
SOCIETY OF ACTUARIES
Retirement Benefits Canada – Design & Pricing

Exam DP-RC

AFTERNOON SESSION

Date: Thursday, November 3, 2011

Time: 1:30 p.m. – 4:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 7 questions numbered 8 through 14 for a total of 60 points. The points for each question are indicated at the beginning of the question. Questions 9 and 13 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.

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.** (12 points) Your client would like to recruit a 45 year old executive. The company currently provides a competitive health and welfare benefit package and a registered defined benefit pension plan for all employees. The VP of Human Resources has asked you to meet with them to discuss offering the following potential special compensation arrangements to the executive:
- (i) \$600,000 base salary.
 - (ii) \$400,000 base salary and 50% annual target bonus, half of which is paid in restricted company stock and half of which is paid in cash.
 - (iii) \$350,000 base salary, 50% annual target bonus paid in cash, and an unsecured defined contribution Supplemental Executive Retirement Plan (SERP), with employer contributions equal to 20% of base salary.
 - (iv) \$300,000 base salary, 50% annual target bonus paid in cash, and a 3% final average base salary defined benefit SERP secured through a Retirement Compensation Arrangement (RCA).

Describe the advantages and disadvantages of each arrangement from the executive's perspective.

Question 9 pertains to the Case Study.

- 9.** (12 points) NOC has hired you to conduct a pension plan design review.
- (a) (6 points) NOC wants to increase the value of the ancillary benefits under the Full-Time Hourly Union Pension Plan.
 - (i) (4 points) Describe how NOC could change the plan to achieve this, taking into consideration any regulatory constraints.
 - (ii) (2 points) In your opinion, which two design changes in part (i) would have the most impact. Justify your answer.
 - (b) (6 points) NOC wants to reduce the cost of the Full-Time Salaried Pension Plan.
 - (i) (4 points) Describe how NOC could change each of the plan features to achieve this, taking into consideration any regulatory constraints.
 - (ii) (2 points) In your opinion, which two design changes in part (i) would have the most impact. Justify your answer.

10. (10 points) Your client's CFO is considering liability driven investment (LDI) strategies to minimize the volatility of the pension plan's funded status.

(a) (2 points) List the characteristics of LDI strategies.

(b) (4 points) Describe the following LDI strategies:

- Dedication
- Immunization
- Contingent immunization

(c) (2 points) You are given:

Pension plan assets: \$683,000,000

Pension plan liabilities:

	Funding Liability	Duration
Active Members	\$529,000,000	20 years
Retired Members	\$234,000,000	10 years

Calculate the optimal duration of the pension plan assets given the CFO's objective.

Show all work.

(d) (2 points) Describe two alternative approaches to extend the duration of the liability hedging portfolio.

11. (3 points) Compare and contrast the cost and accrual patterns of the following cost methods:

- (i) Unit Credit
- (ii) Entry Age Normal
- (iii) Aggregate

12. (4 points) A member of a defined benefit pension plan has attained normal retirement age and has elected to retire as at January 1, 2011.

You are given:

Accrued monthly benefit as at January 1, 2011: \$5,000 per month

Normal form of payment: Life only, payable monthly

Optional forms of payment: Actuarial equivalent to the normal form of payment assuming 50% male and 50% female unisex mortality

- (i) One time lump sum payment of \$720,000;
- (ii) \$4,000 per month joint and survivor 100% pension, with a \$1,000 per month increase if the spouse dies first; or
- (iii) \$K per month joint and survivor 50% pension

The member and the member's spouse are the same age.

Calculate K.

Show all work.

Question 13 pertains to the Case Study.

13. (10 points)

- (a) (3 points) Describe, from both an employee and employer perspective, the key pension objectives of a global retirement program for Third Country Nationals.
- (b) (3 points) Describe the key practical considerations and constraints in implementing a global retirement program.

NOC is expanding into Asia starting next year. A new division called the International Operations Team (IOT), comprised of a group of NOC's brightest Full-Time Salaried Pension Plan participants, will be sent to Asia to set-up operations and train local employees in multiple Asian countries. Employees in the IOT will be expected to remain in Asia for a minimum of 10 years.

NOC's VP of Human Resources is designing a new global retirement program to cover employees in the new IOT and has asked for your help.

- (c) (4 points) Propose a global retirement program design for employees in the IOT identifying how the program addresses or fails to address the considerations in part (b) and the objectives in part (a).

14. (9 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:	1.5% of final average 2 year earnings per year of credited service
Supplemental Retirement Benefit:	\$5 per month per year of credited service, payable until Normal Retirement Age, or death if earlier
Normal Retirement Age:	Age 65
Early Retirement Age:	Age 55
Early Retirement Reduction:	4% for each year between 55 and 60, 2% for each year between 60 and 62.
Normal Form of Payment:	Lifetime only pension, payable monthly in advance
Optional Forms of Payment:	(i) Joint and Survivor 75% pension (ii) Lump sum payment of commuted value
Actuarial Equivalence Basis:	Commuted value basis as of the retirement date
Annual Indexation:	80% of CPI for Normal Retirement Benefit

Annuity Factors:

Interest Rate (per year)	$\ddot{a}_{55}^{(12)}$	$\ddot{a}_{58}^{(12)}$	$\ddot{a}_{58:55}^{(12)}$	$\ddot{a}_{58:71}^{(12)}$
3.8% for first 10 years, 5.00% thereafter	16.8	15.2	13.9	6.0
1.8% for first 10 years, 2.2% thereafter	22.8	19.8	17.7	6.4
2.0% for first 10 years, 2.80% thereafter	21.6	18.9	17.0	6.4
2.2% for first 10 years, 2.70% thereafter	21.4	18.7	16.9	6.4

Annualized Bank of Canada Bond Yields:

7-year Government of Canada benchmark bond yield (V122542)	Long-term Government of Canada benchmark bond yield (V122544)	Long-term real-return Government of Canada bond yield (V122553)
2.88%	3.72%	1.13%

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