

Exam RETFRC

Funding & Regulation Exam - Canada MORNING SESSION

Date: Tuesday, April 28, 2020

Time: 8:30 a.m. – 11:45 a.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 100 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 40 points).
 - a) The morning session consists of 7 questions numbered 1 through 7.
 - b) The afternoon session consists of 5 questions numbered 8 through 12.

The points for each question are indicated at the beginning of the question. Questions 2, 6 and 8 pertain to the Case Study.

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 because 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.

Recognized by the Canadian Institute of Actuaries.

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) You are the actuary for Company ABC that sponsors a defined benefit pension plan registered in Ontario. Company ABC would like to mitigate the impact of market volatility on the Company's contribution requirements to the plan.

- (a) (2 points) Describe the desirable characteristics of an asset smoothing method.

You are given the following:

(\$000s)	2015	2016	2017	2018
Beginning Market Value of Assets	\$95,000	\$98,350	\$98,590	\$103,175
Contributions	5,500	4,200	4,500	3,800
Benefit Payments	(6,000)	(6,400)	(6,400)	(6,200)
Expenses	(150)	(160)	(175)	(180)
Investment Return	4,000	2,600	7,200	(1,800)
Ending Market Value of Assets	\$98,350	\$98,590	\$103,715	\$98,795

Company ABC has elected to use a linear recognition of all investment performance net of expenses over a period of 4 years.

- (b) (2 points) Calculate the smoothed value of assets as at January 1, 2019.

Show all work.

- (c) (2 points) Describe two other appropriate asset smoothing methods.

You are preparing the solvency valuation and will use the smoothed market value of assets determined in (b).

- (d) (2 points) Describe how the asset smoothing would impact the calculation of the solvency liabilities.

Question 2 pertains to the Case Study
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2. (7 points) You are the actuary for the DPC plan. The CFO would like to use the following assumptions for the January 1, 2020 funding valuation:

Going Concern Valuation

Economic Assumptions

Inflation	4.00% per year
Salary Increases	1.00% per year
YMPE Increases	3.00% per year
ITA Increases	1.50% per year

Demographic Assumptions

Retirement Rates	100% at age 67
Termination Rates	50% at age 50

Solvency Valuation

Solvency Assumptions

Mortality Table	125% of CPM2014 Private with CPM-B
Wind-up expenses	\$50,000

You are given the following in addition to the information provided in the Case Study:

(000s) Experience gain/(loss) due to:	January 1, 2017 to January 1, 2019
Salary changes	(6,500)
Indexation	1,000
Mortality	(5,250)
Retirement	(13,000)
Termination	500

- (a) (4 points) Critique the CFO's proposed economic and demographic assumptions for the going concern valuation.
- (b) (3 points) Critique the CFO's proposed assumptions for the solvency valuation.

3. (10 points) Your client sponsors a non-contributory defined benefit pension plan.

You are given:

Plan Provisions:

Normal 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 60
Termination benefit: Deferred pension payable at age 60 or the equivalent lump sum commuted value

Actuarial Assumptions and Methods:

Interest rate: 5% per year
Salary increase rate: 3% per year
Retirement age: Age 60
Gender (unisex assumption): 50% male
Pre-retirement decrements: None
Timing of decrements: Beginning of year
Actuarial cost method: Projected Unit Credit, prorated on service

Member Data at January 1, 2019:

	Member A	Member B	Member C
Age:	35	45	62
Service:	5 years	10 years	10 years
2019 Salary:	\$60,000	\$90,000	n/a
2019 Status:	Active	Active	Retired
Spouse's Age:	n/a	n/a	60

Member C elected a "pop-up" pension benefit payable in accordance with the following:

- \$3,000 per month payable while both the member and the spouse are alive
- \$3,000 per month payable while only the spouse is alive
- \$4,000 per month while only the member is alive

3. Continued

Annuity Factors:

$\ddot{a}_{59}^{(12)}$	15.0	$\ddot{a}_{59:57}^{(12)}$	13.6
$\ddot{a}_{60}^{(12)}$	14.8	$\ddot{a}_{60:58}^{(12)}$	13.4
$\ddot{a}_{61}^{(12)}$	14.5	$\ddot{a}_{61:59}^{(12)}$	13.1
$\ddot{a}_{62}^{(12)}$	14.3	$\ddot{a}_{62:60}^{(12)}$	12.8
$\ddot{a}_{63}^{(12)}$	14.0	$\ddot{a}_{63:61}^{(12)}$	12.5

Additional Information:

Market value of assets as at January 1, 2019 is \$800,000.

- (a) (3 points) Calculate the normal cost and the unfunded actuarial liability as at January 1, 2019.

Show all work.

You are given:

- A contribution of \$20,000 is made to the plan on January 1, 2019.
- The fund earns a rate of return of 10% during 2019.
- At December 31, 2019:
 - o Member A terminates employment and elects to transfer their commuted value of \$75,000 out of the plan.
 - o Member B receives a salary increase of 3%.
 - o Member C's spouse dies.

- (b) (2 points) Calculate the unfunded actuarial liability as at January 1, 2020.

Show all work.

- (c) (5 points) Calculate the gains and losses by source for 2019.

Show all work.

4. (11 points) You are the actuary for a non-contributory defined benefit pension plan registered in Ontario.

You are given:

Actuarial Assumptions and Methods:

Basis	Going Concern	Hypothetical Wind-up	Solvency
Discount Rate	5.00% per year	2.50% per year	3.00% per year (3-year average)
Provision for Adverse Deviations (PfAD)	12.00%	N/A	N/A
Asset Valuation Method	Actuarial value of assets	Market value of assets	Actuarial value of assets
Estimated Wind-up Expenses	N/A	\$5,000,000	\$5,000,000
Excluded Benefits	N/A	None	None

To determine the solvency deficiency, the plan sponsor uses asset and liability smoothing over three years.

Actuarial Value of Assets:

For going concern and solvency, the actuarial value of assets is calculated as follows:

- It is calculated as the average of the market value of assets at the valuation date and the adjusted market value of assets at the end of the two preceding years.
- The adjusted market values are determined using the market values at December 31 of each of the two preceding years, accumulated to the valuation date with the net cash flow (contributions less benefit payments less non-investment expenses) and assumed investment return equal to the going concern discount rate.
- The net cash flow is assumed to occur mid-year.
- The actuarial value of assets must be between 80% and 120% of the market value of assets at the valuation date.

4. Continued

Asset Information:

(\$000s)	2017	2018	2019
Market Value of Assets at January 1	\$300,000	\$325,000	\$400,000
Net Cash Flow for 2017	(5,000)		
Assumed Investment Return (5.0%)	14,875		
Adjusted Market Value of Assets	\$309,875		
Net Cash Flow for 2018	45,000	45,000	
Assumed Investment Return (5.0%)	16,619	17,375	
Adjusted Market Value of Assets	\$371,494	\$387,375	\$400,000
Actuarial value of assets as at January 1, 2019			\$386,290

Liability Information at January 1, 2019:

(\$000s)	Going Concern	Hypothetical Wind-up	Solvency
Liabilities (excluding PfAD)	\$400,000	\$630,000	\$580,000
Normal Cost (mid-year, excluding PfAD)	\$25,000	N/A	N/A
Solvency/Wind-up incremental cost (mid-year)	N/A	\$40,000	\$35,000

Previously Established Amortization Schedules:

Type	Annual Amortization Payment	Date Established	Date of First Payment	Date of Last Payment
Going Concern	\$9,000,000	January 1, 2018	January 1, 2019	December 31, 2033
Solvency	\$7,000,000	January 1, 2018	January 1, 2019	December 31, 2023
Solvency	\$8,000,000	January 1, 2017	January 1, 2018	December 31, 2022

Annuity Certain Factors

Immediate annuity factor compounded monthly	Discount Rate 5.00%	Discount Rate 3.00%
$\ddot{a}_{\overline{1} }^{(12)}$	0.97	0.98
$\ddot{a}_{\overline{3} }^{(12)}$	2.78	2.87
$\ddot{a}_{\overline{4} }^{(12)}$	3.62	3.76
$\ddot{a}_{\overline{5} }^{(12)}$	4.42	4.64
$\ddot{a}_{\overline{10} }^{(12)}$	7.86	8.63

Question 4 continued on the next page.

4. Continued

- (a) (4 points) Calculate the annual minimum required and maximum permissible employer contributions for 2019. Assume that contributions under the Ontario funding regulations are lower based on the current regulations than the previous regulations.

Show all work.

You are given:

(\$000s)	2019	2020
Market Value of Assets at January 1	\$400,000	\$480,000
Actual Contributions	\$150,000	n/a
Benefit Payments	\$50,000	n/a
Non-Investment Expenses	\$3,000	n/a

Assume:

- No Prior Year Credit Balance is established;
 - The solvency discount rate remains at 3% per year;
 - The PfAD is 12%;
 - There are no changes to the actuarial assumptions and methods; and
 - All experience is as expected.
- (b) (7 points) Calculate the estimated minimum required and maximum permissible employer contributions for 2020 using extrapolated liabilities.

Show all work.

5. (9 points)

- (a) (3 points) Describe Solvency Reserve Accounts (SRAs) as per Alberta's regulatory framework for pension plans.
- (b) (6 points) Compare and contrast the use of and requirements for the following for the purpose of solvency special payments:
 - (i) SRAs in Alberta; and
 - (ii) Letters of credit in Ontario.

<i>Part (c) of question 6 pertains to the Case Study</i>
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6. (9 points)

- (a) (2 points) Describe the calculation of a Canadian taxpayer's unused Registered Retirement Savings Plan contribution room.
- (b) (2 points) Explain the rationale behind the calculation of the Pension Adjustment for a single-employer defined benefit pension plan.

DPC would like to improve the DPC plan without affecting members' Pension Adjustments.

- (c) (5 points) Recommend changes to the DPC plan provisions that maximize the benefits payable from the DPC plan upon retirement.

7. (6 points) Company DEF wants to provide a retirement savings arrangement for its employees in Canada. Company DEF is considering one of the following arrangements:

- I. Defined Benefit (DB) registered pension plan;
- II. Group Registered Retirement Savings Plan (RRSP);
- III. Group Tax-Free Savings Account (TFSA); or
- IV. Deferred Profit Sharing Plan (DPSP).

Compare and contrast the pre-retirement and post-retirement tax implications of the above arrangements for the employees.

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

USE THIS PAGE FOR YOUR SCRATCH WORK