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**SOCIETY OF ACTUARIES**  
**Funding & Regulation Exam - Canada**

**Exam RETFRC**

**MORNING SESSION**

**Date:** Wednesday, April 29, 2015

**Time:** 8:30 a.m. – 11:45 a.m.

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**INSTRUCTIONS TO CANDIDATES**

**General Instructions**

1. This examination has a total of 100 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 40 points).
  - a) The morning session consists of 7 questions numbered 1 through 7.
  - b) The afternoon session consists of 5 questions numbered 8 through 12.

The points for each question are indicated at the beginning of the question. Questions 3, 5, and 8 pertain 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.



## **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\*\***  
**Morning Session**

- 1.** (7 points) You are the actuary for a defined benefit pension plan. You have just completed the actuarial valuation for funding purposes. The report has not yet been filed.
- (a) (4 points) Propose appropriate actions to be taken for each of the following situations that recently came to your attention:
- (i) a retroactive immaterial data change.
  - (ii) a change in the target asset mix after the valuation date.
  - (iii) a significant downsizing after the valuation date.
- (b) (3 points) Explain how your proposed actions in (a) would differ if the report had already been filed.

2. (13 points) You are the actuary of an Ontario registered non-contributory pension plan. The plan has a closed defined benefit (DB) component with a defined contribution (DC) component for all new hires. The DB component is a career average earnings plan with no post-retirement indexing. The employer contributes 6% of payroll for DC members annually.

You are given:

	<u>Going Concern</u>	<u>Solvency</u>
DB Liabilities at 01/01/2014:	\$19,000,000	\$21,000,000
DB Assets at 01/01/2014:	\$18,000,000	\$18,000,000
Asset Method:	Market Value	Market Value
Discount Rate:	5.5% per annum	3.8% per annum
Wind-up Expense:	n/a	\$100,000
2014 DB Normal Cost:	\$300,000	n/a
2014 One-year Solvency Incremental Cost:	n/a	\$400,000

**Additional Information:**

2014 Benefit payments:	\$2,000,000 paid mid-year
Salary increase assumption:	3.5% per annum
Estimated 2014 DC payroll:	\$25,000,000

Previously established amortization schedules:

Type	Annual Amortization Schedules	Start Date	Date of Last Payment
Going concern	\$50,000	January 1, 2013	December 31, 2027
Solvency	\$150,000	January 1, 2012	December 31, 2016
Solvency	\$400,000	January 1, 2013	December 31, 2017

**Funding Policy:** Employer will contribute the minimum required contributions based on statutory requirements. The employer elected not to defer the commencement of special payments by one year.

## 2. Continued

- (a) (3 points) Calculate the total 2014 employer contribution assuming the employer contributes as per the funding policy.

Show all work.

- (b) (7 points) In addition to the contribution in (a), the employer contributed \$2,000,000 to the DB component on December 31, 2014. The net DB asset return in 2014 was 20%. There were no other experience gains and losses during the year and no changes to the assumptions.

Calculate the following:

- (i) The funded position of the DB component of the plan as at January 1, 2015 on a going concern and solvency basis.
- (ii) The total 2015 maximum and minimum statutory contributions for the plan.

Show all work.

- (c) (3 points) Describe the potential uses of the surplus and any associated implications, assuming the plan has a going concern and solvency surplus.

**Question 3 pertains to the Case Study.**

- 3.** (6 points) NOC is considering converting the NOC Full-Time Salaried Pension Plan to a defined contribution (DC) plan for all service.

The following conversion assumptions have been proposed:

Discount rate:	7.0% per annum
Salary scale:	0.0% per annum
Retirement age:	Age 65
Proportion married:	All members are assumed to be single

All other assumptions are as per the current going concern assumptions.

- (a) (3 points) Critique NOC's proposed conversion basis given that the pension plan is registered in Ontario.
- (b) (3 points) Explain how your response to (a) would change if the pension plan was Federally regulated.



**4.** (10 points)

- (a) (5 points) XYZ Company sponsors a non-contributory final average earnings pension plan that is closed to new entrants.

Describe the advantages and disadvantages of using the following cost methods from XYZ's perspective:

- (i) Projected Unit Credit (PUC) cost method; and
- (ii) Entry Age Normal (EAN) cost method.

- (b) (5 points) XYZ has recently established a non-contributory final average defined benefit pension plan for a business it recently purchased. Members of the newly established pension plan will be granted past service retroactive to their dates of hire with the prior employer.

Describe the advantages and disadvantages of using the following cost methods from XYZ's perspective.

- (i) Aggregate cost method; and
- (ii) Individual Level Premium (ILP) cost method.

***Question 5 pertains to the Case Study.***

- 5.** (7 points) Ontario has recently adopted the New Brunswick Shared Risk Pension Plan (SRPP) model. NOC is considering converting the Full Time Hourly Union Pension Plan to an SRPP.

At the same time, NOC and the Union are negotiating improvements to the Full-Time Hourly Union Pension Plan. The Union is requesting both pre-retirement and post-retirement indexing of pension benefits equal to 100% of the increase in the Consumer Price Index each year. NOC is concerned about the level and volatility of future contributions if they agree to the Union's request.

NOC's current funding policy is to include excludable benefits in all valuations and to contribute the resulting minimum funding requirements under Ontario legislation.

Describe in words the potential impact of the Union's request on the level and volatility of NOC's contributions under:

- (i) The current plan structure and funding policy; and
- (ii) The SRPP model.

6. (8 points) A member who participates in a non-contributory defined benefit pension plan is retiring at December 31, 2014.

You are given:

**Plan Provisions:**

Retirement benefit:	2.00% of final average earnings times service
Normal form of payment:	Life only, payable monthly in advance
Normal retirement age:	Age 65
Early retirement eligibility:	Age 55
Unreduced early retirement age:	Age 55 and 30 years of service; or, age 60 and 85 points (age plus service)
Early retirement reduction:	3.00% per year prior to age 65
Early retirement benefit:	Immediate pension, deferred pension or commuted value of pension
Optional forms of payment:	Actuarial equivalent to normal form
Actuarial equivalence basis:	Commuted value basis as of retirement date
Post-retirement annual indexation:	75% of CPI

**Participant Data as Retirement Date:**

Member's age:	62
Spouse's age:	60
Service:	25 years of service
Final average earnings:	\$165,000

*Question 6 continued on next page*

**6. Continued**

**Annuity Factors**

<b>Interest Rate (per year)</b>	<b>Life only at age 62</b>	<b>Life only at age 60</b>	<b>Joint life at ages 62 and 60</b>	<b>Life at age 62 with a 15 year guarantee</b>	<b>Joint and survivor 66 -2/3% with a 5 year guarantee (member age 62, spouse age 60)</b>
3.10% for the first 10 years, 4.60% thereafter	14.8	16.4	13.2	15.8	17.0
1.70% for the first 10 years, 2.30% thereafter	17.8	20.3	15.4	18.9	21.0
2.10% for the first 10 years, 2.90% thereafter	16.8	19.1	14.7	17.9	19.8
2.50% for the first 10 years, 3.90% thereafter	15.8	17.7	13.9	17.9	18.3

**Additional Information**

7-year Government of Canada benchmark bond yield (V122542)	2.17% per annum
Long-term Government of Canada benchmark bond yield (V122544)	3.20% per annum
Government of Canada bond yield (V122553)	1.22% per annum

- (a) *(1 point)* Calculate the monthly pension benefit payable under the normal form of payment.

Show all work.

**6. Continued**

- (b) (3 points) Calculate the monthly pension benefits payable under the following optional forms of payment:

- Optional Forms:
- (i) Life with 15 year Guarantee
  - (ii) Joint and Survivor 60%
  - (iii) Joint and Survivor 100%

Show all work.

- (c) (2 points) Identify the most valuable optional form of payment in (b). Justify your response.
- (d) (2 points) The member terminated employment but did not elect to start a pension at December 31, 2014. Your client has contacted you to recalculate the member's optional forms of payment at June 30, 2015. Interest rates have increased since December 31, 2014.

Explain how the change in interest rates would affect the optional forms of payment.

7. (9 points) The new CEO of XYZ Co. is frustrated with the volatility of the Company's contributions to its single-employer defined benefit pension plan. She recently worked at a company that participated in a multi-employer pension plan (MEPP) where the contributions were stable each year.
- (a) (5 points) Explain how MEPP funding principles could be applied to reduce the volatility of contributions to the XYZ plan.
- (b) (4 points) Explain how counter-cyclical funding regulations could help stabilize XYZ's contributions.

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

**USE THIS PAGE FOR YOUR SCRATCH WORK**

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