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

Exam CSP-IC

AFTERNOON SESSION

Date: Friday, November 2, 2012
Time: 1:30 p.m. – 4:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 6 questions numbered 7 through 12 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.

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****BEGINNING OF EXAMINATION****
Afternoon Session

7. (*12 points*)

(a) (*4 points*) ABC Life holds the following properties for Own Use:

	CGAAP Book Value at 12/31/2010	IFRS Cost at 12/31/2010	IFRS Accumulated Depreciation at 12/31/2010	IFRS Cost at 3/31/2011	IFRS Accumulated Depreciation at 3/31/2011
Property 1	280	200	121	180	110
Property 2	218	155	95	140	85

ABC also has the following Investment Properties in their portfolio:

	Purpose	IFRS Fair Value at 3/31/2011	IFRS Unrealized Gains/Losses at 3/31/2011
Property 3	Backing surplus	150	50
Property 4	Backing policy liabilities under CALM	275	(40)

Assume taxes are 26%.

(i) Explain the difference in accounting treatment of Own Use vs. Investment Properties under IFRS.

(ii) Calculate the IFRS conversion impact to regulatory capital from Own Use properties as of March 31, 2011.

(iii) Evaluate adjustments to MCCSR available capital related to Investment properties for ABC as of March 31, 2011.

Show all work.

7. Continued

(b) (*4 points*) You are given the following information about ABC's portfolio of Long Term Bonds and asset default factors by rating category.

		ARA 1		**ARA 2**		**ARA 3**		**Internal Rating**
	Fair Value	**Rating**	**S or U**	**Rating**	**S or U**	**Rating**	**S or U**	
Bond 1	1,000	AA	S	BB	S	A	S	B
Bond 2	500	B	S	AA	U	BBB	S	BB
Bond 3	2,000			B	U	A	U	AA

ARA stands for Allowed Rating Agency

S or U stands for Solicited or Unsolicited Rating

Rating	Asset Default Factor
AA	0.50%
A	1.00%
BBB	2.00%
BB	4.00%
B	8.00%

(i) List the considerations for determining credit ratings that drive asset default factors used in determining the MCCSR C1 component.

(ii) Calculate the C1 – Asset Default Risk for the portfolio of Long Term Bonds.

Show all work.

(c) (*4 points*) ABC's senior management has asked you to consider an Economic Capital (EC) model for its bond portfolio.

(i) Define the main credit sub-risks within an EC framework

(ii) An external consultant recommends a one-year mark-to-market stress testing approach to quantify default risk. Assess the appropriateness of this recommendation.

8. (*12 points*)

(a) (*1 point*) Describe the characteristics of a good Source of Earnings analysis.

(b) (*8 points*) You are a Senior Actuary with XYZ Life Insurance Company and you are reviewing the variance between the financial results for 2010 and 2011 for a particular block of business. Your actuarial student has commented that the bulk of the variance in pre-tax earnings results is attributable to the drop in gross premium of 20M and an increase in surrenders of 15M.

Question 8 Continued on Next Page

8. Continued

Given the information below:

	2010	2011	Variance
Premiums	160	140	(20)
Investment Income			
Product-related	74	63	(11)
Surplus Related (after tax)			
Required	1	2	1
Free	10	12	2
Debt Service Costs	(5)	(7)	(2)
Claims			
Death	(16)	(13)	3
Surrenders	(45)	(60)	(15)
Expenses and Taxes (including Commissions)			
First year (product)	(32)	(30)	2
Renewal (product)	(10)	(15)	(5)
Surplus-related expenses			
Required	(1)	(1)	-
Free	(2)	(2)	-
Income Tax	(20)	(21)	(1)
Change in reserve			
Expected Premiums	(147)	(128)	19
Expected Claims	20	15	(5)
Expected Surrenders	60	75	15
Expected Expenses	12	16	4
Required interest on reserves	(58)	(55)	3
Release of PfADs			
Mortality	3	2	(1)
Surrenders	10	11	1
Expenses	2	2	-
Change in method	(5)	-	5
Change in assumption			
Mortality	-	2	2
Surrenders	4	-	(4)
Expenses	5	3	(2)
Best Estimate Released on Death Claims			
Expected	(4)	(3)	1
Actual	3	3	-
Best Estimate Released on Surrenders			
Expected	(40)	(45)	(5)
Actual	45	55	10
New Business	10	17	7
Total	34	38	4

8. Continued

Required Surplus Reconciliation

	2010	2011
Beginning of Year Value	10	19
Investment Income	1	2
Other Changes	8	5
End of Year	19	26

Perform a Source of Earnings Analysis using Pre-Tax Net Income and evaluate the accuracy of the actuarial student's comment. Show all work.

(c) (*2 points*) Determine the distributable earnings for 2011. Show all work.

(d) (*1 point*) Determine the minimum assets that must be transferred at year end 2011 to sell this block of business if the Embedded Value at year end 2011 is 50.2 M. Ignore transaction costs and taxes. Show all work.

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9. (*10 points*)

(a) (*7 points*) SMURFCO, a small Canadian life insurance company, recently acquired three blocks of business from another company.

Block 1: Individual Universal Life Insurance where Cost of Insurance rates are not guaranteed and premium rates are annually adjustable

Block 2: Individual Term Life Insurance with guaranteed mortality rates

Block 3: Group Life Insurance Block

You are given the following capital information about each block:

Block	Volatility Risk	Catastrophe Risk
Block 1:	100	50
Block 2:	200	70
Block 3:	1000	300

(i) List the four criteria that must be met in order for a policy to be classified as participating for MCCSR purposes.

(ii) After acquisition by SMURFCO, Block 2 is redesigned to be classified as participating and adjustable. Reserves and net amount at risk are unchanged with the redesign. Calculate the change in Block 2's mortality capital.

(iii) SMURFCO wants to reduce their mortality risk exposure. The CFO suggests ceding Block 3 to an unregistered reinsurance company. Calculate the maximum amount by which SMURFCO mortality capital can be reduced on account of a deposit made by an unregistered reinsurer.

(iv) The unregistered reinsurance company is unfamiliar with IFRS 4 requirements. Describe the main points the valuation actuary should be aware of, as described in the CIA Educational Note Valuation of Gross Policy Liabilities and Reinsurance Recoverables.

Show all work.

(b) (*3 points*) SMURFCO has decided to incorporate Future Mortality Improvements (FMI) into the valuation of its existing product lines.

	Policy Liabilities with FMI but no Lapse MfAD at 12/31/2011	Policy Liabilities with FMI and Lapse MfAD at 12/31/2011
Life Insurance	1,000	1,100
Annuities	800	875

9. Continued

You are also given that:

- The impact of assuming FMI is a decrease in policy liabilities of 50 for Life Insurance and an increase in policy liabilities of 40 for Annuities.
- The proportionate increase in policy liabilities when including the lapse MfAD is the same for pre- and post-FMI calculations.
- The C3 factor is 0.02 for Life Insurance and 0.01 for Annuities.
- Tax rate is 30%.

Calculate the following:

(i) MCCSR Lapse Risk and C3 Risk.

(ii) The adjustment to reported Retained Earnings resulting from recognition of future mortality improvements and any related change to Available Capital.

Show all work.

10. (*12 points*)

(a) (*4 points*) Identify the common types of expenses that should be considered by the valuation actuary in setting the policy liabilities including for each type of expenses:

(i) The main unit used

(ii) Whether inflation applies

(iii) Whether a margin for adverse deviation applies

Question 10 Continued on Next Page

10. Continued

(b) (*3 points*) You are given the following allocated expense information for a particular Universal Life (UL) product:

Expense Category		2011 Amount
Policy illustrations	Development	400
	For new business	1,000
	For inforce policies	500
Commissions	First year	3,000
	Renewal	10,000
Pricing	New product	400
	Re-pricing of existing product for new customers	200
	Re-pricing of adjustable inforce policies	300
Underwriting	Policies placed	2,000
	Policies declined or not taken	200
Premium billing and collection		2,000
Annual statements		800
Experience studies		300
Reinsurance Administration		400
Policy Loans		100
Claims Administration	Administration	700
	Litigation	200
Corporate Overhead Allocation	Human Resources	1,000
	Subsidiary Expenses	300
	Investor Relation Expenses	200
Tax	Investment Income Tax	50
	Premium Tax	200
	Income Tax	700
Actuarial/Accounting	Product Pricing	400
	Information System Design	200
	Financial Reporting	400
Total		25,950

Determine the total maintenance expenses to be included in the calculation of the valuation expense assumption. Show all work.

10. Continued

(c) (*5 points*) The 2011 valuation expenses and the average number of units inforce translate into a unit cost of 46. Your CEO suggests that the best estimate valuation assumption for maintenance expenses should be lowered from the current 51 to that level and a reserve release recognized in the income statement. He points to the following in reaching this conclusion:

- Unit costs have been well-managed for the past five years, staying between 49 and 51 per unit with inflation taken into consideration.
- He believes the reduction is real and permanent, due to his belief that:
  - A system conversion in 2010 is partly responsible for the improvement.
  - The outsourcing of the premium collection function to a small, but efficient, local company.
- If unit cost reduction turns out to be temporary, we can simply raise the assumed unit cost and strengthen reserves in the future.
- The company has been a market leader in the UL market for some time, allowing it to grow significantly over the past five years.

(i) Based on the direction from the Canadian Institute of Actuaries in using actuarial judgment in this situation, respond to your CEO's suggestion.

(ii) Recommend a best estimate assumption. Justify your answer.

(iii) Recommend a Margin for Adverse Deviation. Justify your answer.

11. (*6 points*) DBM Life is a Canadian domiciled stock company doing business in both Canada and the United States. The company is also involved in non-insurance business in both countries.

You are given the following information for each country for the year 2011:

	Canada	**U.S.**
Beginning of Year Stat Reserve	0	0
End of Year Stat Reserve	−3,000	40,000
Beginning of Year Tax Reserve (MTAR)	0	0
End of Year Tax Reserve (MTAR)	−3,000	35,000
Premium	10,000	20,000
Claims	500	1,500
Taxable Investment Income	400	800
Investment Income Tax Paid	2,000	0
Income earned on non-insurance business	20,000	30,000
Federal Income tax rate	30%	25%

(a) (*2 points*) Calculate income tax payable by DBM to the Canadian government for the year 2011. Show all work.

(b) (*2 points*) Your CFO has noted that the Canadian MTARs are similar to the Stat Reserves. She recalls that at her previous company, in 2001, these values were generally very different.

Construct a report outlining the differences in the MTAR calculations for life insurance policies that occurred between 2001 and 2011.

(c) (*2 points*) Due to a bizarre problem with your administration system, you are faced with losing the addresses (both at time of issue and current) of either your Universal Life policyholders or Deposit Annuity policyholders written by your Canadian operations.

Assess the impact on the company's tax calculations from losing this policyholder address information, and make a recommendation on this basis as to which product's address information is less detrimental to lose. Justify your answer.

12. (*8 points*) Using the research paper "Use of Stochastic Techniques To Value Actuarial Liabilities Under Canadian GAAP" as a guide with regards to setting Canadian reserves for Segregated Fund products:

(a) (*4 points*) Discuss the advantages and limitations of the Whole Contract stochastic approach of valuation, and ways in which these limitations can be overcome without resorting to the full component approach.

(b) (*4 points*) Discuss how the MFADs for the stochastic variables in the reserving model are defined, and the considerations made when setting the level of MFAD for these variables.

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

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