Exam RETFRC

Funding & Regulation Exam - Canada
MORNING SESSION

Date: Wednesday, October 30, 2019
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 5, 7, and 12 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.

Canadian version of this exam is 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.
1. (6 points) You are the actuary for a defined benefit pension plan. You are reviewing the demographic assumptions used in the going concern valuation.

   (a) (2 points) Describe the considerations in setting the termination assumption.

   (b) (4 points) Describe the considerations in collecting data for a termination experience study.
2. (10 points) Your client sponsors a single-employer defined benefit pension plan registered in Ontario and a single-employer private sector defined benefit pension plan registered in Quebec.

You are given the following:

- There have been no benefit improvements to either plan.
- Neither plan provides indexation.

Compare and contrast the minimum funding regulations applicable to both plans for valuations as at January 1, 2019. Assume that contributions under the Ontario funding regulations are lower based on the current regulations than the previous regulations.
3. (8 points) You are given:

**Plan Provisions:**

- **Retirement Benefit:** 1.50% of final year’s earnings times years of service
- **Employee Contributions:** 4.0% of earnings, contributed at the beginning of the year
- **Normal Form of Payment:** Life only, payable monthly in advance
- **Termination Benefit:** Refund of employee contributions credited with interest at 2.0% per year
- **Normal Retirement Age:** Age 65
- **Vesting:** Immediate

**Actuarial Assumptions and Methods:**

- **Discount Rate:** 5.0% per year
- **Salary Increase Rate:** 2.5% per year
- **Retirement Age:** Age 65
- **Termination Decrement:** 3% per year prior to age 60
- **Timing of Decrements:** End of year
- **Actuarial Cost Method:** Aggregate, level percent of pay
- **Asset Valuation Method:** Market value of assets

**Annuity factor:**

\[ \dd{12}_{65} = 13.4 \]

**Financial Information:**

Market value of assets at January 1, 2019: $275,000
3. Continued

Membership Data at January 1, 2019:

<table>
<thead>
<tr>
<th></th>
<th>Member A</th>
<th>Member B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in Years</td>
<td>60</td>
<td>56</td>
</tr>
<tr>
<td>Years of Service</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>2019 earnings</td>
<td>$70,000</td>
<td>$64,000</td>
</tr>
<tr>
<td>Member contributions with interest</td>
<td>$55,000</td>
<td>$41,000</td>
</tr>
</tbody>
</table>

(a) *(6 points)* Calculate the employer normal cost and the actuarial liability as at January 1, 2019.

Show all work.

(b) *(2 points)* Compare and contrast the pattern of development over time of the normal cost under the Aggregate and Projected Unit Credit funding methods. No calculations are required.
4. (10 points) You are the actuary for Company DEF’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:

<table>
<thead>
<tr>
<th>December 31, 2018</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed income assets</td>
<td>$19,350,000</td>
</tr>
<tr>
<td>Non-fixed income asset</td>
<td>$23,650,000</td>
</tr>
<tr>
<td><strong>Total market value of assets</strong></td>
<td><strong>$43,000,000</strong></td>
</tr>
<tr>
<td>Duration of fixed income assets</td>
<td>7.0 years</td>
</tr>
<tr>
<td>Annual pensioner payments</td>
<td>$1,500,000</td>
</tr>
</tbody>
</table>

**Going Concern Liability**
- Active members: $15,000,000
- Deferred vested members: $2,500,000
- Pensioners: $25,000,000
- **Total going concern liability**: $42,500,000

**Solvency & Wind-up Liability**
- Active members: $17,000,000
- Deferred vested members: $3,000,000
- Pensioners: $27,000,000
- **Total solvency liability**: $47,000,000

- Annual normal cost: $1,250,000
- Duration of going concern liability: 12.0 years
- Going concern discount rate: 5.50% per year

**Stabilization Provision Calculation Chart**

<table>
<thead>
<tr>
<th>Asset Duration / Liability Duration (%)</th>
<th>0</th>
<th>25</th>
<th>50</th>
<th>75</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>14</td>
<td>12</td>
<td>10</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>40</td>
<td>16</td>
<td>14</td>
<td>12</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>50</td>
<td>17</td>
<td>15</td>
<td>13</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>60</td>
<td>19</td>
<td>17</td>
<td>15</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>70</td>
<td>22</td>
<td>20</td>
<td>18</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>80</td>
<td>24</td>
<td>22</td>
<td>20</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>100</td>
<td>27</td>
<td>25</td>
<td>23</td>
<td>21</td>
<td>20</td>
</tr>
</tbody>
</table>
4. **Continued**

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

(a) **(6 points)** Determine the minimum required and maximum permissible contributions for 2019.

Show all work.

Effective December 31, 2019, Company DEF enters into an annuity buy-out contract with an insurance company. The contract includes all members currently in receipt of a pension.

You are given the following information after the annuity buy-out:

<table>
<thead>
<tr>
<th></th>
<th>December 31, 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed income assets</td>
<td>$2,250,000</td>
</tr>
<tr>
<td>Non-fixed income asset</td>
<td>$17,500,000</td>
</tr>
<tr>
<td><strong>Total market value of assets</strong></td>
<td><strong>$19,750,000</strong></td>
</tr>
<tr>
<td>Duration of fixed income assets</td>
<td>7.0 years</td>
</tr>
<tr>
<td>Duration of going concern liabilities</td>
<td>19.0 years</td>
</tr>
<tr>
<td>Duration of normal cost</td>
<td>25.0 years</td>
</tr>
</tbody>
</table>

Assume the following:

- Except for the annuity buy-out, there are no changes to membership during 2019.
- Except for the annuity buy-out, there are no experience gains or losses during 2019.
- The investment policy was revised immediately following the annuity buy-out.
- The same assumptions as at December 31, 2018 apply on December 31, 2019, except for the going concern discount rate which is 6.0% per year.

For a December 31, 2019 valuation of a Quebec registered plan, the deficit amortization period is 11 years.

(b) **(4 points)** Calculate the estimated minimum required contributions for 2020 by extrapolating the liabilities and reflecting the sensitivity of liabilities and normal cost to interest rates.

Show all work.
Question 5 pertains to the Case Study

5. (9 points) An active member is retiring on July 1, 2019 from the DPC plan.

You are given the following information at July 1, 2019:

**Member Data**

<table>
<thead>
<tr>
<th>Age</th>
<th>58 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of Credited Service</td>
<td>7 years</td>
</tr>
<tr>
<td>Marital Status at Retirement</td>
<td>Single</td>
</tr>
<tr>
<td>Best Average Earnings</td>
<td>$220,000</td>
</tr>
<tr>
<td>Highest Average Indexed Compensation</td>
<td>$240,000</td>
</tr>
</tbody>
</table>

**Additional Information**

- Actuarial equivalence is determined based on Going Concern assumptions from the latest filed actuarial valuation.
- 2019 Income Tax Act defined benefit dollar limit is $3,026 per year of service.
- Maximum OAS pension payable in July 2019 is $607 per month.
- CPP maximum pension benefit for 2019 is $1,155 per month.
- The three-year average YMPE is $56,200.

**Going Concern Annuity Factors:**

<table>
<thead>
<tr>
<th>Annuity Factor</th>
<th>Annuity Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\ddot{a}_{58}^{(12)} = 18.01$</td>
<td>$\ddot{a}_{58}^{(12)} = 10.79$</td>
</tr>
<tr>
<td>$\ddot{a}_{58:3}^{(12)} = 18.08$</td>
<td>$\ddot{a}_{58:3}^{(12)} = 10.86$</td>
</tr>
<tr>
<td>$\ddot{a}_{58:10}^{(12)} = 18.27$</td>
<td>$\ddot{a}_{58:10}^{(12)} = 11.06$</td>
</tr>
<tr>
<td>$\ddot{a}_{58:15}^{(12)} = 18.58$</td>
<td>$\ddot{a}_{58:15}^{(12)} = 11.41$</td>
</tr>
</tbody>
</table>

(a) (4 points) Calculate the lifetime and bridge pensions payable from the DPC plan as at July 1, 2019 under the normal form.

Show all work.
5. Continued

(b) (3 points) Calculate the lifetime pension payable under the following optional forms of payment:

(i) Life only

(ii) Life guaranteed for 10 years

(iii) Life guaranteed for 15 years

Show all work.

DPC also offers a commuted value option at retirement. The member elects to transfer the lump sum commuted value to a Locked-In Retirement Account.

(c) (2 points) Describe the limitations placed under the Income Tax Act on the amount of the lump sum transfer of the commuted value from the DPC plan.
6. **(7 points)** You are given:

- Company ABC sponsors Plan A, a defined benefit pension plan registered in Ontario.
- Company XYZ sponsors Plan X, a defined benefit pension plan registered in Ontario.
- Company ABC has acquired a division of Company XYZ. Plan members of this division participated in Plan X but now participate in Plan A.
- Assets and liabilities will be transferred from Plan X to Plan A effective January 1, 2020.

You are given the following as at January 1, 2020:

<table>
<thead>
<tr>
<th></th>
<th>Before transfer</th>
<th>Transferred liabilities</th>
<th>After transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plan X</td>
<td>Plan A</td>
<td>Plan X</td>
</tr>
<tr>
<td>Wind Up liabilities</td>
<td>$420 $360</td>
<td>$120 $300</td>
<td>$120 $300</td>
</tr>
<tr>
<td>Going concern liabilities</td>
<td>$400 $300</td>
<td>$110 $290</td>
<td>$110 $290</td>
</tr>
<tr>
<td>Market value of assets</td>
<td>$430 $290</td>
<td></td>
<td>$430 $290</td>
</tr>
</tbody>
</table>

(a) **(3 points)** Calculate the value of assets to be transferred at the effective date in order to receive regulatory approval for the asset transfer. Show all work.

(b) **(2 points)** Describe the conditions that must be met with respect to the members’ benefits transferred to Plan A.

(c) **(2 points)** List the disclosure requirements for the cost certificate that is prepared following the completion of the asset transfer.
Question 7 pertains to the Case Study

7. (10 points) You are the actuary for the DPC Plan.

You are given:

<table>
<thead>
<tr>
<th>Member</th>
<th>Date of Membership</th>
<th>2019 Salary Rate</th>
<th>Sum of Pension Adjustments (PAs) from Date of Membership to 2018 inclusive</th>
<th>Date of Termination</th>
<th>Date of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>January 1, 1998</td>
<td>$415,000</td>
<td>$420,000</td>
<td>June 30, 2019</td>
<td>N/A</td>
</tr>
<tr>
<td>B</td>
<td>January 1, 2012</td>
<td>$45,000</td>
<td>$34,000</td>
<td>January 31, 2019</td>
<td>N/A</td>
</tr>
<tr>
<td>C</td>
<td>January 1, 2000</td>
<td>$145,000</td>
<td>$250,000</td>
<td>N/A</td>
<td>March 31, 2019</td>
</tr>
</tbody>
</table>

The Income Tax Act defined benefit dollar limit for 2019 is $3,026.

(a) (3 points) Calculate the 2019 Pension Adjustment for each member.

Show all work.

Member A receives a lump sum payment of $410,000 in August 2019. In addition, in 2017, there was a marriage breakdown and the spouse received an immediate transfer of $270,000.

(b) (2 points) Calculate the 2019 Pension Adjustment Reversal (PAR) for Member A.

Show all work.

Effective January 1, 2020, the DPC Plan benefits will be improved retroactively for all active members as follows:

- The Best Average Earnings (BAE) definition will be based on 36 consecutive months in which earnings were highest;
- The benefit formula will be 1.75% of BAE times years of service.

(c) (1 point) Explain in words how each of the above improvements will affect the calculation of Past Service Pension Adjustments (PSPAs).
7. Continued

You are given:

<table>
<thead>
<tr>
<th>Member</th>
<th>Date of Membership</th>
<th>BAE (36 months)</th>
<th>BAE (60 months)</th>
<th>Sum of PAs from Date of Membership to 2019 (inclusive)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>January 1, 2010</td>
<td>$63,000</td>
<td>$60,500</td>
<td>$70,155</td>
</tr>
</tbody>
</table>

(d)  (2 points) Calculate the Past Service Pension Adjustment (PSPA) for Member D. Show all work.

(e)  (2 points) Explain why the PSPAs related to the improvement are exempt from certification.

**END OF EXAMINATION**

Morning Session
USE THIS PAGE FOR YOUR SCRATCH WORK