

Exam RETFRC

Funding and Regulation Exam – Canada AFTERNOON SESSION

Date: Tuesday, April 28, 2020

Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 5 questions numbered 8 through 12 for a total of 40 points. The points for each question are indicated at the beginning of the question. Question 8 pertains 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.

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****

Afternoon Session
Beginning with Question 8

Question 8 pertains to the Case Study

8. (5 points) You are the actuary of the DPC Plan.

(a) (1 point) Calculate the minimum required contributions for 2019.

Show all work.

After filing the January 1, 2019 actuarial valuation, the DPC Plan was amended.

You are given the following information about the amendment:

- The benefit formula is improved from 1.5% of best average earnings times years of service to 1.65% of best average earnings times years of service.
- The amendment applies to all past and future service.
- The effective date of the amendment is January 1, 2019.
- The financial impact of the amendment as of January 1, 2019 is as follows:

Increase in going concern liability (before PfAD)	\$73,000
Increase in total normal cost (before PfAD)	\$4,300
Increase in normal cost subject to PfAD (before PfAD)	\$3,800
Increase in solvency liability	\$86,000
Increase in wind-up liability	\$98,000

(b) (3 points) You are preparing a cost certificate in respect of the amendment.

Calculate the incremental 2019 contributions to be disclosed in the cost certificate resulting from the benefit improvement.

Show all work.

8. Continued

You are given the following information for a member of the DPC Plan:

- Full-time employee of the DPC Plan since January 1, 2016
- Pensionable earnings history:

Year	Pensionable Earnings
2016	\$65,000
2017	\$72,000
2018	\$85,000

- (c) (1 point) Calculate the Past Service Pension Adjustment for the sample member resulting from the plan amendment.

Show all work.

9. (9 points) You are preparing the funding valuations as at December 31, 2018 for two defined benefit pension plans.

- (a) (2 points) Describe the three elements that are typically determined in order to set a best estimate assumption of future mortality improvement rates.

You are given:

Plan information:

Plan	Duration at December 31, 2018 based on 3.23% discount rate	Cost of Living Adjustments	Number of Retirees	Employee Type	Industry
A	9.3	None	50,000	Salaried	Banking
B	12.1	60% of Consumer Price Index (CPI)	500	Hourly	Mining

- (b) (3 points) Recommend an approach for determining the best estimate post-retirement mortality assumption for the going concern valuation for each plan.

Justify your answer.

- (c) (2 points) Describe considerations in setting the mortality assumption for the purpose of determining the liabilities assumed to be settled through the purchase of annuities for the hypothetical wind-up valuation for each plan.

9. Continued

Government of Canada bond yields at December 31, 2018:

Government of Canada Bond	CANSIM Series	Yield
Marketable Bonds with maturities over 10 years	V39062	2.13%
Real-Return Long-term Bonds	V39057	0.78%

Canadian Institute of Actuaries' Guidance for Assumptions for Hypothetical Wind-Up and Solvency Valuations in effect at December 31, 2018 (the Guidance):

Illustrative block	Duration based on 3.23% discount rate	Spread above unadjusted CANSIM V39062	Spread above unadjusted CANSIM V39057
Low duration	8.5	+ 100 bps	- 70 bps
Medium duration	11.0	+ 110 bps	- 70 bps
High duration	13.4	+ 110 bps	- 70 bps

- (d) (2 points) Calculate the discount rate in accordance with the Guidance for the purpose of determining the liabilities assumed to be settled through the purchase of annuities for the hypothetical wind-up valuation as at December 31, 2018 for each plan.

Show all work.

10. (9 points) Your client sponsors a non-contributory defined benefit pension plan.

You are given:

Plan Provisions:

Retirement Benefit:	1.5% of career average earnings
Normal Form of Payment:	Life only, payable monthly in advance
Normal Retirement Age:	Age 65
Unreduced Retirement Age:	Age 62

Actuarial Assumptions and Methods:

Discount Rate:	5% per year
Salary Increase Rate:	3% per year
Retirement Rates:	40% per year from age 62 through 64, 100% at age 65
Pre-Retirement Decrements:	None
Timing of Decrements:	Beginning of the year
Actuarial Cost Method:	Unit Credit
Asset Method:	Market value of assets

Annuity Factors:

$$\ddot{a}_{65}^{(12)} = 13.4$$

$$\ddot{a}_{64}^{(12)} = 13.7$$

$$\ddot{a}_{63}^{(12)} = 14.0$$

$$\ddot{a}_{62}^{(12)} = 14.3$$

Member Data at December 31, 2018:

Age in Years	62
Years of Service	23
Accrued Annual Pension	\$30,100
2018 Earnings	\$90,000

Financial Information:

Market value of assets at December 31, 2018 is \$380,000.

10. Continued

- (a) (3 points) Calculate the unfunded actuarial liability as at December 31, 2018 and the 2019 normal cost.

Show all work.

You are given:

- A contribution of \$24,000 was made on December 31, 2019.
- The investment return for 2019 was -2%.
- Effective January 1, 2019, the member's salary increased by 2%.
- The member is active as at December 31, 2019.

- (b) (2 points) Calculate the unfunded actuarial liability as at December 31, 2019.

Show all work.

- (c) (4 points) Calculate the gains and losses by source for 2019.

Show all work.

- 11.** (9 points) You are the actuary for Company XYZ's defined benefit pension plan registered in Ontario. The Plan has one active member, five retirees and no deferred vested members.

You are given the following as at January 1, 2019:

Plan provisions:

Normal Retirement benefit	1.5% of final 3-year average earnings (FAE3) multiplied by years of credited service
Bridge	0.25% of FAE3 multiplied by years of credited service without reduction for early retirement, payable upon retirement on or after age 62 to the earlier of age 65 or death
Normal Retirement Age	65
Termination Benefit	Deferred pension payable at age 65 or actuarial equivalent if received earlier
Early retirement reduction	Unreduced benefit at age 62, otherwise 5% per year prior to normal retirement age
Normal Form of Benefit	Life only, payable monthly in advance

Active member information:

Age: 49 years
 Years of credited service: 9
 2018 earnings: \$80,000
 2017 earnings: \$76,000
 2016 earnings: \$70,000

Commuted value annuity factors deferred from age 49 for active member:

Age	Lifetime Factor	Bridge Factor
55	17.6	N/A
56	16.7	N/A
57	15.9	N/A
58	15.0	N/A
59	14.3	N/A
60	13.5	N/A
61	12.8	N/A
62	12.1	2.0
63	11.4	1.3
64	10.8	0.6
65	10.2	-

11. Continued

- (a) (3 points) Calculate the commuted value assuming the active member voluntarily terminates employment on January 1, 2019.

Show all work.

Assume the active member did not voluntarily terminate employment and the plan is wound up as at January 1, 2019.

You are given the following additional information as of the wind-up date.

Market value of assets:	\$300,000
Wind-up expenses:	\$60,000
Wind-up liabilities for retirees:	\$200,000

- (b) (4 points) Calculate the funded position upon plan wind-up as at January 1, 2019.

Show all work.

- (c) (2 points) Describe the requirements for funding any wind-up deficit and the potential restrictions on the payment of benefits to plan members.

No calculations are required.

12. (8 points) You are the new actuary for Company ABC. You have been asked to review the following email from the prior actuary to Company ABC.

“The purpose of this email is to provide additional information regarding a potential benefit improvement to the ABC Pension Plan (the “Plan”) as at January 1, 2019.

Based on prior discussions, Company ABC would like to improve pension benefits from the Plan as follows:

- *Increasing the plan formula from 1% times pensionable earnings to 1.5% times pensionable earnings for executive members only.*

Plan Provisions & Membership Data

These estimates are based on the plan provisions we have on file and the membership data we received from Company ABC after the completion of the most recent valuation report.

Actuarial Assumptions & Methods

In order to produce a lower cost to gain the approval of your company’s senior executives, we have adjusted the actuarial assumptions from the most recent actuarial valuation report.

Results

The estimated increase in liabilities as of January 1, 2019 is \$2,500,000 and the estimated increase in normal cost as of January 1, 2019 for the following year is \$75,000.

*Regards,
J.Q. Actuary, FCIA”*

- (a) (4 points) Describe areas of non-compliance with Canadian professional standards.
- (b) (4 points) Recommend a course of action to address the non-compliance.

Justify your answer.

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

USE THIS PAGE FOR YOUR SCRATCH WORK

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