SOCIETY OF ACTUARIES
Life Pricing

Exam ILALP

AFTERNOON SESSION

Date: Wednesday, November 2, 2016
Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 4 questions numbered 7 through 10 for a total of 40 points. 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.

475 N. Martingale Road
Schaumburg, IL 60173-2226

Printed in the U.S.A.
Exam ILALP-Front Cover

****BEGINNING OF EXAMINATION****
Afternoon Session
Beginning with Question 7

7. (*10 points*) You are the Chief Actuary for a large U.S. life insurance company.

(a) (*3 points*) The company's large case block contains the following policies:

Policy	Benefits Payable
A	90
B	30
C	0
D	250

The block is subject to the following reinsurance treaties which are applied in the order they appear in the table below.

Treaty	Priority	Capacity	Quota Share	Premium	Income to Reinsurer
Excess of Loss	50	100	-	40	30
Quota Share	-	-	40%	100	8
Stop Loss	80	60	-	20	15

The U.S. corporate income tax is 35% and the offshore excise tax is 3%.

(i) Calculate the benefits reimbursed under each treaty. Show your work.

(ii) Determine whether it would be optimal for these treaties to be written by an offshore or domestic reinsurer from a tax perspective. Assume no income tax for offshore reinsurer.

(b) (*3 points*) Critique the following statements regarding the reinsurance program between your company and the reinsurers:

A. *"In our quota-share treaty, the reinsurer will fund all benefit payments, in exchange for us sending the reinsurer any premiums and increases in reserve."*
B. *"Regulators do not allow us to use any low quality reinsurance counterparties."*
C. *"Captive insurance companies originated as vehicles to provide greater financial flexibility to insurance companies."*
D. *"Standard treaty terms give the policyholder a direct claim over the reinsurer in the event of the direct insurance company's insolvency."*
E. *"Standard treaty terms allow either party to independently dispute a claim."*

7. Continued

(c) (*4 points*) Critique the memo below for compliance with ASOP 23 and identify any missing elements necessary to be in compliance.

To: Chief Actuary
Subject: Claims experience data analysis
Date: April 30, 2014

I have been tasked with the analysis of claims experience on our reinsured large case block, following up on the same exercise performed two years ago. To perform the current analysis, I relied on a database of claims maintained by the Valuation Actuary which covers claims between 1999 and 2006. After auditing the data, I identified a number of issues that are worth highlighting:

- The data contains duplicate records for policies with the waiver of premium rider
- Some smoker claims experience fields are missing
- Approximately 5% of the records appear to have unreasonably high face amounts

The Valuation Actuary will be providing a Prescribed Statement of Actuarial Opinion (PSAO) on the analysis in conjunction with the relevant ASOPs in a separate e-mail.

A final critical disclosure is that I was required to deviate from the standards in order to comply with our State's newest laws on the subject.

Regards,
Experience Actuary, FSA

8. (*9 points*) You have been asked to perform a sensitivity analysis of a new universal life with secondary guarantee (ULSG) product.

(a) (*2 points*) Identify circumstances under which stochastic modeling is appropriate or inappropriate for ULSG products.

(b) (*3 points*) Explain whether you would suggest stochastic or deterministic modeling for the following assumptions:

(i) Expenses

(ii) Premium persistency

(iii) Stock market projections

(iv) Reinsurance rates

(v) Lapses

(c) (*2 points*) Explain the effect on lapse assumptions of the following:

(i) Different guaranteed crediting rates

(ii) Changes in market interest rates

(d) (*2 points*) The company does not have sufficient computing power to use the full set of scenarios that have been generated. Describe three approaches that will allow the use of a stochastic model despite this constraint.

THIS PAGE INTENTIONALLY LEFT BLANK

9. (*12 points*) You are given the following three equity indexed annuity designs:

	Design X	**Design Y**	**Design Z**
Index	S&P 500	S&P 500	Choice of S&P 500, Dow Jones Industrial Average, or Russell 2000
Index crediting	• 1 year point-to-point • 100% participation rate • 5% initial cap • 3% minimum cap in later years • 0% floor	• 1 year, 125% participation of daily average index growth	• Binary return – 6% credited each year the index has a positive return, 0% credited each year the index has a negative or 0 return
Hedge program	Static hedge	Dynamic hedge	Static hedge
SPDA/FPDA	Single premium	Single premium	Flexible premium
Guaranteed minimum account value	90% of premium accumulated at 2% annually	100% of premium	80% of premium accumulated at 3% annually

(a) (*3 points*) Determine whether each design satisfies the Post-2003 Standard Nonforfeiture Law for individual deferred annuities, if the 5-year Constant Maturity Treasury rate is 2.4%.

Show all work.

(b) (*3 points*) Describe the advantages and disadvantages of the hedging program for each design.

9. Continued

(c) (*4 points*) You wish to revise Design X by changing the participation rate. You plan to maintain the initial 5% cap, and need to keep the hedging cost to 3.0% or less of the starting account value with the available options. You plan to hedge the entire amount and ignore the effect of the guaranteed minimum account value when determining the cost of the hedge.

You are given the following market prices for one year S&P 500 options. The current index level is 2,000.

Strike Price	Call option price (as % of fund value)	Put option price (as % of fund value)
2,000	8.0%	7.8%
2,050	5.5%	10.2%
2,100	4.0%	12.6%
2,150	3.5%	15.0%
2,200	3.0%	17.4%

Calculate the highest participation rate possible given the above assumptions. Show all work.

(d) (*2 points*) Describe the risks that would affect an equity index annuity provider's investment strategy if the level of lapses turns out to be higher or lower than expected when pricing the product.

10. (*9 points*) HLR Life currently offers a Universal Life (UL) product and is planning to introduce a new 20-year term product with the following annual premiums for a male age 50:

Year	Proposed Premium Pattern
1-20	540
21	1,648
22	1,778
23	1,933
24	2,120

(a) (*2 points*) HLR wants to distribute the term product directly through the internet instead of the traditional agent/broker channel used for its current UL product. Assess the impact of this distribution method on mortality and lapse assumptions.

(b) (*4 points*) The UL product was priced with the following lapse assumptions for a male age 50:

Year	Lapse Rate
1	10%
2-10	8%
11+	4%

(i) Explain why the current UL lapse assumptions are not appropriate for the new term product.

(ii) Recommend a lapse assumption pattern appropriate for the proposed term product. Justify your answer.

(iii) Describe how the recommended lapse assumption pattern for the proposed product would differ for a female age 55. Justify your answer.

10. Continued

(c) (*2 points*) HLR is considering the following alternate premium pattern for the term product for a male age 50:

Year	Alternate Premium Pattern
1-20	540
21	2,843
22	3,012
23	3,213
24	3,456

Compare the expected impact on mortality and lapse assumptions between the proposed and alternate premium patterns.

(d) (*1 point*) HLR's pricing team has evaluated the profitability of four product designs as follows:

Profit Measure	Design A	Design B	Design C	Design D
Return on Investment (ROI)	15%	13%	15.5%	15.25%
Break Even Year	7	9	7	11
Value of New Business	50	40	200	30
New Business Strain	(60)	(120)	(350)	(30)

Shareholders are willing to contribute significant capital but require an ROI of at least 15%. Recommend a product design based on profitability metrics. Justify your recommendation.

****END OF EXAMINATION****
Afternoon Session

USE THIS PAGE FOR YOUR SCRATCH WORK