
SOCIETY OF ACTUARIES
Retirement Benefits Canada – Design & Pricing

Exam DP-RC

Morning Session

Date: Thursday, November 4, 2010

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 6 questions numbered 8 through 13.

The points for each question are indicated at the beginning of the question. Questions 2 - 4 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 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****
MORNING SESSION

- 1.** (8 points) Employer sponsorship of post-retirement health care coverage has been declining for several years.
- (a) (4 points) Explain the rationale employers have used to support elimination of these benefits.
 - (b) (4 points) In light of an employer's ability, in most situations, to reduce or eliminate benefits, describe three adjustments that could theoretically be made to the current actuarial model to refine the estimate of the retiree medical obligations. Ignore the restrictions under current accounting standards.

Question 2 pertains to the Case Study.

- 2.** (6 points) The CFO of NOC calls you to discuss the extreme volatility that has occurred in the investment markets over the last several years. One way to address the CFO's question is to review asset valuation methods other than the current method of using the market value of assets.
- (a) (1 point) List the desirable characteristics of an asset valuation method.
 - (b) (2 points) Calculate the actuarial value of assets as at January 1, 2010 for the NOC Salaried Pension Plan based on a three year smoothing method assuming an expected return equal to the going concern valuation discount rate and assuming mid-year cash flows.
 - (c) (3 points) Describe the additional actuarial professional standards you must consider and discuss with the CFO at NOC prior to recommending using the smoothed asset value calculated in (b) rather than the current market value of assets.

*Questions 3 and 4 pertain to the Case Study.
Each question should be answered separately.*

3-4. *The following information applies to both questions 3 and 4.*

NOC is in the final stages of acquiring the salaried workforce of a smaller competitor, ABC Oil Co. (“ABC”). The acquisition has caused NOC to conduct a comprehensive review of its retirement income programs along with ABC’s retirement programs to determine the most appropriate retirement strategy for the new NOC population after the acquisition.

In order of importance, NOC has stated key objectives that should be addressed with regard to their retirement programs in light of the acquisition of ABC:

1. Single plan should cover all salaried employees.
2. Plan should minimize cost volatility.
3. Plan should be attractive to new employees.
4. Plan should encourage retention of current employees.
5. Employees should share responsibility for retirement income.
6. Plan should protect retirement income for existing NOC employees.

3. *(10 points)*

- (a) *(7 points)* In light of NOC’s key objectives, compare and contrast the design characteristics of defined contribution plans and defined benefit plans.
- (b) *(3 points)* Discuss how the characteristics of defined contribution plans described in (a) affect projected retirement income for participants.

**Questions 3 and 4 pertain to the Case Study.
Each question should be answered separately.**

4. *In addition to the information in question 3, for question 4 only, you are given:*

(10 points) NOC has provided you with the following information about ABC's retirement programs and their demographics.

Retirement Programs

Registered plan: Defined contribution plan with employer contribution of 6% of earnings.

SERP plan: Defined benefit plan with pension equal to 1.5% times highest 3 consecutive years of earnings less benefit payable under the registered plan.

Demographic Information

Employee Count:	1,500
Average Age:	30
Average Service:	6 years
Average Earnings:	\$65,000
SERP Employee Count:	30
SERP Average Earnings:	\$400,000

NOC is considering two proposals for the ongoing retirement strategy.

Proposal 1

All ABC salaried employees would be covered under the current NOC Salaried Plan and ABC SERP participants would be covered under the current NOC SERP Plan.

Proposal 2

After the transaction, all NOC and ABC salaried employees would be covered under ABC's defined contribution plan. All SERP participants would also be covered under a new defined contribution SERP with a total employer allocation equal to 10% of earnings less amounts contributed to the registered plan.

- (a) *(7 points)* Discuss the advantages and disadvantages of each proposal.
- (b) *(3 points)* Recommend a proposal from (a) to NOC's Board of Directors. Provide support for your recommendation.

5. (8 points) You are reviewing a pension fund investment manager's performance over the past two years. You have been given the following information:

Year	Asset Class Return for Pension Fund Portfolio		Average Pension Plan Fund Mix		Benchmark Return		Target Pension Fund Allocation
	2008	2009	2008	2009	2008	2009	
Domestic Equities	(30%)	33%	41%	47%	(33%)	30%	50%
International Equities	(26%)	25%	19%	25%	(24%)	22%	15%
Domestic Bonds	8%	2%	32%	26%	6%	5%	35%
Cash	1%	2%	8%	2%	3%	1%	0%

- (a) (2 points) Calculate the fund performance in each of the last two years and in total (including average annual return over that period), relative to the benchmark returns.
Show all work.
- (b) (4 points) Using macro analysis, analyze the manager's relative performance in 2008 and 2009.
Show all work.
- (c) (2 points) List the characteristics that define market indices and describe how a liability benchmark meets these criteria.

6. (10 points) You are the actuary for an Ontario company that wants to establish a non-contributory defined benefit pension plan. The CEO has suggested the following plan design:

Plan Provisions:	
Eligibility:	Earlier of 3 years of employment and age 35
Normal Retirement Benefit:	
Flat dollar per year of credited service according to the following:	
Years of credited service	
1	\$30 per month
2	\$35 per month
3	\$40 per month
4 or More	\$45 per month
Bridge Benefit:	Monthly pension of \$400 payable for life only, from early retirement to age 65
Normal Retirement Age:	Age 65
Early Retirement Age:	Age 58
Early Retirement Reduction:	Unreduced at early retirement age
Normal Form of Payment:	Lifetime pension, guaranteed 20 years, payable monthly in advance
Termination Benefit:	Commutated value payable in cash based on the CIA commuted value basis
Pre-Retirement Death Benefit:	Same as Termination Benefit
Vesting of Lifetime Pension:	50% after 1 year of membership, 100% after 2 years of membership
Post-Retirement Annual Indexation:	5% per annum

Critique each proposed provision from a regulatory perspective.

7. (8 points) Your client establishes a non-contributory defined benefit pension plan as at January 1, 2010.

You are given:

Plan Provisions:

Retirement Benefit: \$60 per month per year of service
 Normal Form of Payment: Life only, payable monthly in advance
 Normal Retirement Age: Age 60

Actuarial Assumptions and Methods:

Interest Rate: 6%
 Retirement Age: Age 60
 Pre-Retirement Decrements: None
 Actuarial Cost Method: Individual Level Premium (level dollar)
 Asset Valuation Method: Market value of assets
 $\ddot{a}_{60}^{(12)} = 13.0$

Participant Data as at January 1, 2010:

Member	Age	Service
A	50	20 years
B	35	5 years

Financial Information:

Market value of assets at January 1, 2011: \$30,000

- (a) (2 points) Calculate the normal cost of the plan at January 1, 2010.
- (b) (2 points) The retirement benefit rate increases from \$60 to \$70 at December 31, 2010. Calculate the accrued liability and normal cost of the plan at January 1, 2011.
- (c) (1 point) Re-calculate the normal cost of the plan at January 1, 2011 using the Aggregate Cost Method.
- (d) (3 points) Compare the normal costs and accrued liabilities under the Individual Level Premium and Aggregate cost methods at January 1, 2011. Explain what causes the difference in normal costs between the two methods.

Show all work.

****END OF EXAMINATION****
MORNING SESSION