**SOCIETY OF ACTUARIES**
**Individual Life & Annuities United States – Company/Sponsor Perspective**

# Exam CSP-IU

## MORNING SESSION

**Date:** Friday, November 4, 2011
**Time:** 8:30 a.m. – 11:45 a.m.

### INSTRUCTIONS TO CANDIDATES

**General Instructions**

1. This examination has a total of 120 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 60 points).

   a) The morning session consists of 8 questions numbered 1 through 8.

   b) The afternoon session consists of 9 questions numbered 9 through 17.

   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 since 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 CSP-IU.

6. Be sure your essay answer envelope is signed because if it is not, your examination will not be graded.

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

**1.** (*4 points*) ABC is a large insurer, with multiple lines of business. ABC Life sells term insurance with preferred underwriting through a closely-tied sales force. ABC uses no reinsurance.

ABC has recently implemented an ERM (Enterprise Risk Management) program as follows:

- Risk management teams are housed in each of its major business units.
- Business unit risk managers are responsible for identifying, measuring and controlling their risks in the manner most appropriate to their specific business unit.

ABC is comparing its ERM program to Standard and Poor's (S&P) ERM Criteria.

(a) (*2 points*) Identify the most favorable indicators for mortality risk control as outlined in the S&P ERM Criteria with respect to:

(i) Risk Identification

(ii) Risk Monitoring

(iii) Risk Limits and Standards

(iv) Risk Limit Enforcement

(v) Risk Management

(vi) Risk Learning

(b) (*2 points*) S&P issued an Adequate ERM rating of ABC.

(i) Evaluate the above aspects of ABC's ERM program that contribute to the Adequate rating.

(ii) Recommend improvements ABC Life could make to its ERM program to improve its rating to Strong.

**2.** (*10 points*) SLH Life, a U.S. life insurance company is considering the acquisition of a closed block of life insurance policies from Alta Life, with a remaining term of two years.

Alta Life provided an actuarial appraisal report as of December 31, 2010, containing the following information and projections for the closed block:

- Adjusted Book Value at December 31, 2010 = 100
- Cost of required capital = 5.84
- Discount rate = 10%
- Corporate tax rate = 35%

| | **2011** | **2012** |
|---|---|---|
| Pre-Tax Statutory Earnings | 800 | 700 |
| Change in Tax Reserve | −100 | −200 |
| Change in Statutory Reserve | −155 | −250 |

(a) (*1 point*) List adjustments a buyer may make to a seller's analysis to develop its own actuarial appraisal.

(b) (*3 points*) You are preparing the best estimate mortality assumptions for the actuarial appraisal of Alta Life Co's business.

Evaluate the appropriateness of:

(i) Using Alta Life's experience

(ii) Using SLH Life's experience

(c) (*3 points*) Calculate the Actuarial Appraisal Value for Alta's closed block on December 31, 2010.

(d) (*3 points*) SLH Life is looking at other methods to determine the value of this block of business.

(i) Contrast an Actuarial Appraisal with a Comparable Transaction Analysis.

(ii) Recommend which of the two appraisal methods SLH should choose. Justify your answer.

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**3.** (*10 points*) Life Co sells term life insurance and wants to broaden its market base. It is considering the acquisition of a block of single premium immediate annuities.

(a) (*2 points*) Life Co will require additional capital to acquire the annuity business and is considering the use of modified coinsurance.

List the advantages and disadvantages of this reinsurance arrangement.

(b) (*4 points*) Life Co obtains the following reinsurance quote:

- Method of Reinsurance: Modified Coinsurance (Mod-Co)
- Effective Date: January 1, 2011
- Quota Share: 40%
- Renewal Premium Allowance: 5% of renewal premium
- Expense Allowance: 20% of premium
- Interest Rate for Mod-Co Adjustment: 7%

Life Co's projected 2011 year-end income statement and balance sheet for this block is as follows:

| **Income Statement (in millions)** | **12/31/2011** |
|---|---|
| **Revenue** | |
| Renewal Premium | 250 |
| Investment Income | 14 |
| **Total Revenue** | **264** |
| **Benefits & Expenses** | |
| Claims | 175 |
| Expenses | 50 |
| Commissions | 5 |
| Reserve Increase | 20 |
| **Total Benefits and Expenses** | **250** |
| **Gain from Operations** | **14** |

**3.** **Continued**

| **Balance Sheet** | **12/31/2010** | **12/31/2011** |
|---|---|---|
| **Assets** | **680** | **714** |
| **Liabilities and Capital** | | |
| Policy Reserves | 180 | 200 |
| Surplus | 500 | 514 |
| **Total Liabilities + Capital** | **680** | **714** |

Assume:

- Net investment income rate is 7%.
- Mid-year insurance cash flows and average reserves for investment income.
- Mod-Co adjustment is calculated at the end of the year.

Determine the impact on Life Co's capital, at the end of 2011, as a result of the Mod-Co agreement. Show all work.

(c) (*4 points*) You discover that your reinsurer is not an admitted reinsurer where Life Co is domiciled.

Recommend appropriate reinsurance methods and approaches that could be used to optimize Life Co's tax and reported income position.

**4.** (*6 points*) Palm Life is a leading U.S. life insurer that sells traditional whole life insurance products. In November 2010, the company launched a UL product called Diversity 2010. Due to limited resources, Diversity 2010 was not implemented within the current valuation system in time for year-end financial reporting.

For year-end financial reporting, Palm Life used the following process to determine Diversity 2010 statutory reserves:

- The Policy Issue Department created a listing of UL policies sold in November and December showing premiums and face amount.

- Using this listing, a spreadsheet was created in the valuation area to project a year-end account value. The company held this account value as the reserve.

- The valuation area submitted this reserve to the financial reporting team to include in reported reserves.

- When the financial statements were reviewed, Palm Life's CFO reduced the Diversity 2010 reserves by 20% in anticipation of future expected profits.

(a) (*4 points*) Evaluate the Diversity 2010 reserve process for the following four risk areas:

(i) Data

(ii) Actuarial valuation systems

(iii) Compilation process

(iv) Management review process

(b) (*2 points*) The Diversity 2010 valuation process will be automated in 2011. Two controls that will be in place for this process are:

| Control | New / Existing | Automated / Manual | Performed By |
|---|---|---|---|
| Reconciliation of input and output totals | Existing | Automated | Junior IT Staff |
| Sample testing of calculations | New | Manual | Senior Actuarial Consultant |

Identify which control is more likely to fail. Justify your answer.

**5.** (*6 points*) The Good Home Puppy Farm (GHPF) will pay a buyer 100 upon the death of any puppy it has sold, within six months of the sale. The cost of this coverage is built into the purchase price of each puppy. The GHPF's accountant believes that a liability should be established for this benefit.

(a) (*1 point*) Identify concerns addressed by establishing a liability for this benefit from the perspective of GHPF.

(b) (*2 points*) An actuary is hired to calculate the liability. GHPF has prepared data from its purchase records.

Explain the actuary's considerations using *ASOP 23* (*Data Quality*) in using this data to establish the liability.

(c) (*3 points*) Propose a methodology for calculating this liability which satisfies the requirements of the *International Financial Reporting Standard's Exposure Draft* on insurance contracts.

**6.** (*6 points*) You are a consulting actuary for the Moosehead Life Insurance Company (ML) responsible for reviewing ML's life insurance reserves prior to the release of its 2010 annual report.

(a) (*1 point*) List the categories for actuarial reserve review techniques.

(b) (*3 points*) In your review of ML's 2010 aggregate reserves, you see a 40% increase from 2009. Your investigation finds that ML purchased a small block of term life in August 2010.

Recommend items to review in validating this 40% reserve increase. Support your recommendation.

(c) (*2 points*) ML also has a small block of variable annuities. The liabilities and capital for this product are stochastically modeled. The CFO has suggested:

"The size of this block is small in comparison to the company's life business. We do not need to implement controls on our modeling process since this would be an inefficient use of our limited resources."

Evaluate the audit considerations of following the CFO's suggestion.

**7.** (*10 points*) You are the actuary responsible for the Enterprise Risk Management (ERM) department of a life insurance company:

(a) (*2 points*) Define the key elements of the ERM process as outlined in the *ERM Specialty Guide* (*May 2006*) of the ERM Working Group of the Society of Actuaries Risk Management Section.

(b) (*2 points*) Your company has a large closed block of a traditional whole life insurance business. Identify the risks to the company of this business.

(c) (*3 points*) Due to the magnitude of the whole life block, you have been asked to perform a stochastic analysis of the associated mortality risk:

(i) Outline the considerations in performing a stochastic analysis of the mortality risk.

(ii) Below are the results of the present value of the cash flows (in millions) of the stochastic scenarios.

| | **Mortality Element** | |
|---|---|---|
| **Scenario** | **Underwriting** | **Catastrophic** |
| Stochastic Scenario 2 | 1.80 | 7.55 |
| Stochastic Scenario 9 | 1.95 | 6.95 |
| Stochastic Scenario 7 | 2.50 | 4.50 |
| Stochastic Scenario 5 | 3.05 | 5.95 |
| Stochastic Scenario 8 | 3.30 | 8.95 |
| Stochastic Scenario 4 | 3.80 | 6.30 |
| Stochastic Scenario 6 | 4.15 | 6.20 |
| Stochastic Scenario 10 | 4.25 | 5.75 |
| Stochastic Scenario 1 | 4.75 | 6.00 |
| Stochastic Scenario 3 | 5.25 | 6.15 |

Calculate CTE(70) for the above two elements of mortality risk.

(d) (*3 points*) As part of your risk analysis of the whole life block, you will calculate the fair value liability.

(i) Outline the steps you would take to calculate the fair value liability, using the direct method.

(ii) Explain the advantages and disadvantages of the direct method to calculate fair value liability.

**8.** (*8 points*) A U.S.-based international life insurance company primarily sells fixed annuity and term life insurance products. The company also has a small, closed block of disability insurance.

The company is considering calculating the economic capital for the entire company.

(a) (*3 points*) Explain common decisions an insurance company must consider when implementing a risk capital methodology.

(b) (*2 points*) To calculate economic capital, the company analyzes the following risks:

(i) Reserves for its fixed annuity business are inadequate due to incorrect lapse assumptions.

(ii) The model does not accurately reflect rare events such as a terrorist attack hitting an area where the company has a high concentration of term life insurance policies.

(iii) Key people leave the company at the same time.

(iv) One of the company's reinsurers does not honor its reinsurance contract obligations.

(v) Disability insurance claims will fluctuate widely from year to year.

Determine the key type of risk for each of the above items. Justify your answer.

(c) (*3 points*) During a risk committee meeting, the Chief Risk Officer asserts that the company should consider diversification benefits in calculating economic capital.

(i) Explain the arguments for and against incorporating diversification benefits in an economic capital calculation.

(ii) Recommend whether the company should incorporate diversification in its economic capital calculation. Justify your recommendation.

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

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