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

Exam CSP-IC

AFTERNOON SESSION

Date: Friday, April 29, 2011
Time: 1:30 p.m. – 4:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 7 questions numbered 10 through 16 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 10

10. (*5 points*) You are the external reviewer for Coastal Life. Coastal Life has implemented a new model for its universal life reserves. The appointed actuary has provided the following in response to your request for information on the new model:

To:	Reviewing Actuary
From:	Appointed Actuary, Coastal Life
Date:	February 15, 2011
Subject:	New Universal Life Reserve Model

Below is an overview of the new reserve model we implemented for our universal life products in June 2010.

- The model was built using a third party actuarial system.
- The company moved from a deterministic model to one that is stochastically based.
- Future equity returns for the equity linked investment options are randomly generated using an equity model reflecting historic patterns appropriate to the various funds.
- Each random scenario generates associated account value balances, surrender values and death benefits. Lapses are not modeled dynamically.
- All other assumptions (e.g. mortality, interest) remain unchanged from the prior method. Those assumptions are outlined in the 2010 Appointed Actuary's Report.
- A distribution of reserve balances is constructed at quarter end.
- The reported reserve is the average reserve balance for the 80^{th} percentile over the most recent 3 quarters.

Determine the additional information you need to fulfill your obligations as external reviewer under OSFI Guideline E-15.

11. (*10 points*) You are given the following information for a three-year term life product:

- 1,000 policyholders
- Death benefit is 500,000 per policy
- All policies issued on the same day
- Single premium is paid at issue for each policy
- At issue, mortality is expected to be normally distributed with a mean of 3% and a standard deviation of 0.5%

Assume:
- Investment rate is 6%
- Cost of capital is 10%
- Ultimate Risk Exposure Method is used for fair value calculations

Based on expected experience at issue, internal economic capital models show the following required levels of capital:

Year	Beginning of Year Required Capital (in millions)
1	48
2	33
3	16

(a) (*6 points*) Calculate the fair value of the insurance liability immediately following the payment of the premium. Show all work.

(b) (*4 points*) By the end of the first policy year, based on credible data, you expect that future mortality will be significantly higher.

Explain the steps you would take to calculate the insurance liability at the end of Year 1 under:

(i) Fair Value Accounting

(ii) CALM

12. (*6 points*)

(a) (*1 point*) Explain the guiding principles underlying the regulatory and supervisory approach to reinsurance of the Office of the Superintendent of Financial Institutions (OSFI).

(b) (*2 points*) In a financial reinsurance arrangement, the following approaches can be used to preserve the reserve credits for the ceding company:

(i) Trust

(ii) Letter of Credit with the reinsurer

Identify the advantages and disadvantages of each from the ceding company's perspective.

(c) (*3 points*) ABC Life has the following reinsurance contract which is currently valued under Canadian GAAP.

Recommend any changes to these reinsurance contract features to ensure risk transfer exists. Justify your response.

(i) The reinsurer may defer claim payments in a year where claims exceed 150% of expected.

(ii) The ceding company may recapture the reinsurance any time after third policy year upon payment of any negative experience refund balance.

(iii) Reinsurance premiums are 120% of ceding company gross premiums and will be reviewed only after five years.

(iv) The reinsurer may terminate the contract after seven years with 90 days notice.

13. (*12 points*) CBA Life, a Canadian insurance company, is acquiring a block of non-participating, term to 100 policies from ZYX Life. The new block of business is 90% YRT reinsured.

A valuation student is proposing the following valuation assumptions and margins for adverse deviation for ZYX's block of term to 100 policies:

- Lapse assumptions are based on CBA Life's experience studies which are fully credible
- Mortality assumption is based on industry experience

	Margins for Adverse Deviation
Mortality Rates	$+10/e_x$
Lapse Rates	+3%
Interest Rates	Level 0.25%

A preliminary valuation for the new block of business using the proposed valuation assumptions and margins for adverse deviation produced the following results:

Total reserve (in millions)	Best Estimated Reserve	Reserve with testing margin only
Lapse	39	36
Mortality	39	31

(a) (*5 points*) Recommend changes to the margins for adverse deviation for the valuation of this new block of business. Justify your answer.

(b) (*3 points*) CBA Life will continue selling the term product after the acquisition is completed. CBA will relax the underwriting requirements by removing an expensive underwriting test that ZYX required.

Assume:

- The condition detected by the underwriting test exists in 3% of insurance applicants.
- Individuals with the condition were previously deemed uninsurable.
- An additional 5% of applicants with the condition will now seek insurance due to the relaxed underwriting requirement.
- Additional mortality is 400% of the average mortality under the old underwriting requirements.
- Ignore reinsurance.

Determine the percentage increase in expected mortality as a result of this underwriting change.

13. **Continued**

(c) (*4 points*) You are given the following information for another block of business for sale by ZYX Life (Financial Statement under GAAP):

Assets		Liabilities and Capital	
Government of Canada Bonds	1,000,000	Reserve	5,600,000
Corporate A-Rated Bonds	3,000,000		
Commercial Mortgages	2,000,000		
		Required Capital	400,000
Total	6,000,000	Total	6,000,000

Assume:

- There are no transaction costs or taxes.
- Upon transfer to CBA, the embedded value for this block of business is 800,000.
- CBA Life will maintain the current reserves.
- Only the C1 capital component of required capital will change.
- The following C1 factors apply:

Asset Type	C1 Factor
Government of Canada Bonds	0%
Corporate A-Rated Bonds	1%
Commercial Mortgages	4%

ZYX has offered to transfer the liabilities and assets equal to 5,000,000. In addition, ZYX will allow CBA to select the asset mix for transfer from the above portfolio.

Evaluate the adequacy of ZYX's offer. Justify your answer.

14. (*12 points*) ABC Life cedes 80% of its whole life business through a coinsurance treaty with XYZ Re.

You are given the following information:

Policy Assumptions	
Face Amount	500,000
Premium	5,000
Policy Fee	25
Mean Reserves–Year 1	400
Commissions–Year 1	95%
Commissions–Year 2+	5%
Premium Tax	2.5%
Expenses	
Underwriting & Issue – per policy	350
Maintenance – per policy per year	25

Assume the following:

- ABC Life and XYZ Re each have initial surplus of 600
- ABC Life and XYZ Re each assume investment rate of return of 10%
- XYZ Re pays an expense allowance to ABC Life as follows:
  Policy year 1 – 100%
  Policy year 2-10 – 15%
  Policy year >10 – 7.5%
- ABC Life retains the policy fee
- XYZ Re reimburses ABC Life for the premium tax paid
- Premium is paid at the beginning of the year
- Death claims of 10,000 paid at end of Year 1

14. **Continued**

(a) (*8 points*)

(i) Calculate the Gain from Operations for both ABC and XYZ for Year 1. Show all work.

(ii) Determine the amount of surplus relief that ABC receives from this reinsurance agreement at the end of Year 1. Show all work.

(b) (*2 points*) Recommend an alternative form of reinsurance that would provide surplus relief, including its advantages and disadvantages.

(c) (*2 points*) ABC Casualty is a Property and Casualty (P&C) insurance company which is owned by the same parent company as ABC Life. ABC Casualty intends to cede 30% of its business using a traditional coinsurance deal to a company in Bermuda, which is unregistered in Canada, and another 60% of its business to XYZ Re, which is registered in Canada.

Recommend an alternative arrangement, if necessary, to ensure ABC Casualty's compliance with the Insurance Company Act. Justify your answer.

15. (*10 points*) Borden Life is a Canadian Life Insurance Company.

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

(b) (*5 points*) Create a Source of Earnings analysis using the following income statement information:

Premiums	2,000
Investment Income	
Product-related	3,000
Surplus Related (after tax)	500
Debt Service Costs	(50)
Claims	
Death	(400)
Surrenders	(1,200)
Expenses (including Commissions)	
First year (product)	(1,000)
Renewal (product)	(1,400)
Surplus-Related Expenses	(30)
Change in Reserve	
Expected Premiums	(1,950)
Expected Claims	480
Expected Surrenders	1,300
Expected Expenses	1,200
Required Interest on Reserves	(2,750)
Release of PfADs	
Mortality	75
Surrenders	120
Expenses	60
Change in Method	(100)
Change in Assumption	
Mortality	100
Surrenders	75
Expenses	25
Best Estimate Released on Death Claims	
Expected	(100)
Actual	90
Best Estimate Released on Surrenders	
Expected	(300)
Actual	400
New Business	800
Income before Income Tax	945
Income Taxes	(350)
Net Income	595

15. **Continued**

(c) (*4 points*) Borden has experienced a significant unanticipated increase in term conversion activity on a recently acquired large block of business.

Recommend adjustments to valuation assumptions based on this term conversion experience.

16. (*5 points*) You have been given responsibility for classifying an insurance company's contracts, for the purposes of reporting under International Financial Reporting Standards (IFRS).

(a) (*2 points*) Identify the general process for classifying contracts under IFRS.

(b) (*3 points*) Recommend the appropriate IFRS classification for each of the following three product lines:

(i) Mutual Funds and Securities

(ii) Fixed Annuities with interest rate and annuitization guarantees

(iii) Variable Annuities with separate account options, general account options with interest rate guarantees, and options to elect minimum death and living benefit guarantees

Justify your answers.

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

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