payable on subsequent death. The premium payable is level throughout the life of the contract, and surrender values are based on a percentage of the statutory reserves.

- (i) List the cashflows that the company would project when using a model to price the contract. [5]

For one model point with a sum assured of \$100,000 the following table shows the mortality rates (q), critical illness rates (ci) and surrender rates (s) in the first 3 years:

<i>Year</i>	<i>q</i>	<i>ci</i>	<i>s</i>
1	0.001	0.002	0.02
2	0.0015	0.003	0.02
3	0.002	0.004	0.02

The model assumes that all cashflows occur at the end of the year, with deaths occurring just before critical illness claims and surrenders.

- (ii) Calculate the expected amount payable on death in year three for the model point, showing your workings. [5]
- (iii) Discuss how the surrender rates could change for policyholders who have already claimed for critical illness. [3]
- (iv) Describe how the model could be changed to allow for any differences in surrender rates for the policyholders who have already suffered a critical illness event. [4]

[Total 17]

8 A life insurance company has a large portfolio of immediate annuity policies and sells policies via independent intermediaries.

The regulator in the country in which the company operates is introducing new climate change regulations. These include a tax on paper usage, which will apply to all companies.

- (i) Discuss the actions the company could take to reduce the paper usage in the administration and sale of annuity policies. [13]
- (ii) Discuss how the new tax may impact the pricing and design of new annuity policies. [6]

[Total 19]

END OF PAPER