
SOCIETY OF ACTUARIES
Retirement Benefits Canada – Design & Pricing

Exam DP-RC

AFTERNOON SESSION

Date: Thursday, November 1, 2012

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 12 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. (9 points) Your client is establishing a non-registered defined benefit pension plan for its highly paid executives to supplement the current registered defined benefit plan. The client's key objectives are:

- Cost containment;
- Benefit adequacy; and
- Retention and attraction.

- (a) (3 points) Describe how different Supplemental Executive Retirement Plan (SERP) designs could address your client's objectives.
- (b) (3 points) You are given the following for two members with individual executive pension arrangements.

Participant Data as at January 1, 2012

	<u>Employee A</u>	<u>Employee B</u>
Age:	55	50
Service:	8 years	12 years
2011 Base Pay:	\$500,000	\$250,000
2011 Bonus:	\$100,000	\$25,000
Pay Increase Timing:	Beginning of year	Beginning of year
Bonus Timing:	End of year	End of year
Assumed Base Pay Increase:	5% per year	4% per year
Target Bonus:	20% of base pay	10% of base pay

Plan Provisions

	<u>Employee A</u>	<u>Employee B</u>
Pay Definition:	Base	Base + Bonus
Normal Retirement Age:	62	65
Final Average Pay (FAP):	3-year average	5-year average
Benefit Formula:	$4\% \times \text{FAP} \times \text{Min}(\text{Service}, 10)$ PLUS $7\% \times \text{FAP} \times \text{Max}(\text{Service} - 10, 0)$	$2\% \times \text{FAP} \times \text{Service}$

Calculate the replacement ratio at their Normal Retirement Age assuming they are fully vested.

Show all work.

- (c) (3 points) Evaluate each plan design in (b) based on your client's objectives.

Question 9 pertains to the Case Study.

9. (9 points) NOC is considering joining a Multi-Employer Pension Plan (MEPP) for future service for their Full-Time Hourly Employees.

- (a) (4 points) Describe the plan design characteristics of MEPPs.
- (b) (5 points) Describe the advantages and disadvantages of joining a MEPP from the perspective of both NOC and the Hourly Employees.

10. (8 points)

- (a) (4 points) Your client has added hedge funds to their pension plan's investment portfolio. In order to monitor the investment performance of these funds, your client is considering using hedge fund indices.

Describe the key issues with using and selecting hedge fund indices.

- (b) (4 points) Compare and contrast the following hedge fund strategies:
 - (i) Merger Arbitrage.
 - (ii) Hedged Equity.

11. (7 points) You are the actuary for a company that sponsors a non-contributory defined benefit pension plan registered in Ontario. You are given the following:

Plan Provisions

Retirement Benefit:	2.0% of final 3-year average earnings times credited service
Normal Retirement Age:	Age 65
Early Retirement Age:	Age 55
Early retirement reduction for all members and former members:	0.5% per month from age 62
Temporary bridge benefit for all members and former members:	Maximum Canada Pension Plan benefit at age 65 with no reduction, payable to the earlier of death or age 65
Vesting:	Immediate on date of hire
Income Tax Act Limits:	Applied at pension commencement

Participant Data as at January 1, 2012

Age:	47
Final 3-year average earnings:	\$200,000
Credited service:	7 years
Continuous service:	9 years
Province of employment:	Ontario

Additional Information at January 1, 2012

Income Tax Act Defined Benefit Pension Dollar Limit:	\$2,646.67 per year of credited service
Monthly Maximum Canada Pension Plan benefit at age 65:	\$986.67
Monthly Maximum Old Age Security Pension:	\$540.12
Year's Maximum Pensionable Earnings:	\$50,100
Implied Rates of Increase in the Consumer Price Index:	2% for 10 years and 2% thereafter

Deferred Annuity Factors

Retirement Age	Lifetime factor	Temporary Bridge Factor
55	9.3	4.8

Calculate the commuted value assuming the member terminated on January 1, 2012. Assume the maximum commuted value occurs at age 55.

Show all work.

Question 12 pertains to the Case Study.

- 12.** (11 points) You are the actuary for the NOC pension and retiree medical plans. NOC has hired you to perform an experience study.
- (a) (1 point) List the steps to perform an experience study for pension and retiree medical plans.
- (b) (5 points) Describe the considerations when performing an experience study for the following assumptions for NOC's defined benefit pension and retiree medical plans:
- (i) Retirement
 - (ii) Turnover
 - (iii) Mortality
 - (iv) Trend rates
- (c) (3 points) Based on a recent experience study for the Full-Time Salaried Pension Plan, you have recommended the following assumption changes:
- Salary Scale:
Under age 35: 6% per year
Age 35 and over: unchanged
- Turnover:
Under 10 years of service: 10% higher than current turnover assumption
Other members: unchanged
- Retirement Age:
Age 64
- Describe, in words, the impact of each assumption change to the January 1, 2012 pension valuation results for the Full-Time Salaried Pension Plan.
- (d) (2 points) Describe, in words, the difference in sensitivity of the liabilities to the above assumption changes between the Full-Time Salaried Pension Plan and the Full-Time Salaried and Union Retiree Health Benefit Program.

- 13.** (9 points) Your client sponsors a defined benefit pension plan where three participants have recently retired under different phased retirement arrangements.

You are given the following information for the three participants:

Participant	Type of Arrangement
A	Elected to commence partial pension payments and is continuing to work for your client on a part-time basis
B	Elected to commence full pension payments and is continuing to work for your client on a full-time basis
C	Elected to commence full pension payments and has been hired by your client as an independent contractor

Describe the benefits and the challenges of each arrangement from both the employees' and employer's perspective.

- 14.** (7 points) Your client established a non-contributory defined benefit pension plan as at January 1, 2012.

You are given:

Plan Provisions:

Retirement benefit:	2% of final year's earnings times years of service
Normal form of payment:	Life only, payable monthly in advance
Normal retirement age:	Age 65

Actuarial Assumptions and Methods:

Interest rate:	6% per annum
Salary increase rate:	4% per annum
Retirement age:	Age 65
Pre retirement decrements:	None
Asset method:	Market value of assets
Amortization method:	Unfunded Actuarial Liability over 15 years, payable annually in advance
Funding policy	Contribute normal cost plus amortization payment at beginning of the year

Annuity Factors:

$$\ddot{a}_{65}^{(12)} = 11.0, \quad \ddot{a}_{60}^{(12)} = 12.0$$

Participant Data at January 1, 2012:

Age:	40
Service:	10 years
2011 Salary	\$100,000

The client will make a contribution at January 1, 2012 in accordance with the funding policy.

- (a) (4 points) Calculate the contribution at January 1, 2012 under the following methods:
- (i) Entry Age Normal
 - (ii) Frozen Initial Liability
- (b) (3 points) Determine the impact on (a)(i) of changing both the normal retirement age and retirement age assumption to age 60.

Show all work.

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

USE THIS PAGE FOR YOUR SCRATCH WORK

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