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**SOCIETY OF ACTUARIES**  
**Life Finance & Valuation – U.S.**

# Exam ILALFVU

## AFTERNOON SESSION

**Date:** Thursday, May 5, 2016

**Time:** 1:30 p.m. – 3:45 p.m.

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### INSTRUCTIONS TO CANDIDATES

#### General Instructions

1. This afternoon session consists of 5 questions numbered 7 through 11 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 ILALFVU.
6. Be sure your essay 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\*\***

**Afternoon Session  
Beginning with Question 7**

**7.** (7 points)

- (a) (1 point) You are asked to set up an economic capital model for lapse risk in a large universal life block. Persistency studies are done annually.

Describe the common approaches used to model lapse risk.

- (b) (3 points) The company issues two types of products using simplified underwriting (UW) and standard UW. You have developed an economic capital model to calculate the market value (MV) of assets and MV of liabilities using a stress test approach. Two scenarios are performed for lapse risk and two scenarios are performed for interest rate risk. The results are as follows:

In millions	Product	Baseline	Low Lapse	High Lapse	Low Interest	High Interest
MV Asset	N/A	250	250	250	300	170
MV Liability	Standard UW	-200	-250	-80	-240	-150
MV Liability	Simplified UW	300	400	100	380	200

You are also given the following information:

- No other risks are modeled.
- There is no correlation between lapse and interest rate risks.

Calculate the economic capital for the company. Show all work.

- (c) (3 points) The company's minimum regulatory capital is lower than its economic capital.

Critique the following statement:

*“The weakness of regulatory capital is it tends to produce a lower capital requirement as it is factor based and too straight forward to calculate. Economic capital results are reasonable as it is higher than the minimum regulatory capital. Holding higher capital will receive favorable views from policyholders, regulators, debtholders, and shareholders. If capital is held lower than peer companies with the same rating, the company will get downgraded by the rating agencies. The company will need to hold more than the current minimum regulatory capital as soon as possible before the regulators take action.”*

**8.** (8 points) With regard to Embedded Value (EV):

- (a) (1 point) Describe the differences in how economic and non-economic assumptions are developed.
- (b) (2 points) Describe considerations when setting the following:
- (i) Lapse rates
  - (ii) Investment assumptions
- (c) (5 points) You are given:
- The annual aggregate expected contribution is 290 million.
  - The value of new business in the current year is 85 million.
  - The free surplus and required capital from the previous year were 200 million and 350 million, respectively.
  - The pretax return on invested assets is 12.5%
  - The effective tax rate is 20%.
  - The expected contribution from new business is equal to 50% of the expected contribution from inforce business in the current year.

Calculate:

- (i) The risk discount rate.
- (ii) The inforce book value at the beginning of the current year.
- (iii) The book profit from new business in the current year. Assume expected inforce book value at the end of the current year is 1,000 million, and total book profit for the current year is 500 million.

Show all work.

**9.** (8 points)

- (a) (4 points) Assess the appropriateness of each of the following excerpts from the Actuarial Opinion and Memorandum of XYZ Life, a U.S. insurance company. Justify your response.
- A. *I, John Actuary, am Appointed Actuary of XYZ Life. I was appointed by the CEO of XYZ;*
  - B. *I am a Fellow of the Society of Actuaries and am familiar with the valuation requirements applicable to life and health insurance companies;*
  - C. *The variable annuity liabilities are determined using a net level premium GAAP reserve;*
  - D. *The asset adequacy for the UL block is determined using cash flow testing with a 5 year projection period;*
  - E. *All whole life products are excluded from the asset adequacy testing because they only represent 10% of XYZ's total liabilities;*
  - F. *All short term products used cash flow testing to determine asset adequacy;*
  - G. *Federal income taxes may or may not be included in the asset adequacy analysis;*
  - H. *A 9/30/15 yield curve was used for the level scenario and a 12/31/15 yield curve was used as the basis for all other scenarios;*
- (b) (4 points) John has been asked to implement a new Principle-based Reserving (PBR) framework for the calculation of life insurance policy reserves as proposed in the NAIC standard valuation law.
- (i) Describe how assumptions are derived for incorporation into a PBR valuation.
  - (ii) Describe PBR regulatory safeguards that assure reserves are adequate.

**10.** (9 points) You are given the following for a universal life (UL) cohort:

Face Amount	100,000
Annual Gross Premium	2,500
First Year Cost of Insurance Charges	200
Expense Charges (% of gross premium)	
First Year	25%
Renewal Years	10%
Commissions (% of gross premium)	
First Year	50%
Renewal Years	5%
Expenses	
Issue and Underwriting (first year)	500
Maintenance (all years)	50
First Year Expected Mortality Rate	0.1%
First Year Expected Lapse Rate	0%
Earned Interest Rate	5%
Credited Interest Rate	3%

Assume:

- Premiums are paid, charges are assessed, and expenses are incurred at the beginning of the year.
- Death benefits are incurred at the end of the year.

(a) (3 points) Calculate the estimated gross profits (EGPs) for the first policy year. Show all work.

## 10. Continued

- (b) (6 points) You are given the following additional information regarding YRT reinsurance:

First Year Ceded YRT Premium	60
First Year Death Benefit Recovery	50
YRT Expense Allowance (% of ceded YRT premium)	
First Year	20%
Renewal Years	10%
Present Value of Future EGPs after reinsurance at end of first policy year (discount rate = credited interest rate)	3,000

Calculate the following using the net reinsurance method as of the end of the first policy year:

- (i) Deferred acquisition cost asset
- (ii) Unearned revenue liability

Show all work.

**11.** (8 points)

(a) (2 points) For each of the following line items:

- (i) Total cash and invested assets
- (ii) Annuity benefits
- (iii) Change in unrealized gains
- (iv) Dividends to policyholders

Identify the primary financial statements from the NAIC Annual Statement where these line items are included.

(b) (2 points) Describe the documentation best practices for the SOX 404 self-assessment process.

(c) (4 points) The following control failures have occurred:

- (i) The reserves were not updated for a block of business, resulting in an incorrect reported reserve.
- (ii) A valuation spreadsheet was changed by someone who had no reason to open it, resulting in an incorrect reported reserve.

Recommend corrective actions to avoid similar future failures.

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

**USE THIS PAGE FOR YOUR SCRATCH WORK**

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