SOCIETY OF ACTUARIES

Retirement Benefits Canada – Design & Pricing

Exam DP-RC

Morning Session

Date: Thursday, May 2, 2013
Time: 8:30 a.m. – 11:45 a.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 120 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 60 points).

   a) The morning session consists of 7 questions numbered 1 through 7.

   b) The afternoon session consists of 7 questions numbered 8 through 14.

   The points for each question are indicated at the beginning of the question. Questions 6 and 11 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 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 DP-RC.

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****
Morning Session

1. (*7 points*) Retirement savings and security have been adversely affected by the recent financial crisis globally. In light of the financial crisis and declining pension coverage, Country Z is looking to establish pension policies to encourage greater savings for retirement.

(a) (*2 points*) Describe tax policies that could be used to encourage employers to provide defined benefit pension plans.

(b) (*2 points*) Describe tax policies that could be used to encourage employees to save for retirement.

(c) (*3 points*) Describe ways the government of Canada has mitigated the loss of tax revenue associated with (a) and (b).

2. (*9 points*)

(a) (*3 points*) In an asset-only framework, macro attribution analysis is used to evaluate an asset manager's investment performance.

Describe the following components of macro attribution analysis:

(i) Risk-free asset.

(ii) Asset categories.

(iii) Net contributions.

(b) (*3 points*) In an asset-liability framework, a liability benchmark can be used to measure plan performance.

(i) (*1 point*) Define a liability benchmark.

(ii) (*2 points*) Describe how to create a liability benchmark.

(c) (*3 points*) Compare and contrast a liability benchmark with an asset-only benchmark.

3. (*13 points*) You are the actuary for a company that sponsors a non-contributory defined benefit pension plan registered in Ontario.

You are given:

Plan Provisions:

Normal Retirement Benefit:	$50 per month per year of service for retirements and terminations prior to January 1, 2014 increasing to $52 per month per year of service effective January 1, 2014.
Employee Contributions:	None
Normal Form of Pension:	Life only
Normal Retirement Age:	Age 65
Earliest Retirement Age:	Age 55
Early Retirement Reduction:	3% per year before age 65
Termination Benefit:	Commuted value of a deferred pension beginning at Normal Retirement Age. Early commencement permitted after Earliest Retirement Age, subject to an actuarial reduction.

Solvency Actuarial Assumptions and Methods:

Discount Rate – Annuity Purchase:	3.3% per year
Discount Rate – Lump Sum Payment:	3.5% per year for 10 years, 3.5% per year thereafter
Percentage of Members Electing a Commuted Value:	100% of members under age 55, 0% otherwise
Retirement Age:	Age that produces the highest liability
Pre-Retirement Decrements:	None

Going-concern Actuarial Assumptions and Methods:

Discount Rate:	5.5% per year
Retirement Age:	Age 60
Termination Decrement:	1% per year prior to age 45, 0% thereafter
Other Pre-Retirement Decrements:	None
Actuarial Cost Method:	Unit Credit

3. Continued

Participant Data as at January 1, 2013:

	Employee A	**Employee B**
Status:	Active	Retired
Age:	43	70
Years of Service:	2	20
Monthly Pension, payable for life:	N/A	$1,020

Immediate Annuity Factors:

	Discount Rates		
Age	5.5%	3.3%	3.5% for 10 years 3.5% thereafter
55	14.1	18.1	17.7
60	12.8	16.1	15.7
65	11.4	13.9	13.6
70	9.9	11.7	11.5
71	9.6	11.3	11.1

(a) (*7 points*) Calculate the going-concern accrued liability and normal cost and solvency accrued liability at January 1, 2013.

Show all work.

(b) (*4 points*) Effective January 1, 2014, an ad hoc increase to pensions-in-pay of 1% per year will be granted. Calculate the Solvency Incremental Cost (SIC) for 2013.

Show all work.

(c) (2 *points*) Explain the factors that contribute to the difference between the going-concern normal cost and the SIC.

Show all work.

4. (*6 points*)

(a) (*4 points*) Describe the input parameters required by the Society of Actuaries' Long-Term Healthcare Trend Resource Model.

(b) (*2 points*) Describe modifications to the input parameters under the following scenarios:

(i) Increase in future co-pays and deductibles paid by the retiree.

(ii) Medical advancements which significantly increase drug costs.

5. (*8 points*)

(a) (*2 points*) Describe the two main approaches to managing intergenerational risks in pension plans.

(b) (*4 points*) Compare and contrast the intergenerational risk sharing characteristics of the following three plans from the employees' and employer's perspective.

(i) Career average defined benefit plan with conditional indexation.

(ii) Defined benefit plan where employee and employer contribution rates are fixed but benefits and indexation are linked to funded status ("Collective Defined Contribution Plan").

(iii) Hybrid plan.

(c) (*2 points*) Recommend the pension plan design in (b) that will provide the greatest potential for sustainable risk sharing among plan members. Justify your answer.

Question 6 pertains to the Case Study.

6. (*9 points*) The CFO of NOC is considering converting the Full-Time Salaried Pension Plan to a target benefit pension plan.

(a) (*4 points*) Compare and contrast the following features of target benefit pension plans versus traditional defined benefit pension plans:

(i) Plan characteristics and design.

(ii) Governance.

(iii) Funding.

(b) (*5 points*) Evaluate the implications of including the following current Full-Time Salaried Pension Plan provisions in a target benefit pension plan:

(i) Normal retirement benefit.

(ii) Early retirement benefit.

(iii) Disability benefit.

7. (*8 points*) You are the actuary for a company that sponsors a contributory defined benefit pension plan.

You are given:

Plan Provisions:

Retirement benefits:	2.0% of final year's earnings times years of service
Normal retirement age:	65
Form of benefit payment:	Life only, payable monthly
Employee contributions:	5.0% of pay payable at the beginning of the year
Vesting:	Immediate
Termination benefit:	The present value of accrued benefits is payable. In addition, if the member contributions, with interest, exceed 50% of the present value of accrued benefits, this excess would be refunded to the member (Note, this refund is not applicable at retirement.)

Actuarial Assumptions and Methods:

Interest rate:	5.25% per annum
Salary increase:	3.75% per annum
Interest on employee contributions:	4.0% per annum
Retirement age:	Age 65
Pre-retirement death benefits:	None
Termination rates:	5% at the end of each of the first 3 years of membership, 0% thereafter
Cost method:	Aggregate, level percent of pay

Annuity Factor:

$\ddot{a}_{65}^{(12)} = 12.0$

7. **Continued**

<u>Participant Data as at January 1, 2013</u>:

	Employee A	**Employee B**
Age:	25	50
2013 Earnings:	\$55,000	\$80,000
Credited Service:	1 year	10 years
Employee contributions with interest:	\$2,800	\$35,000

Plan assets as at January 1, 2013: \$120,000

Calculate the 2013 normal cost.

Show all work.

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

USE THIS PAGE FOR YOUR SCRATCH WORK