

# **INSTITUTE AND FACULTY OF ACTUARIES**

## **EXAMINATION**

29 September 2020 (am)

### **Subject SP2 – Life Insurance Specialist Principles**

Time allowed: Three hours and fifteen minutes

#### **INSTRUCTIONS TO THE CANDIDATE**

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.

If you encounter any issues during the examination please contact the Examination Team on T. 0044 (0) 1865 268 873

- 1** A large bancassurer that sells all types of protection business, and has done so for many years, is considering analysing its data using ‘big data’ methodologies.
- Suggest possible reasons why the company may be considering this course of action. [5]
- 2** Outline the possible approaches that can be used to determine future rates of mortality improvement. [5]
- 3** A life insurance company sells an individual term assurance product and is thinking of introducing an online application process for this product that will include underwriting questions. This will replace the existing traditional paper-based underwriting process that the company currently uses.
- (i) Suggest possible reasons why the company is considering the introduction of an online application process. [3]
- (ii) Describe how the risks the company is facing could change as a result of the move to online questions for underwriting. [4]
- [Total 7]
- 4** A life insurance company is considering adding a mortality option to one of its existing products.
- (i) Outline three common mortality options that could be included in a life insurance product. [3]
- (ii) Suggest possible reasons why a policyholder may choose to exercise each of the three common mortality options identified in part (i). [5]
- [Total 8]
- 5** A large life insurance company has a portfolio of term assurance, annuity and unit-linked policies. The company is reviewing its investment strategy for the assets backing the product liabilities.
- Suggest, with reasons, possible suitable asset classes that the company may consider. [10]

**6** A life insurance company measures its profit criteria using the following measures:

- Net Present Value (NPV), expressed as a percentage of the present value of expected premiums payable, and discounted using a rate relevant to the riskiness of the product
- Internal Rate of Return (IRR)
- Discounted Payback Period (DPP).

The company is deciding which of two new products, A and B, to launch, and has calculated profit criteria for both products. The results of these calculations are shown in the table below:

	<i>NPV</i>	<i>IRR</i>	<i>DPP</i>
Product A	1%	Does not exist	Zero
Product B	2.5%	20%	6 years

- (i) Discuss the advantages and disadvantages of launching either product A or B, based on the information above. [5]
- (ii) Explain what other information the company may consider before deciding on which product to launch. [4]

[Total 9]

- 7 (i) Define the basic equity principle of unit pricing for an internal fund. [1]

A life insurance company that sells unit-linked business is looking to merge two of its internal unit-linked funds – Fund A and Fund B. This will be carried out by closing Fund B and transferring all assets and liabilities of Fund B into Fund A. Any expenses associated with the transfer will be covered by the life insurance company.

Policyholders who are invested in Fund B at the transfer date will be issued new units of Fund A with an equal monetary value to the units that they held in Fund B at the date of transfer.

The following data are available at the transfer date:

<i>Fund A</i>	
Unit Price	\$2.25
<i>Fund B</i>	
Value of assets at market offer price	\$50,000
Cash on deposit	\$400
Value of loans to the fund	\$325
Investments sold but not yet settled	\$5,000
Investment purchased but not yet settled	\$100
Accrued income	\$50
Accrued tax	\$125

- (ii) Determine the number of new units that will need to be created in Fund A for transferring policyholders in order to satisfy the basic equity principle. [5]
- (iii) Suggest other factors that the company could consider when merging unit funds. [10]

[Total 16]

- 8** A life insurance company has a portfolio of unit-linked pension policies where the policyholder can, at retirement, either take the value of the unit-linked fund as a lump sum or convert the lump sum into an immediate annuity. The product is no longer open to new business.

If the policyholder chooses to take an annuity, there is an option on the policy. The policyholder can choose whether the interest rate used to convert the lump sum into an immediate annuity is either the current interest rate in the market at the point of retirement, or a guaranteed annuity option where the rate of interest is set out in the policy's terms and conditions. All other assumptions used in the guaranteed annuity option will be the same as those that the company uses when setting immediate annuity rates at the retirement date.

The guaranteed annuity option is only available if the policyholder retires at the retirement date they selected when they purchased the policy.

A policyholder is approaching their selected retirement date, and is choosing between taking an annuity based on current interest rates or taking the guaranteed annuity option.

Current and predicted future interest rates are below the rate of interest applicable to the guaranteed annuity option.

- (i) Recommend, with reasons, whether the policyholder should take the guaranteed annuity option. [2]

Historically, the life insurer has not modelled the guaranteed annuity option in its valuation of the reserves for the unit-linked pension products. The life insurer is now considering how to model the guaranteed annuity option.

- (ii) Describe the two main approaches the company could use to model the guaranteed annuity option. [5]

- (iii) Suggest the factors the company should consider when deciding between the two approaches. [5]

The company has recently conducted an experience analysis of the take-up of the guaranteed annuity option since interest rates fell below the guaranteed level. It has observed a difference in take-up rates by profession, with more highly paid professions with an alternative source of retirement income taking the lump sum rather than the guaranteed annuity.

- (iv) Discuss the possible reasons for this variation by profession. [5]

[Total 17]

- 9 (i) Outline why a life insurance company may require capital. [6]

A proprietary life insurance company has a portfolio of conventional without profits and unit-linked products.

A projection of the solvency position of the company has just been completed. The projection is for 5 years and allows for new business. The projection shows a significant increase in surplus in excess of regulatory capital requirements over the term of the projection.

The projection is now being checked.

- (ii) Suggest possible checks that may be performed on the projections. [11]

The company has found no errors through carrying out the proposed checks and the surplus is projected to increase over the 5 years of the projection period.

The company is now considering various actions to include in the business plan that will make the most suitable use of the surplus.

- (iii) Suggest possible actions that the company could consider. [6]

[Total 23]

**END OF PAPER**