SOCIETY OF ACTUARIES
Life Finance & Valuation - Canada

Exam ILALFVC

AFTERNOON SESSION

Date: Thursday, November 2, 2017
Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 4 questions numbered 7 through 10 for a total of 40 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 because 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 ILALFVC.

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.

475 N. Martingale Road
Schaumburg, IL 60173-2226

Printed in the U.S.A.

BEGINNING OF EXAMINATION
Afternoon Session
***Beginning with Question* 7**

7. (*10 points*)

(a) (*2 points*) List considerations which would cause an actuary to include other interest rate scenarios in addition to the prescribed scenarios when calculating insurance contract liabilities under Canadian reserving standards.

(b) (*4 points*) BDC Life is a Canadian life insurance company with two product offerings: 10-year Level Term, and Indexed Universal Life (IUL). BDC's Investment department maintains one large portfolio of assets to back all its term and permanent product liabilities.

The IUL product has the following characteristics:

- Policyholders can deposit premiums into four different equity indexed accounts and one fixed crediting rate account.
- Policyholders can deposit into and transfer funds between accounts at any time and in any amount.
- The fixed account has a minimum guaranteed crediting rate of 2.5%.

	Current	Low	High
Ultimate Risk Free Reinvestment Rate Assumption	3.1%	3.0%	4.0%

	Base Scenario	CTE(60)	CTE(70)	CTE(80)
IUL block calculated liabilities	47 million	40 million	45 million	50 million

Propose the insurance contract liabilities Company BDC should hold for its IUL block. Justify your recommendation.

7. **Continued**

(c) (*4 points*) BDC introduced a single premium whole life product in 2016. It is determined that a non-seriatim approximation of C-3 Margin is appropriate for this block of business.

(i) You are given:

Statement Value of Assets as at December 31, 2016: 3

CALM analysis conducted at December 31, 2016, as follows:

Period	Asset Cashflow (year-start)	Liability Cashflow (year start)	CALM Yield
2017	-30	30	
2018	-30	25	2.25%
2019	-30	40	2.33%
2020	-45	45	2.45%

Calculate the market-related value of liabilities including C-3 Margin as at December 31, 2016. Show all work.

(ii) It is proposed that the Loss Carry Forward for this new single premium product be treated as insurance contract related.

Critique this proposal and recommend changes if appropriate.

8. (*9 points*)

(a) (*1 point*) Define the following:

(i) Insurance contract under IFRS 4

(ii) Investment contract under IAS 32

(b) (*3 points*) Recommend the appropriate IFRS classification for each of the following contracts and state which IFRS/IAS guideline applies:

(i) Deferred variable annuity with a Guaranteed Minimum Accumulation Benefit (GMAB)

(ii) Deferred fixed annuity with no rider

(iii) Participating whole life product with a deposit account for dividends paid

Justify your answers.

8. Continued

(c) (*5 points*) PZZ Life is a Canadian insurance company that has created a new annuity product. This product provides fixed payments over a 10-year period, and provides a death or surrender benefit based on the discounted value of remaining payments. There is currently no observable market data for this type of contract. The company chooses to use the discounted cash flow valuation technique to determine the fair value of the annuity product.

(i) List the steps of the discounted cash flow approach.

(ii) You are given:

- All of the policyholders are between ages 18-35 and are healthy.
- The operating expenses of similar annuity products offered by other companies are not readily available.
- The operating expenses for PZZ's annuity product have increased significantly in recent years.

Recommend an appropriate level for the margin of risk and uncertainty for the following assumptions:

- Mortality
- Lapse
- Expense

Justify your answer.

(iii) Recommend a replicating portfolio for determining the discount rate used to calculate the fair value of PZZ's annuity product.

(iv) Recommend approaches of IFRS fair value measurement other than the discounted cash flow approach which are appropriate to determine the fair value of this annuity.

9. (*13 points*)

(a) (*1 point*) List 4 of OSFI's desired attributes for an effective source of earnings disclosure.

(b) (*7 points*) You have a block of 10-year paid-up term insurance issued in 2015.

You are given the following Reserve Movement Analysis (RMA) and Income Statement (I/S) information for this product.

RMA	**2015**	**2016**
Actual Statutory Reserves (with PfADs)	1,126,846	1,096,584
Expected Statutory Reserves (with PfADs)		1,103,944
Actual Best Estimate Reserves	1,013,933	987,972
Expected Best Estimate Reserves		994,603
Interest on Reserve		50,697
Expected Death Benefit		(75,000)
Expected Reserve release on Death		4,973
Actual Reserve Released on Death		(6,631)
Unexplained		0

Income Statement	**2016**
Interest on Assets Backing Liabilities	50,708
Interest on Assets Backing Surplus	1,042
Actual Death Benefits	(100,000)
Change in Liabilities	30,262
Net Income Before Taxes	(17,988)

The tax rate is 30%.

Prepare a Source of Earnings Disclosure for this product as at December 31, 2016. Show all work.

9. Continued

(c) (*3 points*) During 2016, the company introduced a new term product. You are given the following:

	Amount
Premiums Received	1,162,500
Acquisition Expenses (actual)	1,138,000
Acquisition Expenses (best estimate)	1,016,000
Statutory Reserve at Issue	5,700
Best Estimate Reserve at Issue	4,600
Expected PfAD Release in 2016	400
Actual PfAD Release in 2016	300

Calculate the impact on the Source of Earnings disclosure related to the introduction of this new product. Show all work.

(d) (*2 points*) Recommend actions to improve earnings based on the results of the Source of Earnings Disclosures from (b) and (c) above. Justify your recommendations.

10. (*8 points*) TTC Life is a Canadian insurance company which has recently acquired a block of non-par term-to-100 (T100) policies from another company. TTC Life is determining Canadian valuation assumptions for this acquired block of business.

- Lapse assumptions are based on TTC Life's fully credible experience studies.
- Mortality assumptions are based on a current industry experience study.
- Expenses are assumed to be a flat 2 per policy per year to cover statement mailing costs for the life of the policy.

(a) (*5 points*) The following Margins for Adverse Deviation (MfAD) have been proposed:

Mortality	$+10/e_x$
Lapses	+3%
Expenses	None

Preliminary valuation runs produced the following results:

Mortality Assumption	**Lapse Assumption**	**Reserve in Millions**
Best Estimate	Best Estimate	39
Best Estimate	Best Estimate with MfAD	36
Best Estimate with MfAD	Best Estimate	31

(i) Recommend changes (if any) to the base assumption and MfAD on mortality. Justify your answer.

(ii) Recommend changes (if any) to the MfAD on lapse. Justify your answer.

(iii) Critique the appropriateness of the base assumption and MfAD for expenses.

(iv) Explain how the Provision for Adverse Deviation (PfAD) for interest rate risk should be determined.

10. Continued

(b) (*3 points*) TTC Life plans to continue selling this T100 product, but will relax the underwriting requirements by removing an expensive underwriting test that the previous company required.

Assume:

- The condition detected by the underwriting test exists in 4% of insurance applicants.
- Individuals with the condition were previously deemed uninsurable.
- An additional 6% of applicants with the condition will now apply for this insurance due to the relaxed underwriting requirements.
- Additional mortality for people with this condition at all ages is 400% of the average mortality for people without this condition.

Determine the percentage increase in expected mortality for new issues as a result of this underwriting change. Show all work.

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

USE THIS PAGE FOR YOUR SCRATCH WORK