

INSTITUTE AND FACULTY OF ACTUARIES



EXAMINATION

26 April 2018 (pm)

Subject ST2 – Life Insurance Specialist Technical

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
3. *You have 15 minutes of planning and reading time before the start of this examination. You may make separate notes or write on the exam paper but not in your answer booklet. Calculators are not to be used during the reading time. You will then have three hours to complete the paper.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all seven questions, beginning your answer to each question on a new page.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator from the approved list.

- 1 Contrast the revalorisation and contribution methods of distributing profits to policyholders. [5]
- 2 (i) Describe the key features of catastrophe reinsurance. [4]
- Life insurance company A writes individual term assurance business. Life insurance company B writes group life business.
- (ii) Explain why company B is more likely than company A to purchase catastrophe reinsurance, including examples of different situations that might give rise to a catastrophe reinsurance claim. [4]
- [Total 8]
- 3 A life insurance company sells a unit-linked savings product.
- There are two types of contract under this product: contract type A has guaranteed charges and contract type B has variable charges.
- For supervisory reporting purposes, the company sets its non-unit reserves using prudent assumptions.
- Contracts of type A have positive non-unit reserves due to the projected future guaranteed charges being lower than projected future expenses. Type B contracts have negative non-unit reserves.
- The regulatory environment permits surrender rates to be used in the calculation of supervisory reserves. The margin for prudence is achieved by adding or deducting a margin from the best estimate surrender rate.
- (i) Explain whether the margin should be added to or deducted from the surrender rate assumption, for each of contract type A and B. [3]
- The company's persistency experience analysis is performed across both types of contract, without differentiating between type A and type B. The results of this analysis over the last ten years are as follows:
- | | | | | | | | | | | |
|-------------------|------|------|------|------|------|------|------|------|------|------|
| Year of surrender | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Surrender rate | 3% | 4% | 5% | 6% | 7% | 8% | 6% | 7% | 9% | 8% |
- The company proposes to set its non-unit reserve surrender rate assumptions for contract type A as 3% per annum, and for contract type B as 9% per annum.
- (ii) Evaluate this proposal. [8]
- [Total 11]

- 4** A life insurance company is considering adding a new feature to its term assurance product.

This feature would allow the policyholder, when the original term assurance policy came to an end, to have the option to take out a new term assurance policy with the company for the same sum assured as the original policy.

The premium rate for the original policy would include a loading to allow for the cost of the option.

At the time of exercising the option the new policy would not be subject to any underwriting and the premium payable would be based on the market rates offered by the company at that time for a term assurance policy.

- (i) Describe the additional risks that the company would face as a result of adding this option to the product. [7]
 - (ii) Suggest ways in which the company could manage these risks. [9]
- [Total 16]

- 5** In a developed country, policyholders save for retirement by purchasing a unit-linked endowment assurance which provides an accumulated pension fund at their retirement date, which the policyholder can use to provide benefits in retirement.

Historically, the country's pensions legislation has allowed policyholders to take up to 25% of their accumulated fund in cash at retirement, and the balance of their fund has to be used to purchase an immediate annuity with the company that provided the endowment assurance.

Pensions legislation is now changing. Policyholders will be able to take their full accumulated fund as cash, i.e. the maximum limit is being removed, and they will no longer be required to purchase an immediate annuity. However, if they still wish to purchase an immediate annuity this can be from any insurance company in the market.

- (i) Assess the impact this change is likely to have on the pricing assumptions for immediate annuities. [10]
 - (ii) Suggest actions that a life insurance company could take in order to determine revised immediate annuity pricing assumptions as a result of this change. [4]
 - (iii) Describe the risks to an endowment assurance policyholder who reaches retirement following the implementation of the new legislation. [4]
- [Total 18]

- 6 A life insurance company is designing a new single premium unit-linked product to provide customers with a flexible income in retirement.

At retirement, the pension fund that the customer has already accumulated (using other products) will be invested in unit-linked funds chosen by the customer. There will be a wide range of unit-linked fund choices, including an “income solution” fund that the company promotes.

The customer then chooses how much income to take from their policy and when that income will be taken.

Income can be taken regularly (annually or monthly), but customers can also withdraw any amount at any time.

To help the customer manage their income and investment during retirement, the company will also offer an optional annual review service.

The product charges that are being proposed are:

- a basic fund annual management charge of 1% on all unit-linked funds
- an additional fund annual charge of 0.2% on the “income solution” fund, if chosen
- an additional fund annual charge of 0.1% for the annual review service, if chosen

No other charges are proposed, including no penalties on full withdrawal or on income withdrawals. On death, a benefit equal to the unit fund value of the policy would be paid.

The company has developed a deterministic model in order to test the profitability of this product.

- (i) List the main assumptions that would be used in this model. [6]
- (ii) Outline possible reasons why the company chose to use a deterministic model. [2]

The company is planning to perform a number of model runs in addition to the main best estimate run.

- (iii) Suggest, with reasons, additional model runs that would be useful. [4]

The initial model runs give results that do not meet the company’s profit criteria.

- (iv) Suggest possible actions the company could take to improve the profitability of the product. [8]
- [Total 20]

- 7 A life insurance company has taken on the existing insurance risk of a pension scheme through a “bulk buy-out” arrangement. Under this arrangement the life insurance company has taken on the risk via a number of without profits deferred annuity liabilities to pay benefits to the members when they retire.

The company has incorporated the bulk buy-out policies (i.e. the deferred annuities) into its actuarial valuation model and processes, and is able to produce a monthly valuation of the liabilities. The policies and liabilities can be identified at a member level.

The company has been asked to provide transfer values (i.e. the value of the member’s deferred annuity, which they can transfer to another provider) to members at the point at which the members request them. The company has decided to calculate these transfer values by using its prospective liability valuation model. The assumptions to be used in the transfer value calculation are based on best estimates, being the same as those used for pricing without profits deferred annuities at the time at which the transfer value is requested.

- (i) Assess the extent to which this approach will meet the principles for setting surrender values. [12]
- (ii) Suggest practical considerations and issues that would arise for the company in relation to the production of transfer value calculations for members. [5]

At death after retirement age, if the scheme member is married then a spouse’s pension of 50% of the member’s pension is payable to the spouse for the remainder of their life.

The company has just discovered that it also needs to calculate the value of the spouse-related benefits in isolation from the other benefits for the member.

- (iii) Discuss the additional practical issues that could arise from this requirement, including possible solutions. [5]
- [Total 22]

END OF PAPER