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

Exam CSP-IU

AFTERNOON SESSION

Date: Friday, May 3, 2013
Time: 1:30 p.m. – 4:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 7 questions numbered 8 through 14 for a total of 60 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 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.

475 N. Martingale Road
Schaumburg, IL 60173-2226

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Exam CSP-IU Front Cover

****BEGINNING OF EXAMINATION****
Afternoon Session
Beginning with Question 8

8. (*9 points*) Your company is preparing for the upcoming examination with insurance regulators. You have been asked to review the company's RBC (Risk Based Capital) reports, specifically the C-1 calculations.

(a) (*1 point*) List reasons for regulators' interest in a company's RBC position.

(b) (*2 points*) The actuary in charge of statutory reporting prepared the RBC reports and made the following comment:

"I calculated the RBC Ratio at 105%. Since the ratio is greater than 100% I am sure the regulators will be satisfied."

Critique the above comment.

(c) (*6 points*)

(i) You are given:

Authorized Control Level Risk-Based Capital:
= 0.5 * {C0 + C4a + [(C1a + C3a)^2 + C1cs^2 + C2^2]^0.5}
Total Adjusted Capital = $95
Statutory Surplus = $75
Assume no asset concentration risk

C0	C4a	C3a	C1cs	C2
0	5	30	0	50

Company's investment portfolio only consists of bonds:

Asset Class	# Bonds	# Issuers	Statement Value	Market Value	C1 Factor
Government	1,000	1	1,000	1,500	0.000
High Quality Corporate	1,000	500	1,100	1,000	0.013

Size Factor Table:

First 50	2.5
Next 50	1.3
Next 300	1.0
Over 400	0.9

Calculate the RBC ratio. Show all work.

8. Continued

(ii) You have been asked to review the current and an alternate investment strategy with the goal of increasing return on capital. You are given:

		Current investment strategy			Alternate investment strategy		
	Expected annual portfolio return	# Issuers	Statement value	Market value	# Issuers	Statement value	Market value
Government Bonds	2%	1	1,000	1,500	0	0	0
Class 2 Bonds	4%	500	1,100	1,000	0	0	0
Class 3 Bonds	6%	0	0	0	100	800	800
Class 4 Bonds	9%	0	0	0	100	500	500
Class 5 Bonds	14%	0	0	0	300	300	300
Unaffiliated Stock (Beta = 1.6)	12%	0	0	0	50	450	450
Affiliated Stock (Beta = 1.2)	10%	0	0	0	10	300	300
Cash	0%	0	0	0	n/a	150	150

- The top five common stock holdings total 70 in unaffiliated stock and 30 in affiliated stock
- The average RBC factor for the affiliated stock is 0.40
- All other RBC components remain unchanged
- Management demands:
  - a minimum 12 % return on capital, and
  - a minimum 200% RBC ratio

Evaluate the two investment strategies and recommend changes to each strategy as necessary to meet management targets.

Note to candidates: actual calculations are not required for answers to this part.

9. (*4 points*) Fantastic Life Insurance Company (FL) is a small U.S. life insurance company which sells variable annuity and term insurance. FL also has closed blocks of fixed annuity and universal life policies on its books.

FL is reviewing its capital position and Enterprise Risk Management (ERM) implementation.

(a) (*1 point*) Explain how the following factors affect the quality of the ERM process according to the ERM Specialty Guide:

- Judgment
- Breakdowns
- Collusion
- Management override

(b) (*3 points*) FL's management is especially concerned about risks associated with:

- Potential excess volatility on its variable annuities block
- Redundant XXX reserves held for its term insurance products
- Amount of capital locked in its closed blocks

(i) Describe the pros and cons of using each of the following strategies to mitigate the above risks:

- Hedging
- Securitization
- Strategic Risk Management

(ii) Recommend the most suitable strategy to mitigate the above risks for each of FL's blocks of business.

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10. (*12 points*) Bighorn Life & Annuity Company is a U.S. company. You are the actuary preparing to perform the annual asset adequacy analysis for year-end 2012 using the cash flow testing (CFT) method for the majority of the company's business.

(a) (*2 points*) With respect to asset adequacy testing:

(i) Identify situations that indicate a need for CFT.

(ii) Identify situations where other types of analysis might be sufficient.

(iii) List acceptable methods of asset adequacy analysis other than CFT.

(b) (*2 points*) In previous CFT models, the only strategy for handling negative cash flows was to borrow cash internally from another product line within the company. Identify other strategies for handling negative cash flows and explain the modeling considerations for each.

(c) (*4 points*) For the company's three fixed single premium deferred annuity (SPDA) plans, you are given:

Plan Code	Issue Years	Credited Interest Rate
SPDA1	1990-1995	4%
SPDA2	1996-2009	2%
SPDA3	2010-2012	2%

Policy Year	Surrender Charge (for all plans)
1	6%
2	4%
3	2%
4+	0%

You review the SPDA CFT model which uses the following assumptions:

Current market credited interest rate	3%
Base Lapse Rate	Constant percentage; rate is the same for all plan codes
Excess Lapse Rate	Constant percentage; rate is the same for all plan codes
Expenses	Original pricing assumption; is a fixed, per unit amount that represents all expenses
Taxes	Not modeled

Recommend changes to the assumptions. Justify your answer.

10. Continued

(d) (*4 points*) CFT for all of Bighorn's business has been completed. Each line of business was projected for 30 years over multiple scenarios, and the present value of ending surplus (i.e. surplus at the end of the projection period) was calculated for each scenario. The results were as follows:

Line of Business	# of Scenarios Run	# of Scenarios with Negative PV of Ending Surplus
SPDA	100	43
Universal Life (UL)	100	11
Whole Life (WL)	100	0
Variable Annuity(VA)	1,000	97

(i) Additional reserves must be established for the SPDA, UL, and VA lines.

(ii) Bighorn could retest the SPDA and VA blocks together. The combined assets will potentially result in more scenarios with positive ending surplus for SPDA.

(iii) In the 11 scenarios for which the UL block had negative PV of ending surplus, the WL block had very large positive results. Bighorn could combine the UL and WL results and report them as "Total Life Results" to make the results look more favorable.

(iv) To ensure the UL block passes all scenarios (i.e. having positive PV of ending surplus), Bighorn could increase its UL reserves.

Critique each of the above statements.

11. (*9 points*) You are an actuary working for a small U.S. life insurance company that sells group life, group accident and health (A&H), individual life, and annuity products.

(a) (*1 point*) U.S. life insurance companies are required to use Federally Prescribed Tax Reserves (FPTRs) in the calculation of taxable income. Briefly describe the method, interest rate and mortality table requirements for calculating FPTRs on life insurance policies.

(b) (*5 points*) U.S. life insurance company taxable income (LICTI) is defined as gross income less deductions.

(i) Describe the general deductions that life insurance companies use to determine their LICTI.

(ii) You are given:

Tax Year	Tentative LICTI	Operation Loss
2008	300,000	-
2009	300,000	-
2010	200,000	-
2011	-	300,000
2012	-	150,000

Assume that your company follows the Operation Loss Deduction (OLD) rules for small companies and the current valuation date is 12/31/2012.

Calculate the LICTI for the tax years 2008, 2009, and 2010. Show all work.

(c) (*3 points*) When determining LICTI, your company plans to calculate the DAC amortization deduction using the following assumptions:

- DAC capitalization rate is 7.7%
- DAC amortization period is 10 years
- Reinsurance is ignored

Recommend changes, if any, to the assumptions above. Justify your answer.

12. (*10 points*) XYZ Life, a U.S. stock life insurance company, is currently developing a single premium 3-year term life insurance product. The face amount is level, and the unearned portion of the single premium is returned to the policyholder in the event of surrender. It has been determined that the product should be treated as a long duration traditional life insurance contract under U.S. GAAP.

(a) (*3 points*) Describe considerations taken into account when determining the interest, mortality and lapse assumptions for the U.S. GAAP valuation model.

(b) (*2 points*) Explain the role of the Deferred Profit Liability, in a U.S. GAAP context, for this product.

(c) (*5 points*) You are given the following policy data:

Face Amount	1,000,000
Single Premium	50,000
Acquisition Expense	7,500
Annual Maintenance Expense	40
Annual Valuation Lapse Rate	0%
Annual Valuation Interest Rate	6%
1st Year Valuation Mortality Rate	10 per 1,000
2nd Year Valuation Mortality Rate	15 per 1,000
3rd Year Valuation Mortality Rate	20 per 1,000

Assume:

- Expenses occur at the beginning of the policy year.
- Deaths occur at the end of the policy year.

Calculate the Deferred Profit Liability for this policy at the end of policy year 1. Show all work.

13. (*8 points*)

(a) (*2 points*) With regard to U.S. statutory reserves for Universal Life (UL) products:

(i) Explain the purpose of the guaranteed maturity premium (GMP) in the CRVM reserve calculation.

(ii) Describe the process used to calculate GMP for flexible premium products.

(b) (*6 points*) U.S. domiciled insurance company ABC sells a 3-year 100,000 level-face amount flexible-premium universal life product, with a no-lapse secondary guarantee based on specified premium being paid. You are given:

- Issue Age: 50
- Maturity Age: 53
- All rates are annual
- Risk charges are deducted after premium payments and before expense charges
- Guaranteed Maturity Premium (GMP) = 32,275.60 per year
- Guaranteed Maturity Fund (GMF) at end of year 2 = 65,890.80
- Valuation interest rate = 4%
- Valuation mortality rate = Guaranteed risk charge rate
- Net level premium used for valuation = 30,969

Policy Year	**1**	**2**	**3**
Attained Age	50	51	52
Guaranteed Expense Charge Per Policy	120	120	120
Current Expense Charge Per Policy	100	100	100
Guaranteed Risk Charge Rate Per 1000	3.320	3.590	3.960
Current Risk Charge Rate Per 1000 (= 90% of Guaranteed Risk Charge)	2.988	3.231	3.564
Guaranteed Credited Interest Rate	2%	2%	2%
Current Credited Interest Rate	3%	3%	3%

Question 13 Continued on next page

13. Continued

The company has sold these policies to two individuals who have paid the minimum specified premium to date to keep the no lapse guarantee inforce. You are given:

Name	Age At Issue	Policyholder Fund Value At End of Year 2
Smith	50	66,500
Lee	50	0

(i) (*5 points*) Calculate the basic CRVM reserve at the end of year 2 for each of the two policyholders.

(ii) (*1 point*) Determine the appropriateness of holding only the basic CRVM reserve for these policies, and list the additional reserves (if any) which are required to be held. (Calculations are not required.)

14. (*8 points*) GPS Life sells a 5-year term certain payout annuity.

You are given:

Premium (beginning of year 1)	100,000
Annual policy benefit (paid at end of each year)	22,000
Deferrable acquisition expense (incurred at beginning of year 1)	5,000
Non-deferrable acquisition expense	0
Maintenance expense (incurred at end of each year)	500
Statutory valuation rate	5.00%

Present values of a 5-year term certain immediate annuity paying 1 per year under different interest rates are given below:

Interest rate	Present value
3.19%	4.555
4.00%	4.452
4.06%	4.444
4.97%	4.333
5.00%	4.329
5.91%	4.222

(a) (*1 point*) Identify and justify the proper U.S. GAAP reserve methodology for this annuity. Justify your answer.

(b) (*4 points*) Calculate the following values at the end of year 2 under U.S. GAAP:

(i) Net GAAP Reserve

(ii) Benefit Reserve

(iii) Maintenance Expense Reserve

(iv) Implied DAC Balance

14. Continued

(c) (*3 points*) GPS Life offers a rider, at no additional upfront cost, which provides a cash surrender benefit in exchange for a reduced annual policy benefit. This rider option can be exercised at the end of each policy year, prior to the payment of the annual policy benefit.

You are given the following information for policies with this rider:

Premium	100,000
Annual policy benefit (paid at end of year)	21,000
Cash surrender value (end of year 1)	77,900
Cash surrender value (end of year 2)	59,800
Cash surrender value (end of year 3)	40,800
Cash surrender value (end of year 4)	21,000

Calculate the U.S. Statutory CARVM reserve at the end of year 2 using a statutory valuation rate of 5.00%. Show all work.

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

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