SOCIETY OF ACTUARIES
Funding and Regulation Exam – Canada

Exam RETFRC

AFTERNOON SESSION

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

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 5 questions numbered 8 through 12 for a total of 40 points. The points for each question are indicated at the beginning of the question. Question 12 pertains to the Case Study, which is enclosed inside the front cover of this exam booklet.
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 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.

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CASE STUDY INSTRUCTIONS

The case study will be used as a basis for some examination questions. Be sure to answer the question asked by referring to the case study. For example, when asked for advantages of a particular plan design to a company referenced in the case study, your response should be limited to that company. Other advantages should not be listed, as they are extraneous to the question and will result in no additional credit. Further, if they conflict with the applicable advantages, no credit will be given.

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

8. (*9 points*) Your client sponsors a non-contributory defined benefit pension plan. You are given:

Plan Provisions:

Retirement benefit:	\$100 per month times years of service
Normal form of payment:	Life only, payable monthly in advance
Normal retirement age:	Age 65
Early retirement reduction:	3% per year prior to age 65.
Termination benefit:	Deferred pension payable at age 65 or payment of the commuted value of the pension.

Actuarial Assumptions and Methods:

Interest rate:	5% per year
Retirement age:	Age 60
Pre-retirement decrements:	None
Timing of decrements:	Beginning of year
Actuarial cost method:	Entry Age Normal, Level Dollar
Asset method:	Market value of assets

Annuity Factors:

$\ddot{a}_{65}^{(12)} = 13.5 \qquad \ddot{a}_{60}^{(12)} = 14.8 \qquad \ddot{a}_{55}^{(12)} = 16.0$

Active Member Data at January 1, 2017:

Member:	A	B	C
Age:	35	45	54
Years of Service:	10	20	29

Financial Information:

Market value of assets at January 1, 2017: \$650,000

(a) (*3 points*) Calculate the unfunded actuarial liability and the normal cost as at January 1, 2017.

8. Continued

You are given the following for 2017:

- At December 31, 2017:
  - Member A terminates employment and receives a lump sum of $50,000 from the Plan.
  - Member B continues in active employment.
  - Member C retires and starts receiving a pension from the Plan.
- No contributions are made to the plan in 2017.
- The fund earns a rate of return of 0% during 2017.

(b) (*2 points*) Calculate the unfunded actuarial liability as at January 1, 2018.

(c) (*4 points*) Calculate the gains or losses, by source, for 2017.

Show all work.

9. (*7 points*) Your client sponsors a non-contributory defined benefit pension plan registered in Quebec. You are preparing the actuarial funding valuation as at December 31, 2016.

You are given:

Asset Class	**Target Asset Allocation (%)**	**Fund Duration**
Equities	50	0
Fixed Income	45	7.8
Cash	5	0

Stabilization Provision Calculation Chart

		Investment Duration / Liability Duration (%)				
		0	**25**	**50**	**75**	**100**
Variable Income Securities (%)	**0**	12	10	8	6	5
	20	14	12	10	8	6
	40	16	14	12	10	8
	50	17	15	13	11	9
	60	19	17	15	13	11
	70	22	20	18	16	14
	80	24	22	20	18	16
	100	27	25	23	21	20

Going Concern Results as at December 31, 2016		
Discount Rate	6.00%	5.25%
Margin for adverse deviation reflected in the discount rate	0.00%	0.75%
Market Value of Assets	\$17,800,000	\$17,800,000
Liabilities	\$15,600,000	\$17,940,000
2017 Normal Cost	\$82,000	\$97,000
Liability Duration	20	21

Solvency Results as at December 31, 2016	
Discount Rate	2.4%
Market Value of Assets	\$17,800,000
Wind-up Expenses	\$200,000
Solvency Assets	\$17,600,000
Solvency Liabilities	\$18,500,000

9. Continued

Annuity Factors:

$\ddot{a}_{\overline{n}\rceil}^{(12)}$	**Discount rate**		
	2.40%	5.25%	6.00%
5	4.7	4.4	4.3
15	12.6	10.4	10.0

(a) (*4 points*) Calculate the minimum contributions required for 2017 where the client has elected to reflect no margin for adverse deviation in the going concern discount rate.

Show all work.

You are given the following:

- The plan becomes an Ontario registered pension plan as at December 31, 2016.
- The client elects a margin for adverse deviation of 0.75% in the going concern discount rate.
- The client elects not to defer the commencement of special payments.
- There are no prior existing amortization schedules.

(b) (*3 points*) Calculate the minimum contributions required for 2017.

Show all work.

10. (*7 points*) Describe the actions that would need to be taken for a pension supervisory authority to conform to the following principles as described in the "IOPS Principles of Private Pension Supervision":

(i) Governance;

(ii) Risk-based supervision; and

(iii) Transparency.

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11. (*7 points*) You are the actuary for a company that sponsors four defined benefit pension plans registered in Ontario.

You are given:

Government of Canada bond yields at December 31, 2016:

Government of Canada Bonds	CANSIM Series	Yield
Marketable Bonds with maturities over 10 years	V39062	2.21%
Real-Return Long-term Bonds	V39057	0.51%

Canadian Institute of Actuaries' Guidance for Assumptions for Hypothetical Wind-Up and Solvency Valuations in effect at December 31, 2016:

Illustrative block	Duration based on 3.11% discount rate	Spread above unadjusted CANSIM V39062	Spread above unadjusted CANSIM V39057
Low duration	8.5	+ 70 bps	- 60 bps
Medium duration	11.0	+ 90 bps	- 60 bps
High duration	13.5	+ 100 bps	- 60 bps

Plan information:

Plan	Duration at December 31, 2016 based on 3.11% discount rate	Indexing Provision
A	9.1	Non-indexed
B	7.0	Non-indexed
C	13.2	80% of Consumer Price Inflation (CPI)
D	12.0	75% of CPI less 2%, not less than 0% and not to exceed 2.5%

11. **Continued**

(a) (*3 points*) Calculate the appropriate discount rate used to determine the liabilities assumed to be settled through the purchase of annuities for the hypothetical wind-up valuation as at December 31, 2016 for each of the following:

(i) Plan A

(ii) Plan B

(iii) Plan C

Show all work.

(b) (*4 points*) Explain, in words, how you would determine an appropriate annuity purchase discount rate for Plan D.

Question 12 pertains to the Case Study.

12. (*10 points*) You are the new actuary for the DPC Plan. In order to prepare the January 1, 2017 funding valuation, you will need the following:

- Prior membership data in order to replicate the prior valuation results
- Current membership data for the January 1, 2017 funding valuation

(a) (*3 points*) List the membership data you will need to perform the valuation as at January 1, 2017.

You are replicating the prior valuation results. Upon your review of the prior membership data, you realize that there was a material error in the prior valuation results.

(b) (*3 points*) Describe the appropriate course of action taking into consideration the rules of professional conduct.

You receive incomplete data for the January 1, 2017 valuation. You expect that you will not receive further data in a timely manner.

(c) (*4 points*) Explain how you would apply the standards of practice regarding the sufficiency and reliability of the data as a guidance to proceed with the valuation as at January 1, 2017.

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

USE THIS PAGE FOR YOUR SCRATCH WORK

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