

# Exam RETFRC

## Funding & Regulation Exam - Canada MORNING SESSION

Date: Wednesday, October 31, 2018

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 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 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.

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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. (6 points) Company ABC sponsors a defined benefit pension plan. You have been asked to calculate the liabilities of the members impacted by the sale of one of Company ABC's divisions as at January 1, 2018.

You are given the following membership data at January 1, 2018 for the division:

**Active members**

	<b>Gender</b>	<b>Date of birth (mm/dd/yyyy)</b>	<b>Best average earnings (\$)</b>	<b>Salary rate (\$)</b>
1	Male	05/07/1973	62,000	63,500
2	Female	08/12/1965	64,000	
3	Male	12/23/1968	48,000	52,000
4	Female	03/20/1970	55,000	60,000
5	Female	07/05/2069	70,000	

**Retirees and beneficiaries**

	<b>Gender</b>	<b>Status</b>	<b>Age</b>	<b>Guarantee period at retirement</b>	<b>Spouse age</b>	<b>Service at retirement (years)</b>	<b>Monthly pension (\$)</b>
1	Male	Retiree	67	5 years	63	21	1,950
2	Female	Retiree	83		89	22	27,830
3	Male	Retiree	59	5 years		20	25,600
4	Male	Beneficiary	69			19	1,470
5	Female	Beneficiary	80			22	1,683

The division has no deferred vested members in the ABC plan

- (a) (2 points) Identify potentially incorrect, missing or incomplete data required to calculate the liabilities.

You request the revised and complete data from Company ABC, but do not receive any updated data.

- (b) (4 points) Describe how you would proceed, taking into consideration the standards of practice regarding the sufficiency and reliability of the data.

***Question 2 pertains to the Case Study.***

**2.** (9 points)

- (a) (6 points) Describe the process for setting the following going concern assumptions for the valuation of the Pension Plan for Employees of DPC Limited:
- (i) Inflation
  - (ii) Salary scale
  - (iii) Retirement scale for active members
  - (iv) Proportion with spouse and age difference
- (b) (3 points) The CFO of DPC asks you to change the retirement assumption to age 65 for all members.

Assess the appropriateness of changing the retirement assumption, taking into consideration professional standards.

3. (10 points) You are the actuary for Company ABC's private sector single employer defined benefit pension plan. The Plan is registered in Quebec. You are performing a funding valuation as at December 31, 2018.

You are given:

	<b>December 31, 2018</b>
Fixed income assets	\$38,700,000
Non-fixed income asset	\$47,300,000
<b>Total market value of assets</b>	<b>\$86,000,000</b>
Duration of fixed income assets	7.0 years
Monthly benefit payments	\$250,000
<b>Going Concern Liability</b>	
Active members	\$30,000,000
Deferred vested members	\$5,000,000
Pensioners	\$50,000,000
<b>Total going concern liability</b>	<b>\$85,000,000</b>
Annual normal cost	\$2,500,000
Duration of going concern liability	12.0 years
Going concern discount rate	6% per annum

**Stabilization Provision Calculation Chart**

		<b>Asset Duration / Liability Duration (%)</b>				
		<b>0</b>	<b>25</b>	<b>50</b>	<b>75</b>	<b>100</b>
<b>Variable Income Securities (%)</b>	<b>0</b>	12	10	8	6	5
	<b>20</b>	14	12	10	8	6
	<b>40</b>	16	14	12	10	8
	<b>50</b>	17	15	13	11	9
	<b>60</b>	19	17	15	13	11
	<b>70</b>	22	20	18	16	14
	<b>80</b>	24	22	20	18	16
	<b>100</b>	27	25	23	21	20

### 3. Continued

For a December 31, 2018 valuation of a Quebec registered plan, the deficit amortization period is 12 years.

- (a) (5 points) Determine the minimum funding requirements for 2019.

Show all work.

Effective June 30, 2019, Company ABC amends the plan to grant a one-time 2% increase to the pensions currently in pay. A new funding valuation is to be performed as at June 30, 2019 using a roll-forward approach from the December 31, 2018 valuation.

Assume the following:

- The same assumptions as December 31, 2018 apply.
- There are no changes to membership during the first half of 2019.
- There are no experience gains or losses during the first half of 2019.
- Minimum contributions for the first half of the year were remitted to the plan on June 30, 2019.

- (b) (4 points) Calculate the minimum contribution requirements for the last six months of 2019 following the plan amendment.

Show all work.

- (c) (1 point) Explain in words how the minimum contribution requirements would change due to the plan amendment if the Plan were 70% funded on a going concern basis.

**4.** (11 points)

- (a) (5 points) Describe the considerations in setting the base mortality table assumption for the going-concern valuation of a defined benefit pension plan.
- (b) (6 points) Describe the considerations in setting the annuity purchase mortality assumption for the solvency valuation in accordance with the CIA Educational Note on Assumptions for Hypothetical Wind-up and Solvency Valuations for each of the following separate groups:
  - (i) 200 retired professors
  - (ii) 5,000 retired coal miners
  - (iii) 20,000 retired office workers



**5.** (6 points) Company XYZ sponsors two different defined benefit pension plans, Plan A and Plan B, both registered in Ontario. The company has decided to merge Plan A into Plan B.

- (a) (1 point) List the funding requirements contained in the Ontario Asset Transfer Regulation that must be satisfied for the Superintendent to consent to this merger.

You are given the following information prior to the asset transfer:

(in \$millions)	Plan A	Plan B
Market value of assets	\$250	\$500
Going concern liabilities	\$200	\$600
Solvency liabilities	\$320	\$750

- (b) (3 points) Calculate the lump sum amount that Company XYZ needs to contribute to Plan B, the successor plan, in order for the Superintendent to consent to the merger.

Show all work.

- (c) (2 points) Describe the conditions that must be met with respect to members' benefits in the successor plan after the merger.

**6.** (10 points) Compare and contrast the requirements of the Office of the Superintendent of Financial Institutions (OSFI) and the Financial Services Commission of Ontario (FSCO) for converting a defined benefit pension plan to a defined contribution pension plan for all service with respect to the following:

- (i) Minimum value of converted benefits
- (ii) Ancillary benefits
- (iii) Salary projection
- (iv) Application of the 50% cost-sharing rule
- (v) Funding shortfalls
- (vi) Options to members

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7. (8 points) Company ABC sponsors a defined benefit pension plan registered in Ontario. The plan membership consists of pensioners and one active member.

You are given:

**Active Member Data as at January 1, 2018**

Age	60
Years of Service	14
Final Average Salary	\$90,000

**Plan Provisions**

Retirement Benefit	1.5% of Final Average Salary for each year of service
Normal Retirement Age	Age 65
Early Retirement Reduction	For active members who retire with at least 15 years of service, the retirement benefit is reduced by 4% for each year by which the early retirement age precedes age 60.  For all other members, the retirement benefit is reduced by 6% for each year that the early retirement age precedes the normal retirement age.
Portability Option	Lump sum commuted value option permitted to age 65.

**Commuted value annuity factors as at January 1, 2018:**

$\ddot{a}_{60}$	18.0
${}_1 \ddot{a}_{60}$	17.1
${}_2 \ddot{a}_{60}$	16.2
${}_3 \ddot{a}_{60}$	15.4
${}_4 \ddot{a}_{60}$	14.6
${}_5 \ddot{a}_{60}$	13.8

You are given the following information at January 1, 2018:

- The plan winds up on January 1, 2018.
- Market value of assets (net of wind-up expenses) is \$21,000,000.
- Pensioner wind-up liabilities are \$20,000,000.
- Assume the active member elects a lump sum on wind-up.

**7. Continued**

- (a) (3 points) Calculate the funded position of the plan.

Show all work.

- (b) (3 points) Describe the process to be followed in order to distribute surplus to an employer on plan wind-up.

- (c) (2 points) Calculate the commuted value of benefits for the active member if the plan does not wind-up and the member terminates employment voluntarily on January 1, 2018.

Show all work.

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

**USE THIS PAGE FOR YOUR SCRATCH WORK**