SOCIETY OF ACTUARIES

Individual Life & Annuities Canada – Company/Sponsor Perspective

Exam CSP-IC

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-IC.
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.

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****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 comments:

"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 comments.

(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 products. 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. (*10 points*) Sky Life, a Canadian life insurance company with operations in Haiti, sells participating and non-participating life insurance policies.

(a) (*5 points*) You are given:

- Sky Life recently began selling a 3-year pure endowment plan in Haiti.
- All policies were issued 1 January 2012.
- The current total amount due in 3 years is 10,000,000 Haitian Gourdes (HTG).
- The liabilities are denominated in Haitian Gourdes (HTG).
- The assets backing the product are denominated in Canadian Dollars (CAD).

You have the following information at the valuation date:

- 1 CAD buys 42.30 HTG.
- The Canadian 3-year risk free rate is 1.39%.
- The Haitian 3-year risk free rate is 9.00%.
- The mean change in the exchange rate over 3 years is 0.653.
- The standard deviation of the change in the exchange rate over 3 years is 0.461.

The adverse scenario is defined as the mean minus one standard deviation of the change in exchange rates.

Calculate the provision for adverse deviation in Haitian Gourdes that Sky Life should hold for the currency risk. Show all work.

10. Continued

(b) (*5 points*) You are given:

- The taxable income of Sky Life in Canada without reinsurance, policy loans and premium taxes is CAD7,500,000.

Ending Reported Amounts (in '000s CAD)	Prior Year		Current Year	
	Canada	Haiti	Canada	Haiti
Gross Reserves	50,000	10,000	60,000	13,000
Ceded Reserves – Registered Reinsurers	30,000	8,000	36,000	10,000
Ceded Reserves – Unregistered Reinsurers	10,000	0	12,000	0
Policy Loans (incl. Accrued Interest)	5,000	1,000	6,000	1,200

Reported Amounts (in '000s CAD)	Current Year	
	Canada	Haiti
Gross Premiums	20,000	5,000
Policy Dividends	4,000	800
Reinsurance Premiums	12,000	2,000
Reinsurance Claims	11,000	1,500

- The premium tax rate is 5.0%.
- All reinsurers reimburse their share of the premium tax paid by Sky Life.

Recalculate the current year's taxable income of Sky Life in Canada, including reinsurance, policy loans, and premium tax in the calculation. Show all work.

11. (*11 points*)

(a) (*4 points*) Describe the considerations for determining if a contract qualifies as an insurance contract for IFRS accounting purposes.

(b) (*4 points*) You are given the following contracts:

(i) An insurer provides a contract to insure against the loss of CAD100 in value on a 10,000,000 U.S. T-Bill portfolio.

(ii) An insurer provides replacement auto insurance. A particular vehicle is now old and its market value is less than 500, while a new replacement vehicle would cost 30,000.

(iii) An annuity contract issued with a guaranteed rate of 5% when current Guaranteed Interest Certificate (GIC) rates were at 12%.

(iv) Separate but linked Term-to-100 (T100) and life annuity contracts with no underwriting required on the T100 policy as the mortality loss on the insurance policy is offset by a mortality gain on the annuity policy.

(v) A contract allows for the addition of future face amounts at newly underwritten rates where evidence of insurability is satisfactory.

(vi) A segregated fund policy with a guarantee of return of premiums in the first 10 years is now in its 15th policy year.

(vii) A mutual fund contract allows for the purchase of a deferred annuity crediting an interest rate equal to the Government of Canada Long-term Bond Yield plus 2%.

Assess whether each contract would qualify as insurance for IFRS accounting purposes. Justify your answer.

Continued on next page

11. Continued

(c) (*3 points*) In assessing the qualification of insurance contracts, the Appointed Actuary (AA) discovers a grossly understated liability for a large group of contracts. Since the situation requires rectification to mitigate the threat to the financial condition of the company, the AA drafts the following communication in order to meet the Standards of Practice requirements:

To:	*I.M. Knaught Keddon, CFO ABC Life*
	Warren T. Rubble, VP, Insurance Operations
From:	*S.Wetton Bullits, Appointed Actuary*
Subject:	*Financial Condition*

I am writing to inform you of a considerable previous understatement of our liabilities with respect to a guaranteed interest feature of one of our Universal Life blocks. The contract requires us to credit a rate, starting in five years from now, which would be historically high. Although it can be satisfied today, our investigation shows that under scenario testing, there is a 30% chance we would not be able to credit this rate in the future. We need to investigate ways to mitigate this risk.

We will continue to monitor this issue every two years.

In the meantime we will notify OSFI of this situation.

Critique the communication.

12. (*6 points*) FX Life Company has been successfully selling fully underwritten Term-to-100 (T100), standalone Critical Illness (CI) and Long-term Care (LTC) products for the last 30 years in Canada. Each of the products has its own underwriting standards and asset segments.

In order to expand its market share, the company developed a product combining life insurance and critical illness with the option to purchase LTC. For ease of administration, the same underwriting practices used for the T100 products will be used for this new product.

(a) (*4 points*) Evaluate the appropriateness of the following proposed valuation assumptions for this new combo product:

Mortality	Same assumption as T100 products, where best estimate is 100% company mortality table MfAD = $5 / e_x$
Lapse	Same assumption as T100 product, where best estimate ultimate lapse rate = 3% MfAD =10%
CI incidence rate	Best estimate = 110% of CI standalone MfAD = 5%, same as CI standalone
LTC option elected rate	Best estimate = 35% MfAD = 22%
Maintenance expenses	Same assumption as T100 product, where best estimate expense = 50/policy MfAD = 2.5%

(b) (*2 points*) FX Life decided to back this new product using the same asset segment and investment strategy as the T100 block. Assess the appropriateness of this decision and recommend suitable changes, if any.

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13. (*12 points*)

(a) (*3 points*) SNJ Life is a small Canadian insurance company that sells non-participating individual life insurance policies using both full and simplified underwriting.

You are given:

Year	Total Company			Simplified Underwriting Line of Business		
	Number of claims	Actual Claim Volume	Expected Based on 100% Industry Table	Number of claims	Actual Claim Volume	Expected Based on 100% Industry Table
2006	100	100,000	110,000	0	0	0
2007	150	190,000	140,000	0	0	0
2008	165	210,000	200,000	30	15,000	15,000
2009	125	150,000	230,000	20	10,000	15,000
2010	130	150,000	250,000	15	10,000	15,000
2011	155	200,000	260,000	25	15,000	20,000
Total	825	1,000,000	1,190,000	90	50,000	65,000

- The industry mortality ratio is 78%.
- There was an epidemic in 2007 and 2008.
- You are using the Poisson model with parameters p = 90% and r = 3% to determine the partial credibility factor.

Calculate the mortality ratio to apply to the industry mortality table to use as the expected mortality assumption for the fully underwritten policies. Show all work.

(b) (*3 points*) SNJ management is concerned about profitability with respect to the simplified underwriting block. They wish to encourage replacement by offering the following:

- Replacement policies issued without underwriting
- An additional bonus paid to sales staff

For the following assumptions:

(i) Mortality
(ii) Per policy maintenance unit cost expense
(iii) Policyholder behaviour

Recommend an appropriate margin for adverse deviation for each of the above assumptions. Justify your answers.

13. Continued

(c) (*6 points*) SNJ has acquired a block of business from CCS effective 1 January 2012. You have the following expense information:

Expense Item	**Amount in 2011 for CCS**
Commissions	100,000
Investment expenses for assets supporting policy liabilities	30,000
Investment expenses for assets supporting surplus	10,000
Underwriting medical expenses	20,000
Salary for underwriters transferred from CCS to SNJ	110,000
Salary for policy administration staff transferred from CCS to SNJ	200,000
Salary for IT staff transferred from CCS to SNJ	180,000

- SNJ incurred 300,000 in expenses in 2011 to acquire the block from CCS.
- SNJ capitalized furniture expenses incurred in 2012 and uses a straight line depreciation method over 10 years.
- SNJ anticipates additional temporary expenses related to the acquisition of 40,000 in 2012 and 15,000 in 2013.
- The per policy maintenance unit cost for SNJ in 2011 is 40.
- The inflation rate assumption is 2%.
- Number of policies inforce at 31 December 2011:
  - 60,000 for SNJ
  - 6,000 for CCS
- The IT staff transferred from CCS will work on the inforce administration system previously used by CCS.
- No expense savings are expected from the acquisition, and the company does not have current plans to reduce expenses.

(i) Identify the expense items that should be included in or excluded in the per policy maintenance unit cost calculation. Justify your answers.

(ii) Calculate the per policy maintenance unit cost for 2012 and 2013. Show all work.

14. (*8 points*)

(a) (*3 points*) Describe the steps used to value a Universal Life (UL) product according to the CIA Educational Note on Valuation of Universal Life Contract Liabilities.

(b) (*5 points*) DSS Life sells a UL product which has the following features:

Death Benefit	Level Death Benefit plus Account Value
Cost of Insurance	Guaranteed Yearly Renewable Term – deducted from the account value monthly
Expenses	Guaranteed Level Expense Charge – deducted from account value monthly
Investment Fund	General Fund – earns credited rate - credited rate set by company - backed by a mix of fixed income assets (public and private bonds, and mortgages) as well as non-fixed income assets (public and private equity)
Lapse Criteria	Policy will lapse if the account value is negative after premiums and expenses are deducted

Additional information:

- Credited rates may be adjusted as needed, however, due to competition DSS reviews rates once a quarter and has been unwilling to adjust its credited rate down by more than 80% of the decrease in the Government of Canada long term bond yield.
- Death benefit is 50% reinsured under a YRT agreement with a single reinsurer.

14. Continued

The valuation assumptions and methodologies developed at the time the product was introduced 10 years ago are still being used and described below:

Assumption	Methodology
Mortality	Company specific experience blended with industry experience for later durations and older ages. Mortality assumption is reviewed every two years.
Funding / Premium Persistency	Three premium patterns are assumed: **Minimum funded** – Each premium is sufficient to cover only the annual policy charges **Overfunded –** Premiums in the early years exceed the annual policy charges **Single Pay** – Initial premiums sufficient to cover the annual policy charges for a significant number of years
Withdrawal	A single withdrawal assumption uses company specific experience. Assumption is reviewed every three years.
Expenses	Determined specifically for this product. Includes the additional costs of exempt testing and annual policyholder reporting along with admin costs. Expenses are reviewed and updated yearly.
Investment Spread	Developed using the current weighted average earned rate for inforce assets less an amount for investment expenses. Assumed to be level. Reviewed and updated yearly.
Discount Rate	Developed using CALM. Reviewed and updated quarterly.

Critique the above assumptions and methodologies used to value this UL product.

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

USE THIS PAGE FOR YOUR SCRATCH WORK