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**SOCIETY OF ACTUARIES**  
**Funding and Regulation Exam – Canada**

**Exam RETFRC**

**AFTERNOON SESSION**

**Date:** Tuesday, October 28, 2014

**Time:** 1:30 p.m. – 3:45 p.m.

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**INSTRUCTIONS TO CANDIDATES**

**General Instructions**

1. This afternoon session consists of 6 questions numbered 7 through 12 for a total of 40 points. The points for each question are indicated at the beginning of the question. Question 10 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 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 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\*\***

**Afternoon Session  
Beginning with Question 7**

7. (6 points) You are the actuary for a company that sponsors a non-contributory defined benefit pension plan. You are given:

**Plan Provisions:**

- Normal Retirement Benefit: 1.75% of final average three year earnings per year of credited service
- Normal Retirement Age: Age 65
- Early Retirement Age: Age 55
- Early Retirement Reduction: If member has 10 years of service: 3% for each year prior to earlier of age 65 and when the member would have attained 80 points (age plus service); otherwise, Actuarial Equivalent
- Normal Form of Payment: Life only
- Optional Forms of Payment: (i) Joint and Survivor 66 $\frac{2}{3}$ % pension  
(ii) Level income option, where CPP and OAS commence at age 65
- Actuarial Equivalence Basis: Commuted value basis as of the retirement date

**Other Information**

	$\ddot{a}_{61}^{(12)}$	$\ddot{a}_{55}^{(12)}$	$\ddot{a}_{61:55}^{(12)}$	$\ddot{a}_{61:\overline{4} }^{(12)}$	$\ddot{a}_{61}^{(12)}$ Deferred to age 65
Annuity Factors Using Commuted Value Basis	<b>13.4</b>	<b>16.8</b>	<b>13.9</b>	<b>4.2</b>	<b>7.2</b>

- C/QPP Maximum Pension Benefit: \$1,038 per month
- Maximum OAS payable in month of retirement: \$551 per month
- Income Tax Act Defined Benefit Dollar Limit: \$2,770 per year of credited service

**7. Continued**

**Participant Data as at Date of Retirement:**

Member's Age:	Age 61
Spouse Age:	Age 55
Final Average Earnings:	\$165,000
Credited Service:	14 years

Calculate the benefits payable under the normal form and each optional form of payment.

Show all work.

- 8.** (4 points) You are the new actuary for a company that sponsors a defined benefit pension plan. In reviewing the last actuarial valuation prepared by the previous actuary, you become aware of an apparent material error in the results.

Describe:

- an appropriate course of action, and
- possible outcomes,

with respect to your review, taking into consideration professional standards.

- 9.** (8 points) Describe the benefits of implementing the following principles as described in the “IOPS Principles of Private Pension Supervision”:

- (i) Independence;
- (ii) Adequate powers; and
- (iii) Proportionality and consistency,

from the perspectives of the following stakeholders:

- Pension plan members;
- Pension plan sponsors; and
- Pension regulatory authorities.

**Question 10 pertains to the Case Study.**

**10.** (8 points) You are the actuary for the NOC Full-Time Salaried Pension Plan and are preparing the January 1, 2015 funding valuation.

(a) (2 points) State the goals and limitations of provisions for adverse deviations when establishing the assumptions for the going concern valuation.

(b) (4 points) You are given:

<b>Asset Class</b>	<b>Expected long-term real return (per annum)</b>	<b>Target Allocation from Investment Policy</b>
Domestic Large Cap Equities	4.0%	30%
Domestic Small Cap Equities	4.5%	10%
Domestic Fixed Income	0.5%	40%
International Equities (in \$C)	3.5%	20%

- Long-term expected inflation: 2.5% per annum
- Total investment management fees assumption: 0.35% of assets
- Investment management fees assumed for a comparable passively managed portfolio: 0.15% of assets
- Administration fees assumption: 0.20% of assets
- Plan assets are actively managed

Recommend a discount rate assumption using the building block approach. Justify your recommendation.

(c) (2 points) Assume that all provisions for adverse deviations are reflected in the going concern discount rate.

Describe how your selection of the provisions for adverse deviations would differ if you were setting the going concern discount rate assumption for the NOC Full-Time Hourly Union Pension Plan.

**11.** (7 points) You are the actuary for a company that sponsors two Ontario registered non-contributory defined benefit pension plans, Plan A and Plan B. The company is considering merging Plan A into Plan B. The asset transfer would occur on January 1, 2015.

- (a) (3 points) Describe the restrictions that could prevent the asset transfer.
- (b) (4 points) You are given the following solvency valuation information as at January 1, 2015:

(\$000s)	Plan A	Plan B
Assets	5,656	465
Liabilities	7,980	530

Determine the minimum one time contribution required at January 1, 2015 before the transfer could occur.

Show all work.



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**12.** (7 points) Your client sponsors a contributory defined benefit pension plan.

You are given:

**Plan Provisions:**

Normal Retirement benefit: 2% of final year's salary times years of service  
 Normal form of pension: Life only  
 Normal retirement age: Age 65  
 Early retirement age: Age 55  
 Early Retirement benefit: Unreduced at 62 with 30 years of service; otherwise, reduced by 6% per year prior to unreduced date  
 Termination Benefit: Commuted value of deferred pension payable at age 65

**Actuarial Assumptions and Methods:**

Interest rate: 6% per annum  
 Salary increase rate: 4% per annum  
 Retirement age: Age 62  
 Pre-retirement mortality: None  
 Termination rates: None  
 Actuarial cost method: Projected unit credit, pro-rated on service

**Commuted Value basis:**

Interest rate: 2.3% for the first 10 years; 4.2% thereafter

**Annuity Factors:**

	<b>At 6% (deferred to age 62)</b>	<b>At 2.3% for the first 10 years; 4.2% thereafter (deferred to age 65)</b>
$\ddot{a}_{33}^{(12)}$	2.4	4.8
$\ddot{a}_{58}^{(12)}$	10.0	12.8
$\ddot{a}_{62}^{(12)}$	12.6	14.6
$\ddot{a}_{65}^{(12)}$	11.9	16.0

## 12. Continued

### Participant Data as at January 1, 2014:

	<u>Employee A</u>	<u>Employee B</u>
Age:	32	57
Service:	10 years	30 years
2014 Salary:	\$50,000	\$100,000

You are also given:

- During 2014, no salary increases were granted.
- Participant A terminated on December 31, 2014.
- Participant B retired on December 31, 2014.

Calculate the gain and loss by source for each of these events as of January 1, 2015.

Show all work.

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

**USE THIS PAGE FOR YOUR SCRATCH WORK**