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**SOCIETY OF ACTUARIES**  
**Life Pricing**

# Exam ILALP

## MORNING SESSION

**Date:** Wednesday, April 26, 2017

**Time:** 8:30 a.m. – 11:45 a.m.

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### INSTRUCTIONS TO CANDIDATES

#### General Instructions

1. This examination has a total of 100 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 40 points).
  - a) The morning session consists of 6 questions numbered 1 through 6.
  - b) The afternoon session consists of 4 questions numbered 7 through 10.The points for each question are indicated at the beginning of the question.
2. Failure to stop writing after time is called will result in the disqualification of your answers or further disciplinary action.
3. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.

#### Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.
2. Write on only one side of a sheet. Start each question on a fresh sheet. On each sheet, write the number of the question that you are answering. Do not answer more than one question on a single sheet.
3. The answer should be confined to the question as set.
4. When you are asked to calculate, show all your work including any applicable formulas.
5. When you finish, insert all your written-answer sheets into the Essay Answer Envelope. Be sure to hand in all your answer sheets because they cannot be accepted later. Seal the envelope and write your candidate number in the space provided on the outside of the envelope. Check the appropriate box to indicate morning or afternoon session for Exam ILALP.
6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

Tournez le cahier d'examen pour la version française.



**\*\*BEGINNING OF EXAMINATION\*\***  
**Morning Session**

- 1.** (8 points) You are developing a single premium deferred annuity product to be sold in the U.S. with the following constant maturity treasury (CMT) rates:

	<b>5-year CMT</b>	<b>10-year CMT</b>
Average over last 2 years	3.87%	5.12%
Average over last 1 year	3.69%	4.97%

- (a) (4 points) Calculate the minimum nonforfeiture amount at the end of the first three policy years assuming that the initial CMT applies for all future periods and the single premium is 10,000. Show all work.
- (b) (4 points) You determined that cash surrender value does not meet the minimum nonforfeiture requirements under the retrospective test.

You are given the following:

- Single premium = 10,000
  - Surrender charge = 10% of premium year 1, decreasing by 1% each year after
  - Commissions = 8% of premium
  - Front end load = 2% of premium
  - Periodic fee = 85 (deducted at the end of each year)
  - Guaranteed interest rate = 2.00%
- (i) Demonstrate how the cash surrender values fail the retrospective test.
- (ii) Recommend four product design changes that will make the product compliant with the minimum nonforfeiture requirements. Justify your answer.

**2.** (11 points) EBB Life is looking to enter the U.S. Life Insurance industry. EBB is interested in offering the following products:

- Guaranteed Issue 10-Year Term Insurance
- Indexed Universal Life with No Lapse Guarantee
- Variable Annuities
- Single Premium Immediate Annuities

(a) (5 points) EBB is evaluating the following distribution channels:

- Financial Advisors
- Independent Agents
- Career Agents
- Home Service Agents
- Direct Marketing

- (i) (2 points) Describe the types of compensation typically used for each distribution channel.
- (ii) (3 points) Recommend a distribution channel for each of EBB's proposed products. Justify your answer.

## 2. Continued

EBB is interested in offering the above products to wealthy clients.

- (b) (3 points) Evaluate the appropriateness of each product for EBB's target market. Justify your answer.
- (c) (1 point) List items that must be submitted as part of the product filing with a state department of insurance.
- (d) (2 points) The following procedures have been proposed for handling life insurance policy replacements:

### **EBB Life**

#### Life Insurance Replacement Procedures:

1. We will develop and distribute a pamphlet to potential policyholders describing the pros and cons of the replacement.
2. Before initiating a replacement offer, we will contact the existing insurer to provide the name and contact information of the policyholder and the policy form we are marketing.
3. We will track replacement transactions to provide statistical summaries for all appropriate regulators.
4. We will allow the existing insurer to provide an inforce illustration within 30 days of replacement initiation, otherwise we will complete the replacement.
5. We will guarantee any new policyholder free-look terms that are no worse than those found on their original policy.

*For Internal Use Only*

Compare the requirements of the proposed replacement procedures to those required by the NAIC Model Life Insurance and Annuities Replacement Regulation.

3. (13 points) You are given the following information for a flexible premium universal life policy issued to an insured person age 45 in the U.S.

- Policy face amount = 100,000
- Planned annual premium = 1,250 per year
- Annual policy fee = 75 in all years
- Premium load = 10% on all premiums
- First year policy load = 250
- Guaranteed cost of insurance charges equal 2017 CSO mortality table
- Guaranteed credited rate = 3%
- All charges and credits are applied to the accumulation value on the base plan

There are two optional riders:

- Accidental death benefit (ADB) rider (charge is 80 per year)
- Hospital indemnity acceleration benefit (HI) rider which permits acceleration of 1% of a specified amount if hospitalized for at least 7 days due to a critical illness such as heart attack (charge is 50 per year)

(a) (2 points) Explain how the actuarial limitations under 7702 and 7702A will change with these riders.

(b) (5 points) The policy follows the guideline premium and cash value corridor test for section 7702 purposes. You are provided the following pertinent information based on the 2017 CSO mortality table:

Age	The net single premium per 1,000		$\ddot{a}_x^{4\%}$	$\ddot{a}_x^{6\%}$	$\ddot{a}_{x:\overline{7} }$
	@ 4%	@ 6%			
45	291	174	18.43	14.50	6.19
55	402	274	15.54	12.74	6.11
65	535	409	12.09	10.57	5.91

- (i) Calculate the guideline single premium and guideline level premiums for this policy.
- (ii) Calculate the guideline limit in policy year 30.
- (iii) Calculate the 7-pay premium under section 7702A.

Show all work.

### 3. Continued

- (c) (4 points) Calculate the tax implications in year 16 assuming the cash value is 30,000, for the following:
- (i) withdrawal of 22,000 for a non-MEC policy
  - (ii) policy loan of 22,000 for a non-MEC policy
  - (iii) withdrawal of 22,000 for a MEC policy
  - (iv) policy loan of 22,000 for a MEC policy
- (d) (2 points) Explain the income tax treatment of the HI rider assuming a significant gain in the contract and the policy is:
- (i) A non-MEC
  - (ii) A MEC

**4.** (10 points) JKL Life sells Universal Life (UL) products and decides to introduce a flexible premium Variable Universal Life (VUL) product that will either offer a level COI or a YRT COI option.

(a) (3 points) For JKL's UL and VUL products:

- (i) Describe the risks associated with using a level COI option.
- (ii) Describe the risks associated with using a YRT COI option.
- (iii) Propose a sensitivity test to better assess each risk identified above.

You are given:

- Statutory required capital is factor-based and is similar for the level COI and the YRT COI options
- Pricing earned rate is the 20-year corporate bond yield

(b) (4 points) The risk of each COI option is measured using either IRR or value of new business (VNB) profit metrics.

- (i) (3 points) Explain advantages and disadvantages of each profit metric.
- (ii) (1 point) Recommend which profit metric would best reflect the risks of each of the COI options. Justify your answer.

(c) (3 points) Explain which COI option will produce a higher VNB assuming risk-based pricing.



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- 5.** (11 points) LDD Life launched a single premium equity indexed annuity (EIA) in 1998 with a 5-year point-to-point index period crediting strategy. The guaranteed minimum account value (GMAV) was set to satisfy the “old” (pre-2003) Standard Nonforfeiture Law. The volatility of the equity markets has increased significantly since the product was originally designed and priced.
- (a) (1 point) List four product design changes to reduce option costs.
- (b) (3 points)
- (i) Describe two major forms of hedging to mitigate option risk for an EIA.
- (ii) Describe advantages and disadvantage of these forms.
- (c) (3 points) The earned rate of the assets backing the GMAV has declined from 7% to 4% since the original pricing of the product. Calculate the percentage impact this decrease in the earned rate would have on a single premium of 100. Show all work.

## 5. Continued

(d) (4 points) The following new EIA product has been proposed:

Index Period:	4 Years
Index:	S&P 500
Index Growth Method:	Point-to-point
Ratchet:	Every 2 years

Ratchet Feature	Rate	Application order at the time of each
Participation Rate	97.0%	1
Margin	0.5%	2
Floor	0.0%	3
Cap	10.0%	4

Year	S&P 500 Index Value
0	1000
1	960
2	1120
3	1020
4	1135

The product is subject to the post-2003 NAIC Standard Nonforfeiture Law for individual deferred annuities using an interest rate of 3.5% to calculate the minimum nonforfeiture amount.

Calculate the following at the end of years 2 and 4 as a percentage of the single premium:

- (i) Index account value
- (ii) GMAV
- (iii) Cash value

Show all work.

**6.** (7 points) JJD Life is entering the U.S. term life insurance market with a new two-year level-premium term product.

(a) (4 points)

- (i) (1 point) Describe the difference between buyer-oriented and competition-oriented pricing strategies.
- (ii) (1 point) Describe each buyer-oriented strategy.
- (iii) (2 points) Assess whether each strategy is appropriate for JJD.

You are given the following pricing results:

Year	GAAP Income	Required Capital at Start of Year	Statutory vs. GAAP Accounting Differences	Statutory Cash Flow
1	90	1000	135	75
2	90	650	90	40

The initial statutory cash flow is negative 100. The interest on required surplus is 4%.

(b) (3 points)

- (i) Calculate the annual GAAP ROI for years 1 and 2.
- (ii) Calculate the statutory IRR.
- (iii) Explain why GAAP ROI and Statutory IRR may differ.

Show all work.

**\*\*END OF EXAMINATION\*\***  
**Morning Session**

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