SOCIETY OF ACTUARIES
Funding and Regulation Exam – Canada

Exam RETFRC

AFTERNOON SESSION

Date: Wednesday, May 4, 2016
Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 6 questions numbered 8 through 13 for a total of 40 points. The points for each question are indicated at the beginning of the question. No questions pertain to the Case Study.
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 provided on the outside of the envelope. Check the appropriate box to indicate morning or afternoon session for Exam RETFRC.
6. Be sure your written-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

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Exam RETFRC

****BEGINNING OF EXAMINATION****
Afternoon Session
Beginning with Question 8

8. (*5 points*) Your client establishes a new non-contributory defined benefit pension plan at January 1, 2016.

You are given:

Plan Provisions:

Normal retirement benefit:	\$100 per month per year of service
Normal form of payment:	Life only, payable monthly in advance
Normal retirement age:	Age 65
Early retirement age:	Age 55
Early retirement reduction:	4% per year prior to normal retirement age

Actuarial Assumptions and Methods:

Interest rate:	5% per annum
Retirement age:	Age 60
Pre-retirement decrements:	None
Actuarial cost method:	Individual Level Premium (Level Dollar)

Participant Data at January 1, 2016:

	Member A	**Member B**
Age:	30	50
Years of service:	5 years	5 years

Annuity Factor:

$\ddot{a}_{60}^{(12)} = 14.5$

8. Continued

(a) (*2 points*) Calculate the normal cost as at January 1, 2016.

(b) (*3 points*) Effective January 1, 2017, the normal retirement benefit is increased to $120 per month per year of service, for future service only.

Calculate the accrued liability and normal cost as at January 1, 2017.

Show all work.

9. (*12 points*) You are the actuary for a non-contributory defined benefit pension plan registered in Ontario.

You are given:

Actuarial Assumptions and Methods:

Basis	Going Concern	Hypothetical Wind-up	Smoothed Solvency
Liability Discount Rate	5.50% per annum	2.25% per annum	3.00% per annum (using averaging technique)
Asset Valuation Method	Actuarial value of assets	Market value of assets, less wind-up expenses	Actuarial value of assets, less wind-up expenses
Estimated Wind-up Expenses ($000s)	N/A	$1,000	$1,000
Excluded Benefits	N/A	None	None

To determine the smoothed solvency deficiency, the plan sponsor uses asset and liability smoothing over four years.

Actuarial Value of Assets:
For going concern and smoothed solvency, the actuarial value of assets is calculated as follows:

- It is the average of the market value of assets at the valuation date and the adjusted market value of assets at the end of the three preceding years.
- To obtain the adjusted market values, the market values at December 31 of each of the three preceding years are accumulated to the valuation date with net cash flow (contributions less benefit payments less non-investment expenses) and assumed investment return.
- Net cash flow is assumed to occur mid-year.
- The resulting asset value must be between 80% and 120% of the market value of assets at the valuation date.

9. Continued

Asset Information:

($000s)	2013	2014	2015	2016
Market Value of Assets at January 1	$375,000	$400,000	$425,000	$450,000
Adjusted Market Value of Assets	$375,000			
Net Cash Flow for 2013	(5,000)			
Assumed Investment Return (5.5%)	20,489			
Adjusted Market Value of Assets	$390,489	$400,000		
Net Cash Flow for 2014	4,000	4,000		
Assumed Investment Return (5.5%)	21,585	22,109		
Adjusted Market Value of Assets	$416,074	$426,109	$425,000	
Net Cash Flow for 2015	18,000	18,000	18,000	
Assumed Investment Return (5.5%)	23,372	23,924	23,863	
Adjusted Market Value of Assets	$457,446	$468,033	$466,863	$450,000
Actuarial value of assets as at January 1, 2016				$460,586

Liability Information at January 1, 2016:

($000s)	Going Concern	Hypothetical Wind-up	Smoothed Solvency
Liabilities	$375,000	$525,000	$490,000
Normal Cost (mid-year)	$50,000	N/A	N/A

Previously Established Amortization Schedules:

Type	Annual Amortization Payment ($000s)	Date Established	Date of Last Payment
Going Concern	$1,000	January 1, 2015	December 31, 2029
Solvency	$3,000	January 1, 2013	December 31, 2019
Solvency	$2,000	January 1, 2014	December 31, 2018

Question 9 continued on next page

9. Continued

Annuity Factors:

	Discount Rate 5.50%	Discount Rate 2.25%	Discount Rate 3.00%
$\ddot{a}^{(12)}_{\overline{2}\rceil}$	1.90	1.96	1.94
$\ddot{a}^{(12)}_{\overline{3}\rceil}$	2.78	2.90	2.87
$\ddot{a}^{(12)}_{\overline{4}\rceil}$	3.61	3.83	3.78
$\ddot{a}^{(12)}_{\overline{5}\rceil}$	4.40	4.74	4.65
$\ddot{a}^{(12)}_{\overline{14}\rceil}$	9.87	12.04	11.48
$\ddot{a}^{(12)}_{\overline{15}\rceil}$	10.33	12.77	12.13

(a) (*4 points*) Calculate the annual minimum required and maximum permissible employer contributions for 2016. Assume no deferral of amortization schedules.

Show all work.

(b) (*7 points*) You are given:

($000s)	**2016**	**2017**
Market Value of Assets at January 1	$450,000	$650,000
Actual Contributions	$65,000	n/a
Benefit Payments	$5,000	n/a
Non-Investment Expenses	$5,000	n/a
Normal Cost (mid-year)	n/a	$60,000
Going Concern Liability at January 1	n/a	$440,000
Hypothetical Wind-up Liability at January 1	n/a	$670,000
Smoothed Solvency Liability at January 1	n/a	$585,000

Assume:

- no deferral of amortization schedules;
- no Prior Year Credit Balance is established; and
- no change to any of the actuarial assumptions.

Calculate the annual minimum required and maximum permissible employer contributions for 2017.

Show all work.

9. **Continued**

(c) (*1 point*) Describe the impact on the annual minimum required and maximum permissible employer contributions for 2017, if the plan were in a hypothetical wind-up surplus position.

10. (*3 points*) XYZ Company sponsors a mid-sized defined benefit pension plan with the following characteristics:

- 500 active members;
- 2,000 inactive members; and
- all active and inactive members are or were blue collar, private sector workers.

A mortality study was performed last year which compared the mortality of the plan members to the 2014 Private Sector Mortality Table (CPM2014Priv) with CPM Improvement Scale B (CPM-B). The study revealed that the actual plan mortality rates were slightly higher than those of the CPM2014Priv table.

Describe the considerations for selecting a base mortality table and mortality improvement scale when developing a best estimate mortality assumption for XYZ Company's pension plan.

11. (*7 points*) You are given the following for a defined benefit pension plan registered in Ontario:

($000s)	**January 1, 2016**
Market value of assets	750,000
Wind-up expense	5,000
Active solvency liability	500,000
Inactive solvency liability	500,000
2016 solvency incremental cost	24,000
2016 expected benefit payments	12,000
2016 current service cost	15,000
2016 special payments	45,000

Additional Information:

- The blended solvency discount rate at January 1, 2016 is 2.5% per annum.
- Windup liabilities are equal to the solvency liabilities.
- Contributions are equal to the current service cost plus special payments and are remitted at the beginning of each month.
- The fund return from January 1, 2016 to September 30, 2016 was −10.0%.
- There were no other experience gains and losses during the period and no changes to the assumptions since January 1, 2016.

(a) (*3 points*) Calculate the transfer ratio as at September 30, 2016.

Show all work.

(b) (*4 points*) The transfer ratio in (a) was filed with the regulators. You are subsequently notified that the plan sponsor terminated a large number of active plan members on June 1, 2016.

Propose a course of action with respect to updating the September 30, 2016 transfer ratio. Justify your answer with reference to professional standards.

12. (*6 points*) You are the actuary for XYZ Company which sponsors a defined benefit pension plan registered in Ontario. You are setting the economic assumptions for the January 1, 2016 valuation.

You are given:

Asset Class Information:

	Expected long-term real rate of return (per annum)	Target Asset Allocation
Canadian Fixed Income	1.0%	60%
Canadian Equities	4.5%	25%
International Equities	5.0%	15%

Additional Information:

- Long-term expected inflation rate: 2.0% per annum
- Total investment management fee assumption: 0.10% of assets
- There is an explicit assumption for administration fees in the current service cost
- Plan assets are all passively managed

(a) (*3 points*) Recommend a best estimate going concern discount rate assumption using the building block approach. Justify your recommendation.

(b) (*1 point*) Describe the alternative approach for determining the best estimate going concern discount rate as outlined in the CIA Consolidated Standards of Practice.

(c) (*2 points*) XYZ Company is considering changing from passively managed funds to actively managed funds with the following proposed target asset allocation:

Asset Class	Proposed Target Asset Allocation
Canadian Fixed Income	70%
Canadian Equities	15%
International Equities	15%

Describe in words how the proposed changes will impact the best estimate going concern discount rate, using the building block approach.

13. (*7 points*) ABC Company is considering closing to new entrants its defined benefit pension plan registered in Ontario and providing pension benefits under one of the following arrangements:

- a new registered defined contribution pension plan (DCRPP)
- a Group Registered Retirement Savings Plan (GRRSP)
- a Deferred Profit Sharing Plan (DPSP)

(a) (*2 points*) Describe the advantages and disadvantages of the above arrangements from an employer cost perspective.

(b) (*5 points*) Compare and contrast the following characteristics of the above arrangements from a regulatory perspective:

(i) Employer contributions
(ii) Employee contributions
(iii) Contribution limits
(iv) Periods of absence
(v) Forfeitures
(vi) In-service withdrawals

****END OF EXAMINATION**
Afternoon Session

USE THIS PAGE FOR YOUR SCRATCH WORK

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