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

Exam CSP-IC

MORNING SESSION

Date: Friday, April 29, 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 9 questions numbered 1 through 9.

   b) The afternoon session consists of 7 questions numbered 10 through 16.

   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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Exam CSP-IC Front Cover

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

1. (*3 points*)

(a) (*1 point*) List the positive effects of testing interest rate scenarios using asset/liability modeling (ALM).

(b) (*2 points*) Evaluate the following approach used by a life insurance company in validating ALM models:

> *The asset cash flows are validated by comparing the starting modeled book values, par values, and average yields to the actual initial values. Similarly, the liability cash flows are validated by comparing the starting reserves, annualized premiums in force, and cash values to the actual initial values. You consider the model accurate if it reproduces the actual starting values within a range of 95% to 105%.*

2. (*5 points*) Beaumont Life is evaluating the purchase of a block of business from Settlers Life for 30 million.

Settlers Life Balance Sheet as of the proposed purchase date is as follows (all values are in millions):

Invested Assets	45	Solvency Reserves	40
		Required Capital	5
Total Assets	45	Total Liabilities and Capital	45

Assume:

- Beaumont Life will establish the same solvency reserves as Settlers Life.
- Beaumont Life will establish required capital of 3 million.
- Beaumont Life's tax rate is 35%.
- Beaumont Life's pre-tax transaction costs would be 2 million.
- Tax reserves are equal to solvency reserves.

(a) (*1 point*) List prerequisites Settlers Life should consider before entering into the sale.

(b) (*2 points*) Calculate the embedded value of this block of business. Show all work.

(c) (*2 points*) Recommend whether Beaumont Life should proceed with the purchase. Justify your recommendation.

3. (*8 points*) You are given the following:

- A three-year term insurance contract with a level face amount of 100,000.
- A single premium of 600 is payable at the beginning of the first policy year.
- Commissions and other acquisition costs are equal to 40% of first year premium payable at the beginning of the first year.
- Credit risk premium is 1%.
- The risk-free rate is 5%.
- Taxes are ignored.
- Deaths occur at the end of each policy year.

Policy Year	q_x
1	0.01
2	0.02
3	0.03

(a) (*2 points*) Explain the following approaches to Fair Value Liability valuation:

(i) Direct Method

(ii) Indirect Method

(b) (*1 point*) Identify the conditions under which the Fair Value Liability using the Indirect Method will equal the Fair Value Liability using the Direct Method.

(c) (*3 points*) Calculate the Fair Value Liability at policy issue using the Direct Method. Show all work.

(d) (*2 points*) Predict whether the Fair Value Liability increases or decreases for each of the following scenarios. Justify your answers.

(i) The credit risk premium increases.

(ii) An epidemic increases the mortality rate in policy year three.

(iii) The cost of equity capital increases.

4. (*8 points*) Your company is developing an integrated risk management program.

(a) (*5 points*) Assess the appropriateness of each of the following statements regarding this program.

(i) The risk management function will be done at the business unit level.

(ii) Risk officers report to the pricing officer of each business unit.

(iii) A checklist will be developed to help the risk management officers assess product risks.

(iv) The Board of Directors will be advised as risk issues arise.

(v) Risk management will be rules-based.

(vi) Compensation will continue to reflect the volume of sales.

(b) (*3 points*) The following recommendations have been made by an actuary to the CEO.

(i) Reinsure company's Long-Term Care business because it is a long-tail business and the company lacks in-house expertise to assess the risk.

(ii) Enter the Fixed Annuity market because most company products are Term and Whole Life.

(iii) Reallocate investments from risky assets to Government of Canada Bonds.

(iv) Create a Chief Risk Officer (CRO) position who is responsible for the risk reporting process. All operational areas will report periodically on potential risks to the CRO.

(v) The CRO and other senior managers should periodically assess the company's risks. For each significant risk, a senior manager should be assigned responsibility for its management.

Determine the parts of the Risk Control Process described in the Society of Actuaries' "Enterprise Risk Management Specialty Guide" that the company should follow for each of these recommendations. Justify your answer.

5. (*12 points*) ABC Life evaluates its asset/liability matching using the seven required scenarios under NY Regulation 126, plus eight additional, deterministic scenarios.

(a) (*2 points*) Assess the advantages and disadvantages of using deterministic scenarios in this analysis.

(b) (*2 points*) Compare the use of immunization versus cash flow matching.

(c) (*3 points*) You are given the following for a particular liability cash flow stream:

Discount rate	6%
Macaulay duration	9.86
Present value of cash flows	1,450

Calculate the present value of cash flows using a Modified Duration approach and a discount rate of 6.5%. Show all work.

Question 5 continued on next page

5. Continued

(d) (*5 points*) ABC Life's cash flow testing has produced the following Economic Value efficient frontier results:

	Portfolios						
Asset Allocation (%)	Current	Same Return	Same Risk	A	B	C	D
All Bonds maturity < 1 year	5%	10%	0%	30%	5%	0%	0%
Government Bonds 1 - 10 years	10%	5%	5%	20%	10%	0%	0%
Government Bonds 10 - 30 years	15%	20%	0%	15%	20%	25%	0%
Corporate Bonds 1 - 10 years	20%	10%	40%	15%	10%	0%	0%
Corporate Bonds 10 - 30 years	20%	30%	25%	15%	25%	25%	0%
Equities	30%	25%	30%	5%	30%	50%	100%

	Portfolios						
	Current	Same Return	Same Risk	A	B	C	D
Expected Economic Value	13,500	13,500	14,600	11,800	14,100	14,900	15,400
Standard Deviation	2,400	2,100	2,400	1,850	2,300	2,700	3,100
Expected Annualized Change in GAAP Equity	11.0%	11.0%	12.8%	9.0%	12.1%	13.6%	14.4%
Probability of Failure to Meet Change in Surplus Test	12%	8%	13%	4%	8%	14%	20%

(i) Explain efficient frontier analysis.

(ii) Construct a portfolio that will achieve a 12.5% GAAP equity growth target with a 90% likelihood of compliance using the Change in Surplus Test.

6. (*6 points*) An interest rate swap used for hedging a Guaranteed Minimum Accumulation Benefit contract guarantee within a variable annuity is 300% effective and is currently accounted for as a fair value hedge.

(a) (*1 point*) Explain the general disclosure requirements of SFAS 133 with respect to hedging.

(b) (*2 points*) Compare accounting treatment differences between a fair value hedge and a cash flow hedge under SFAS 133.

(c) (*3 points*) An accountant is concerned about the income statement volatility caused by fair value hedging and proposes changing to cash flow hedging.

Explain the potential impacts of the accountant's proposal.

7. (*6 points*)

(a) (*1 point*) Define the Liability Runoff and the one-year Mark-to-Market approaches for Economic Capital.

(b) (*2 points*) Explain the steps a company would take to calculate Economic Capital using the one-year Mark-to-Market approach.

(c) (*3 points*) A company sells long-duration life and annuity contracts including Universal Life and Variable Annuities with guarantees.

Explain challenges of using the Liability Runoff approach for Economic Capital for this company.

8. (*7 points*) You are given the following information for a block of fixed single premium deferred annuity (SPDA) contracts:

- The minimum guaranteed crediting rate is 2%.
- Liabilities are backed by the following asset portfolio:

Asset Class	Market Value	Duration	Convexity
Callable Corporate Bonds	10,000,000	3	4
Mortgages	10,000,000	10	15
MBS	10,000,000	7	25

Assume:

- A parallel yield curve increase of 200 bps has just occurred.

(a) (*2 points*) Explain the impact this yield curve shift would have on each of the following:

(i) Asset cash flows of the portfolio

(ii) Statutory liability values

(iii) Policyholder behavior

(b) (*3 points*) Determine which of the asset classes above has the largest impact to the market value of the asset portfolio following the yield curve shift. Show all work.

(c) (*2 points*) Identify the embedded asset and liability options in this block of business.

9. (*5 points*) You are conducting an actuarial review of a life insurance company's reserves. You are given the following:

	Annual Statement 12/31/2008	Annual Statement 12/31/2009	Preliminary 12/31/2010
Face Amount In Force	52,500,000	55,125,000	57,000,000
Reserve	2,367,000	2,578,500	2,200,000
Valuation Net Premium	1,300,000	1,425,000	1,100,000
Tabular Interest	115,000	125,500	150,000
Reserves Released by Death	109,000	119,000	115,000
Reserves Released by Other Terminations	55,000	60,000	55,000

Average Tabular Mortality Rate	
2007	**2008**
0.02067	0.02164

(a) (*4 points*)

(i) Determine the trend in the average tabular mortality rates through 2010. Show all work.

(ii) Identify possible drivers of this trend.

(b) (*1 point*) Explain spot check techniques that can be used to review the preliminary 2010 reserves.

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

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