

RET FRC Model Solutions

Fall 2020

1. Learning Objectives:

1. The candidate will understand how to analyze data for quality and appropriateness.
7. The candidate will understand how to apply the standards of practice and professional conduct guidelines.

Learning Outcomes:

- (1a) Identify data needed.
- (1b) Assess data quality.
- (1c) Make and/or recommend appropriate assumptions where data cannot be provided.
- (1d) Comply with regulatory and professional standards pertaining to data quality.
- (7a) Apply the standards related to communications to plan sponsors and others with an interest in an actuary's results (i.e., participants, auditors, etc.).
- (7d) Demonstrate compliance with requirements regarding the actuary's responsibilities to the participants, plans sponsors, etc.

Sources:

ASOP 23

CIA Consolidated Standards of Practice – sections 1440 and 1700

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Describe three considerations for reviewing and assessing data for the purpose of a funding valuation based on professional standards.

Commentary on Question:

The candidates needed to describe 3 of the following 4 key considerations to get full marks. Only a few candidates were able to get full points. Most described only 1 or 2 items or listed the considerations instead of describing them.

1. Continued

- The actuary should review the data for reasonableness and consistency, unless, in the actuary's professional judgement, such review is not necessary or practical. The actuary should examine the data for internal and external consistency and compare data against prior period, using a data reconciliation.
 - The actuary should take into account the extent of any checking, verification or auditing that has already been performed. The actuary can rely on data supplied by others, however, the actuary would need to consider the source of data, the qualifications, competence, integrity and objectivity of the party providing the data.
 - The actuary should be able to certify that the data is sufficient and reliable for the funding valuation. The data is sufficient if it includes all the needed information for the work and the data is reliable if it is sufficiently complete, consistent and accurate for the work.
 - If sufficient and reliable data cannot be obtained, the actuary should identify questionable data values and try to rectify the data by either obtaining corrected or additional data or by making reasonable assumptions and adjustments. If sufficient and reliable data cannot be obtained, the actuary should consider to either report with reservation or to decline the work.
- (b) Identify potentially incorrect, missing, or incomplete data required for the valuation.

Commentary on Question:

Most candidates did well on this question. Those who didn't get full points did not list sufficient data queries for active and inactive members. Candidates had to list 8 of the followings get full marks.

For active members:

- ID 11012: This is a duplicate, should be included in the data query.
- ID 11022: Date of birth is incorrect and should be questioned as the member is over age 71.
- ID 11024: The service is missing and should be requested in the data query.
- ID 11029: The service and/or date of membership should be requested in the data query as 20 years of service for a member aged 28 is unrealistic.
- Should request information on any lump sum payments that have been made since prior valuation (there were 8 active members at the prior valuation and there are now only 6).
- Points were also given for each of the following if the candidate supports the reason for requesting this information:
 - Salary information, if FAE plan
 - Date of hire, for the calculation of points for early retirement subsidies

1. Continued

- Province of employment, to determine eligibility for grow-in benefits
- Contributions at valuation date for the 50% excess rule, if plan is contributory

For inactive members:

- Date of retirement is missing for all members
- Status is missing for all members (pensioner or beneficiary)
- Spouse's information is missing for member with J&S pension (spouse's date of birth and sex)
- ID 11011: can state that bridge is assumed to be nil as member is over age 65.
- ID 11021: Should confirm bridge amount for this member, as member is under age 65 and the total bridge pension payable at the last valuation was \$6,000 vs \$1,200 at this valuation.
- Request data for deferred members or the confirmation that the deferred members from the prior valuation have been paid out and that there are no new deferred members.
- If deferred members have been paid out, request data on lump sum payments and date of payment.

- (c) List the required disclosures in respect of data to be included in the valuation report in accordance with the Canadian Institute of Actuaries' Standards of Practice.

Commentary on Question:

Most candidates did not list sufficient disclosure items to get full marks.

Candidates had to list 12 of the followings:

- Source of data
- Extent of reliance on data supplied by others
- Confirmation that data was reviewed and that tests were applied for internal consistency and for consistency with previous valuation and that results were satisfactory
- Any adjustments or modifications made to the data OR description of any adjustments and methods used in respect of insufficient or unreliable membership data
- Any limitations on results due to uncertainty regarding the data quality OR should disclose if a review was not completed and any resulting limitation if actuary feels review was not necessary
- Any unresolved concerns about the data that may have a material effect on the results
- Materiality of highly uncertain or potential bias due to imperfect data and potential magnitude

1. Continued

- Any conflicts arising from complying with applicable law, regulation or biding authority
- Data was not verified or audited OR data was reviewed for suitability only
- A summary of the membership data
- Comparison of membership data with prior valuation
- Date on which data was compiled
- Statement of opinion regarding the membership data OR confirmation that data is sufficient and reliable
- “In my opinion, the membership data on which the valuation is based are sufficient and reliable for the purpose of the valuation.”

2. Learning Objectives:

3. The candidate will understand how to apply/synthesize the methods used to value pension benefits for various purposes.

Learning Outcomes:

- (3b) Perform periodic valuations of ongoing plans, calculating normal cost and actuarial liability, using a variety of cost methods.

Sources:

References – Anderson, FR-132-17

Commentary on Question:

Most candidates did well on this question.

Solution:

- (a) Calculate the total normal cost and the unfunded actuarial liability as at January 1, 2020.

Show all work.

$$\begin{aligned} \text{EAN NC}_x &= \sum \text{PVFB}_w / \text{PVFS}_w \times S_x ; w\text{-entry age and } x\text{-current age} \\ \text{EAN AL}_x &= \sum (\text{PVFB}_x - \text{PVFNC}_x) \end{aligned}$$

Member A

$$\begin{aligned} \text{PVFB}_w &= 2\% \times 60,000 \times 1.04^{(64-40)} \times (65-30) \times \ddot{a}_{65}^{(12)} \times v^{(65-30)} \\ &= 1,200 \times 1.04^{24} \times 35 \times 13.5 \times v^{35} \\ &= 263,486 \end{aligned}$$

$$\begin{aligned} \text{PVFS}_w &= 60,000 \times 1.04^{-10} \times \ddot{a}_{65-30}^j ; \text{ where } j = (1.05/1.04)-1 \\ &= 1,211,326 \end{aligned}$$

$$\begin{aligned} \text{EAN NC}_x &= 263,486 / 1,211,326 \times 60,000 \\ &= 13,051 \end{aligned}$$

$$\begin{aligned} \text{PVFB}_x &= \text{PVFB}_w \times 1.05^{10} \\ &= 263,486 \times 1.05^{10} = 429,191 \end{aligned}$$

$$\begin{aligned} \text{PVFNC}_x &= \text{EAN NC}_x \times \ddot{a}_{65-40}^j \\ &= 291,575 \end{aligned}$$

$$\text{EAN AL}_x = 429,191 - 291,575 = 137,616$$

2. Continued

Member B

$$\begin{aligned}PVFB_w &= 2\% \times 70,000 \times 1.04^{(64-50)} \times (65-30) \times \ddot{a}_{65}^{(12)} \times v^{(65-30)} \\ &= 1,400 \times 1.04^{14} \times 35 \times 13.5 \times v^{35} \\ &= 207,669\end{aligned}$$

$$\begin{aligned}PVFS_w &= 70,000 \times 1.04^{-20} \times \ddot{a}_{65-30}^{\uparrow} \\ &= 954,716\end{aligned}$$

$$\begin{aligned}EAN NC_x &= 207,669 / 954,716 \times 70,000 \\ &= 15,226\end{aligned}$$

$$\begin{aligned}PVFB_x &= PVFB_w \times 1.05^{20} \\ &= 207,669 \times 1.05^{20} = 551,007\end{aligned}$$

$$\begin{aligned}PVFNC_x &= EAN NC_x \times \ddot{a}_{65-50}^{\uparrow} \\ &= 213,779\end{aligned}$$

$$EAN AL_x = 551,007 - 213,779 = 337,228$$

Member C

$$\begin{aligned}PVFB_w &= 2\% \times 80,000 \times 1.04^{(64-60)} \times (65-35) \times \ddot{a}_{65}^{(12)} \times v^{(65-35)} \\ &= 1,600 \times 1.04^4 \times 30 \times 13.5 \times v^{30} \\ &= 175,400\end{aligned}$$

$$\begin{aligned}PVFS_w &= 80,000 \times 1.04^{-25} \times \ddot{a}_{65-35}^{\uparrow} \\ &= 786,332\end{aligned}$$

$$\begin{aligned}EAN NC_x &= 175,400 / 786,332 \times 80,000 \\ &= 17,845\end{aligned}$$

$$\begin{aligned}PVFB_x &= PVFB_w \times 1.05^{25} \\ &= 175,400 \times 1.05^{25} = 593,966\end{aligned}$$

$$\begin{aligned}PVFNC_x &= EAN NC_x \times \ddot{a}_{65-60}^{\uparrow} \\ &= 87,542\end{aligned}$$

$$EAN AL_x = 593,966 - 87,542 = 506,424$$

$$AL_{2020} = 137,616 + 337,228 + 506,424 = 981,268$$

$$NC_{2020} = 13,051 + 15,226 + 17,845 = 46,122$$

2. Continued

$$\begin{aligned} \text{UAL}_{2020} &= \text{AL} - \text{F} \\ &= 981,268 - 1,000,000 &= (18,732) \end{aligned}$$

(b) Calculate the unfunded actuarial liability as at January 1, 2021.

Show all work.

Member A (deferred pension)

$$\begin{aligned} \text{AL} &= 2\% \times 60,000 \times 11 \times \ddot{a}_{65}^{(12)} \times v^{(65-41)} \\ &= 55,254 \end{aligned}$$

Member B

$$\begin{aligned} \text{PVFB}_w &= 2\% \times 70,000 \times 1.10 \times 1.04^{(64-51)} \times (65-30) \times \ddot{a}_{65}^{(12)} \times v^{(65-30)} \\ &= 1,540 \times 1.04^{13} \times 35 \times 13.5 \times v^{35} \\ &= 219,650 \end{aligned}$$

$$\begin{aligned} \text{PVFS}_w &= 77,000 \times 1.04^{-21} \times \ddot{a}_{65-30}^{\ddot{i}} \\ &= 1,009,796 \end{aligned}$$

$$\begin{aligned} \text{EAN NC}_{x+1} &= 219,650 / 1,009,796 \times 77,000 \\ &= 16,749 \end{aligned}$$

$$\begin{aligned} \text{PVFB}_x &= \text{PVFB}_w \times 1.05^{21} \\ &= 219,650 \times 1.05^{21} &= 611,936 \end{aligned}$$

$$\begin{aligned} \text{PVFNC}_x &= \text{EAN NC}_x \times \ddot{a}_{65-51}^{\ddot{i}} \\ &= 220,508 \end{aligned}$$

$$\begin{aligned} \text{EAN AL}_x &= 611,936 - 220,508 &= 391,428 \end{aligned}$$

Member C (immediate reduced pension)

$$\begin{aligned} \text{AL} &= 2\% \times 80,000 \times 26 \times \ddot{a}_{61}^{(12)} \times (1-.05 \times (65-61)) \\ &= 499,200 \end{aligned}$$

$$\begin{aligned} \text{AL}_{2021} &= 55,254 + 391,428 + 499,200 &= 945,882 \end{aligned}$$

$$\begin{aligned} \text{F}_{2021} &= 1,000,000 \times (1-.10) + 50,000 \\ &= 950,000 \end{aligned}$$

2. Continued

$$\begin{aligned} \text{UAL}_{2021} &= \text{AL} - \text{F} \\ &= 945,882 - 950,000 &= (4,118) \end{aligned}$$

(c) Calculate the gains and losses by source for 2020.

Show all work.

$$\begin{aligned} \text{Exp'd UAL}_1 &= \text{UAL}_0 \times 1.05 \\ &= (18,732) \times 1.05 &= (19,669) \end{aligned}$$

$$\text{Act'l UAL}_1 = (4,118) \text{ (see above)}$$

$$\text{Gains/(Losses)} = (19,669) - (4,118) = (15,551)$$

Gain on contributions/normal cost:

$$\begin{aligned} \text{Normal cost} &= 46,122 \times 1.05 \\ &= 48,428 \end{aligned}$$

$$\text{Act'l Conts} = 50,000$$

$$\text{Gain/(Loss)} = 50,000 - 48,428 = 1,572$$

Gain on fund return:

$$\begin{aligned} \text{Act'l F} &= 950,000 \text{ (see above)} \\ \text{Exp'd F} &= 1,000,000 \times (1.05) + 50,000 \\ &= 1,100,000 \end{aligned}$$

$$\text{Gain/(Loss)} = 950,000 - 1,100,000 = (150,000)$$

Gain on termination – Member A:

$$\begin{aligned} \text{Exp'd AL} &= (137,616 + 13,051) \times 1.05 \\ &= 158,200 \end{aligned}$$

$$\text{Actual AL} = 55,254 \text{ (see above)}$$

$$\begin{aligned} \text{Gain/(Loss)} &= \text{AL}_{\text{exp}} - \text{AL}_{\text{act'l}} \\ &= 158,200 - 55,254 &= 102,946 \end{aligned}$$

Loss on salary increase – Member B:

$$\begin{aligned} \text{Exp'd AL} &= (337,228 + 15,226) \times 1.05 \\ &= 370,077 \end{aligned}$$

2. Continued

$$\text{Act'l AL} = 391,428 \text{ (see above)}$$

$$\begin{aligned} \text{Gain/(Loss)} &= \text{AL}_{\text{exp}} - \text{AL}_{\text{act'l}} \\ &= 370,077 - 391,428 = (21,351) \end{aligned}$$

Gain on retirement – Member C:

$$\begin{aligned} \text{Exp'd AL} &= (506,424 + 17,845) \times 1.05 \\ &= 550,482 \end{aligned}$$

$$\text{Act'l AL} = 499,200 \text{ (see above)}$$

$$\begin{aligned} \text{Gain/(Loss)} &= \text{AL}_{\text{exp}} - \text{AL}_{\text{act'l}} \\ &= 550,482 - 499,200 = 51,282 \end{aligned}$$

Check:

$$\begin{aligned} \text{Gains/(Losses)} &= 1,572 + (150,000) + 102,946 + (21,351) + 51,282 \\ &= (15,551) \end{aligned}$$

3. Learning Objectives:

6. The candidate will understand how to apply the regulatory framework in the context of plan funding.

Learning Outcomes:

- (6b) Evaluate funding restrictions imposed by regulations.

Sources:

[FSRA - Frequently Asked Questions Pertaining to the 2018 Funding Reform for Defined Benefit Pension Plans](#) (Transition Rules – Questions 400 – 404 background only), PBA, WTW book

Commentary on Question:

The question was written to test the candidate's familiarity with the new Ontario pension funding framework. The question was less comprehensive than had originally been intended since it only require contributions in the year of the valuation. It had been intended to require the calculation of special payments that are deferred for one year. However, the question, as it was written, implied that only the contributions for the year immediately following the valuation were required, and as a result, no special payment contributions needed to be calculated.

Solution:

Calculate the minimum required and maximum permissible employer contributions at January 1, 2020, assuming there were no special payments at the last valuation date.

Show all work.

Commentary on Question:

One common mistake that candidates made was in the calculation of component C of the PfAD. the BDR is compared to the gross discount rate. The final discount rate was 6.2%, and the question mentions implicit investment expenses of 0.1%, which means the gross discount rate is 6.3%. Many candidates also excluded the administrative expenses from the normal cost and PfAD calculations.

BDR Calculation

Component A: Fixed component	
Assume open plan fixed component is 4%	4%
Component B: Asset mix component	
Equity Allocation = 20% + 35%+10%*50%	60.0%
First variable component based on table:	4%
Component C: excess of BDR over gross discount rate	
Benchmark Discount rate formula = 0.5% + benchmark Yield +(1.5%*FI alloc) + (5% * EqAlloc)	5.86%
Gross discount rate	6.30%
component C= Duration x Max (0, gross discount - BDR)	7.57%

Final PfAD	15.57%
Going Concern contributions	
Assets	375,856
Going Concern liabilities	412,056
PfAD only calculated on non-indexed liabilities	52,172
Going concern deficit to be funded	-88,379
PV of 10 year annuity, payable monthly BOM	7.0936
Annual going concern special payment (deferred one year)	12,458
Calculate the normal cost contributions	
Normal cost	16,150
Admin expenses	250
PfAD on NC without COLA and expenses	2,101
Total ongoing costs	18,501
Solvency contributions	
market value of assets	375,856
Wind-up expenses	-500
Solvency liabilities do not need to include the value of indexation	
Solvency liabilities	430,339
PV of going concern contributions on a solvency basis: factor	4.6866
PV of going concern contributions on a solvency basis	58,386
Solvency target funded position	67,954
Surplus when funding to 85% target, no solvency special payments	
Total minimum contribution	
NC + amortization special payments	
Required contributions are 18,501 in first year after the valuation (special payments are deferred for one year)	18,501
Maximum contribution	
current service cost + greater of GC and wind-up deficit	
Going Concern deficit to fund	88,372
assets less windup expenses	375,356
Wind-up liabilities include indexation	503,879
Wind-up deficit	128,523
Max (Going concern deficit, wind up liabilities)	128,523
Maximum contributions	147,024
If contribute maximum in 2021, contributions for remaining 2 years equal to required CSC	

4. Learning Objectives:

4. The candidate will understand the principles and rationale behind regulation.
5. The candidate will understand how to evaluate and apply regulatory policies and restrictions for registered retirement plans.

Learning Outcomes:

- (4a) Describe the principles and motivations behind pension legislation and regulation.
- (4b) Describe sources and framework of government regulation.
- (5i) The candidate will be able to describe and apply regulation pertaining to contributions and benefits.

Sources:

CAPSA Recommendation – *Funding of Benefits for Plans Other than Defined Contribution Plans*

Pension Benefits Act (*Ontario*)

Benefits Canada – *A look at the landscape for pension solvency funding reform across Canada*

Commentary on Question:

The question was intended to test whether candidates understand the rationale behind regulatory policies, particularly in the context of the new Ontario funding rules. Note that there are a total of 9 CAPSA recommendations related to the funding of defined benefit pension plans; candidates could compare and contrast any 6 of these recommendations.

It was clear from the answers provided that most candidates were familiar with the reference material (CAPSA Recommendation). Most commonly, candidates were able to speak to CAPSA Recommendations 1, 3, 4 and 7, and were able to get most of the marks for comparing the CAPSA Recommendation to the Ontario funding rules. However, candidates were less familiar with CAPSA Recommendations 2 and 5, and even less so with CAPSA Recommendations 6 and 9. As a result, most candidates did not score either very well or very poorly.

Solution:

Compare and contrast six (6) CAPSA recommendations related to the funding of defined benefit pension plans to the requirements of the Ontario pension legislation as they relate to plan funding.

4. Continued

CAPSA recommendation 1: Modify solvency funding rules with a caveat

Ontario: Ontario requires solvency deficits to be funded up to 85%, with the caveat that going concern is funded with a PfAD. Therefore, Ontario is aligned for CAPSA.

CAPSA recommendation 2: Strengthen going concern funding regime

Ontario: Ontario requires going concern deficits and normal cost to be funded with a PfAD, resulting in a strengthened going concern funding regime (i.e., aligned with CAPSA).

Ontario requires going concern deficits to be funded over 10 years, resulting in a strengthened approach compared to prior rules

CAPSA recommendation 3: Provision for Adverse Deviation (PfAD)

Ontario: Ontario requires the inclusion of a PfAD, increasing required funding amounts and aligned with CAPSA.

The PfAD is determined based on 1. Plan maturity, 2. Asset mix and 3. Discount rate assumption. The factors used and the number of factors are in line with CAPSA recommendation.

Some differences are that CAPSA does not mention whether the margin should be implicit or explicit, but Ontario mandates an explicit calculation.

CAPSA recommendation 4: Amortization period

Ontario: The amortization periods for going concern (10 years after transition) and solvency (5 years) are in line with CAPSA recommendation.

However, CAPSA recommends a going concern amortization no longer than 10 years and solvency amortization no longer than 5 years. Therefore, Ontario rules are using the maximum period recommended by CAPSA.

CAPSA allows fresh start on both going concern and solvency but Ontario only allows fresh start on going concern

4. Continued

CAPSA recommendation 5: Incorporate a banker's clause/side-car fund

Ontario: Ontario does not have a side-car fund feature. Any excess asset would be subject to plan text and legislations and surplus sharing, failing to provide upward reward potential for plan sponsor for funding the plan. This is different than the CAPSA recommendation which recommend such a side-car fund.

CAPSA recommendation 6: Refund to the employer from the side-car fund

Ontario: Ontario does not have a side-car fund feature. Any excess asset would be subject to plan text and legislations and surplus sharing, failing to provide upward reward potential for plan sponsor for funding the plan. This is different than the CAPSA recommendation. CAPSA recommends assets in excess of a certain threshold could be recovered through various mechanisms

CAPSA recommendation 7: Using/taking contribution holiday(s)

Ontario: Ontario allows contributions holidays if there is available actuarial surplus. This is in line with CAPSA recommendation.

CAPSA recommendation 8: Letter of credit

Ontario: Letters of credit may be used towards special payments with respect to a plan's reduced solvency deficiency up to a maximum of 15% of a plan's solvency liabilities (up to the new 85% solvency funding threshold)

CAPSA recommendation 9: Transfer rules

CAPSA recommends that the value of benefits eligible for transfer should not disadvantage members remaining in the plan, nor should it unduly benefit those who elect to transfer; need to balance interests of those who remain in the plan and those electing to transfer. CAPSA recommends that a potential approach would be to allow commuted value transfer times the transfer ratio (with no future claim) or leave amount in the plan with right to transfer should the funded ratio improve.

Ontario is not exactly in line with this, as payment of full commuted values are permitted even if the transfer ratio is below 100%. However, at a certain point, if cumulative transfer deficiencies exceed 5% of the market value of assets, additional employer contributions are required. There is also a prescribed process for requesting approval from the regulator to pay commuted values if the funded position deteriorates significantly (i.e., by 10%).

5. Learning Objectives:

5. The candidate will understand how to evaluate and apply regulatory policies and restrictions for registered retirement plans.
6. The candidate will understand how to apply the regulatory framework in the context of plan funding.

Learning Outcomes:

- (5i) The candidate will be able to describe and apply regulation pertaining to contributions and benefits.
- (6b) Evaluate funding restrictions imposed by regulations.

Sources:

OSFI instruction guide, PBA, [Provisions for Adverse Deviations in Going Concern Actuarial Valuations](#), [A Practical Approach to Establishing Margins for Adverse Deviations in Going Concern Funding Valuations](#)

Commentary on Question:

Most candidates had a good understanding of the funding regulations in Ontario, particularly as they relate to funding shortfalls; however, responses on contribution holidays were less complete. Candidates seemed to struggle with understanding the regulations as they apply to federally-regulated plans in any depth.

Solution:

Compare and contrast the minimum funding regulations applicable to each plan with respect to the following:

- (i) Frequency of filing
- (ii) Smoothing of assets and liabilities
- (iii) Provisions for adverse deviations
- (iv) Maximum going-concern discount rate
- (v) Funding of shortfalls
- (vi) Contribution holidays

Commentary on Question:

See above

5. Continued

	Plan A – Ontario/FSRA	Plan B – Federal/OSFI
Frequency of filing	Within one year of current valuation date if ratio of solvency assets to solvency liabilities is less than 85% or employer elected to exclude plant closure or permanent lay-off benefits. Otherwise required no later than three years after the current valuation date.	Annual filing at plan year end date unless it is a designated plan or if the solvency ratio is 1.20 or greater then triennial valuation permitted.
Smoothing of assets and liabilities	Asset smoothing permitted in going concern valuation. Solvency financial position can be determined by smoothing assets and the solvency discount rate over a period of up to 5 years.	Allowed for going concern assets, provided the method is reasonable. Smoothed asset cannot exceed 110% of market value or produce asset values systematically greater than the market value of the total portfolio. Any smoothing is prohibited for solvency valuation.

<p>Provision for adverse deviations</p>	<p>Prescribed funded PfAD added to going concern liabilities and current service cost.</p> <p>PfAD is based on the plan's:</p> <ol style="list-style-type: none"> 1) Open or closed status 2) Target asset allocation to fixed income assets as defined in the regulation 3) Excess of going concern discount rate above a benchmark discount rate 	<p>OSFI expects that a set of actuarial assumptions as a whole would include an appropriate provision for adverse deviations.</p> <p>Margin set by actuary based on the plan administrator/employer's funding policy, knowledge of the risk tolerance of the plan administrator/employer, and any other applicable terms of engagement.</p> <p>Should consider that a riskier asset mix would generally translate into a higher provision for adverse deviations than for the same plan with a less risky asset mix.</p> <p>Not necessary that each assumption includes a margin for adverse deviations (ex. acceptable to select best estimate assumptions for all contingencies except the discount rate, thus the necessary overall margin would be included in the discount rate assumption).</p>
<p>Maximum going concern discount rate</p>	<p>No maximum discount rate defined.</p> <p>The funded PfAD will be larger if the going concern discount rate net of active management fees exceeds a "benchmark discount rate" based on long-term government of Canada benchmark bond yield and the plan's target asset allocation to fixed income assets.</p>	<p>6.00% for a plan no more than 50% fixed income.</p> <p>Expected to adjust if higher than 50% fixed income.</p>

<p>Funding of shortfalls</p>	<p>Consolidation of going concern special payments and re-amortization at each valuation.</p> <p>Going concern unfunded liability must be funded over 10 years, beginning 12 months after the valuation date.</p> <p>In addition, the going concern special payments as identified in the prior valuation report must continue to be made in the 12 months after the valuation date.</p> <p>Only required to fund to 85% on solvency basis.</p> <p>New reduced solvency deficiency must be amortized over 5 years, beginning no later than 12 months after the valuation date.</p> <p>If solvency excess is not large enough to eliminate all solvency special payments, the amortization period can be reduced so as to reduce the solvency excess to zero.</p>	<p>Going concern unfunded liability must be funded over 15 years.</p> <p>Pre-existing going concern special payments should be carried forward from one report to the next and considered when determining whether an unfunded liability exists at the valuation date.</p> <p>If PV going concern special payments exceed going concern deficit, the payments can be reduced pro-rata. Amortization period of a schedule cannot be reduced.</p> <p>Solvency special payments re-determined at each valuation.</p> <p>Solvency deficiency is based on an adjusted solvency asset</p> <p>Adjusted solvency asset determined as product of solvency liabilities and 3 year average solvency ratio (adjustments permitted).</p> <p>Solvency special payments equal to the amount by which the solvency deficiency divided by 5 exceeds the amount of going concern special payments (if any) payable during the year.</p>
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<p>Contribution holidays</p>	<p>Available actuarial surplus can be applied towards current service cost including PfAD and PBGF fees.</p> <p>Available actuarial surplus is lesser of going concern excess and amount by which solvency assets exceed 105% of solvency liabilities.</p> <p>Requires actuarial cost certificate be filed within first 90 days of fiscal year.</p> <p>Maximum amount of available surplus that can be used for contribution holiday is the amount of available actuarial surplus as identified in the last full funding valuation, adjusted to reflect amounts funded from the available actuarial surplus and the amount of estimated actuarial surplus as identified at the date of the actuarial cost certificate.</p>	<p>Employer contributions must be at least employer current service cost less the lesser of going concern excess and amount by which solvency assets exceed 105% of solvency liabilities.</p>
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6. Learning Objectives:

5. The candidate will understand how to evaluate and apply regulatory policies and restrictions for registered retirement plans.

Learning Outcomes:

- (5a) The candidate will be able to describe and apply regulation pertaining to plan design.

Sources:

Canadian Pensions and Retirement Income Planning, Willis Towers Watson, 6th Edition, 2017

Commentary on Question:

The question was intended to test candidates' knowledge of Income Tax Act maximum pension limits (lifetime, bridge, combined). Candidates did very well overall. Note that candidates were not penalized for an incorrect calculation in any one component of the question that would otherwise flow through to other parts.

Specific commentary on each part is provided separately.

Solution:

- (a) Calculate the lifetime and bridge pensions payable to Member A.

Show all work.

Commentary on Question:

Candidates did every well on part (a). Some minor errors were noticed in some candidates' papers, for example:

- *For the "30, 60, 80" ITA reduction, some candidates used credited service to calculate the date when 30 years is reached, but this should be based on continuous service*
- *For the maximum bridge calculation, some candidates missed the 10 years of credited service adjustment or forgot the reduction for pre-age 60*

However, these were relatively small errors and candidates were not penalized for subsequent calculations that relied on these intermediate calculations.

Pension payable Member A

Life-time Retirement Benefit (LRB):

$LRB \text{ no cap} = 1.5\% * FAE3 * \text{credited service} * \text{Plan ERF} = 1.5\% * (240,000+250,000+230,000)/3 * 8 * (1-.04*3) = \$25,344 \text{ per annum or } \$2,112 \text{ per month}$

Age when 80 points = $59 + (80 - (59+11))/2 = 64$

Age when 30 years of service = $59 + [30-11] = 78$

6. Continued

Minimum ITA reduction from Age min (age 60, 30 years credited service, 80 points) = 60

Maximum ITA LRB = $\$3,130.22 * 8 * (1 - .03 * (60 - 59)) = \$24,290.51$ or $\$2,024.21$ per month

Life only pension payable to Member A is minimum (LRB no cap, Max ITA LRB) = $\$2,024.21$ per month

Bridge Benefit:

Plan Bridge Payable = $0.5\% * \text{FAE3} * \text{Credited Service} = 0.50\% * 240,000 * 8 = \$9,600$ per annum or $\$800$ per month

ITA maximum Bridge ERF = $.25\%$ per month from age 60 * $\min(1, \text{credited service}/10)$
= $(1 - 0.25\% * 12 * (60 - 59)) * (8/10)$
= 0.776

ITA Bridge Maximum = $(\text{CPP} + \text{OAS}) * 12 * \text{ITA ERF} = (1,175.83 + 613.53) * 12 * .776$
= $16,662.52$ per annum or $\$1,388.54$ per month

Combined Maximum = $\text{ITA max} * \text{credited service} + 25\% * \text{YMPE3} * (\text{credited service}/35)$
= $\$3,130.22 * 8 + .25 * 57,300 * (8/35)$
= $\$28,316.05$ per annum or $\$2,359.67$ per month

Member A Bridge = $\min(\text{plan bridge payable}, \text{ITA Bridge Maximum}, \text{Bridge from Combined ITA maximum})$
= $\min(\$9,600, \$16,662.52, \$28,316.05 - \$24,290.51)$
= $\$4,025.54$ or $\$335.46$ per month

(b) Calculate the lifetime and bridge pensions payable to Member B.

Show all work.

Commentary on Question:

The new wrinkle to this question compared to part (a) is that Member B elected a Joint and Survivor 100% form of payment. Most candidates were able to perform similar calculations as they did in part (a), but some did not mention that the ITA maximum pension limits are based on Joint & Survivor 66.67% Guaranteed 5 Years form of payment and did not perform the required calculations/ adjustments to the resulting maximum pensions payable. However, that was the minority of candidates and overall this question was also done very well.

Pension payable Member B

Life-time Retirement Benefit (LRB):

LRB no cap = $1.5\% * \text{FAE3} * \text{credited service} * \text{Plan ERF} = 1.5\% * (300,000 + 275,000 + 260,000)/3 * 29 * (1 - .04 * 3) = \$106,546$ per annum or $\$8,878.83$ per month

6. Continued

$$\begin{aligned}\text{LRB payable in JS100\% before ITA maximum} &= 8,873.83 * \text{Life Only Factor} / \text{JS100\% Factor} \\ &= 8,873.83 * 15.170 / 17.851 \\ &= \$7,541.09\end{aligned}$$

$$\text{Total Points} = 59 + 29 = 88 \text{ points}$$

ITA Reduction = 0, member is unreduced as he has attained 80 points

$$\text{Maximum ITA LRB} = \$3,130.22 * 29 = \$90,776.38 \text{ or } \$7,564.70 \text{ per month}$$

Maximum Form of Pension payable under ITA is JS66.67% guaranteed 5 years

$$\begin{aligned}\text{Maximum Value of Pension under ITA} &= \text{ITA Max} * \text{Maximum Form of Pension} = \$3,130.22 * 29 * \\ &16.981 = \$1,541,473.\end{aligned}$$

$$\begin{aligned}\text{ITA Max pension payable under JS100\%} &= \text{Maximum Value Pension Payable under ITA} / \text{JS100\% Factor} = \\ & \$1,541,473.71 / 17.851 = \$86,352.23 \text{ per annum or } \$7,196.02 \text{ per month}\end{aligned}$$

LRB payable to member B is \$7,196.02 per month

Bridge Benefit:

$$\begin{aligned}\text{Plan Bridge Payable} &= 0.5\% * \text{FAE3} * \text{Credited Service} = 0.50\% * 278,333.33 * 29 = \$40,358.33 \text{ per} \\ &\text{annum or } \$3,363.19 \text{ per month}\end{aligned}$$

$$\begin{aligned}\text{ITA maximum Bridge ERF} &= .25\% \text{ per month from age 60} * \min(1, \text{credited service}/10) \\ &= (1 - 0.25\% * 12 * (60-59)) \\ &= 0.97\end{aligned}$$

$$\begin{aligned}\text{ITA bridge Maximum} &= (\text{CPP} + \text{OAS}) * 12 * \text{ITA ERF} = (1,175.83 + 613.53) * 12 * 0.97 \\ &= \$20,828.15 \text{ per annum or } \$1,735.68 \text{ per month}\end{aligned}$$

$$\begin{aligned}\text{Combined Maximum} &= \text{ITA max} * \text{credited service} + 25\% * \text{YMPE3} * (\text{credited service}/35) \\ &= 3,130.22 * 29 + .25 * 57,300 * (29/35) \\ &= 102,645.67 \text{ per annum or } \$8,553.81 \text{ per month}\end{aligned}$$

$$\begin{aligned}\text{Bridge Payable} &= \min(\text{plan bridge payable, ITA Bridge Maximum, Bridge from Combined ITA maximum}) \\ &= \min(40,358.33, 20,828.15, 102,645.67 - \$86,352.23) \\ &= \$16,293.44 \text{ or } \$1,357.79 \text{ per month}\end{aligned}$$

7. Learning Objectives:

2. The candidate will understand how to analyze/synthesize the factors that go into selection of actuarial assumptions for funding purposes.
3. The candidate will understand how to apply/synthesize the methods used to value pension benefits for various purposes.

Learning Outcomes:

- (2a) Describe and apply the techniques used in the development of economic assumptions for funding purposes.
- (2b) Evaluate and recommend appropriate assumptions for funding purposes.

Sources:

CIA Revised Educational Note, December 2015: *Determination of Best Estimate Discount Rates for Going Concern Funding Valuations*

Actuarial Standard of Practice (ASOP) 27: *Selection of Economic Assumptions for Measuring Pension Obligations*

Commentary on Question:

This question was intended to test candidates' knowledge of the approach for setting going concern discount rates for funding valuations, but in the context of a pension plan sponsor that has adopted a glide-path for the investment policy. There are two approaches to setting the best estimate assumption going concern discount rate: based on expected future investment returns on the assets of the pension plan or based on yields of investment grade debt securities. Most candidates sufficiently described the first approach and the "building block" methodology, but were expected to provide more information on how the investment policy (and glide path) should be incorporated. As for the yield curve approach, the majority of candidates failed to mention this as an option and therefore did not receive full marks. Candidates were expected to present this approach as an option and comment that the investment policy (and glide path) would be irrelevant.

Solution:

- (a) Describe the considerations in setting the best estimate going concern discount rate for the January 1, 2021 actuarial valuation.

Going concern discount rate should be a best estimate assumption modified to incorporate margins for adverse deviations, to the extent, if any, required by law

Two approaches to setting the best estimate assumption going concern discount rate:

7. Continued

1. Based on expected future investment returns on the assets of the pension plan

One accepted methodology for establishing a best estimate discount rate that reflects expected future investment returns is a building block approach:

- Determine best estimate long-term return for each asset class;
- Combine best estimate long term returns for each asset class reflecting the plan's asset allocation under the investment policy (with consideration for effect of diversification);
- Consider inclusion of an allowance for additional return from active management, where appropriate; and
- Make appropriate provision for expenses.

The discount rate should be based on a best estimate of the expected future investment return on the plan's assets over a relevant time frame. Typically, this will be a long-term horizon such as 20–30 years but a shorter-term perspective may be needed for very mature plans.

Since this pension plan employs a glide-path investment strategy, the actuary would make a judgement to reflect the anticipated timing and effect of the asset mix changes on the expected future investment returns on the plan's assets. In this case, the actuary must make an assumption for how the solvency funded position is expected to evolve by taking into account:

- Expected returns of each asset class
- Expected growth in liabilities
- Regulatory funding requirements
- Plan's funding policy

The going concern discount rate is then set reflecting that the asset mix is gradually shifted to the end-point of the glide path over X number of years.

2. Based on the yields of investment grade debt securities, considering the expected future benefit payments of the pension plan

The plan's current target asset mix and glide-path are irrelevant under this approach.

The yields of investment grade debt securities would reasonably match the projected benefit cash flows or have a duration comparable to that of the projected benefit cash flows. Take into account appropriate allowance for future plan expenses that are expected to be paid from the pension fund.

7. Continued

- (b) Describe the impact of this funding strategy on the going concern discount rate.

If the discount rate is based on the yields of investment grade debt securities, considering the expected future benefit payments of the pension plan, then the funding policy has no impact on the going concern discount rate.

Under the approach of using expected investment returns on the assets of the pension plan to determine the going concern discount rate, the incorporation of the glide path must also consider the funding policy. In years 1-4, the expected return on assets will decrease gradually, reducing the discount rate. The expected return from year 5 should be based on the allocation of the ultimate step in the glide-path (90% fixed income).

8. Learning Objectives:

3. The candidate will understand how to apply/synthesize the methods used to value pension benefits for various purposes.

Learning Outcomes:

- (3b) Perform periodic valuations of ongoing plans, calculating normal cost and actuarial liability, using a variety of cost methods.

Sources:

Anderson, FR-xxx-17: A Problem-Solving Approach to Pension Funding and Valuation, Second Edition, Ch. 5

Commentary on Question:

A well-prepared candidate will be able to calculate actuarial liability and normal cost using both the Unit Credit and Projected Unit Credit, prorated on services, cost methods.

Solution:

- (a) Calculate the total actuarial liability and normal cost as at January 1, 2020.

Show all work.

Commentary on Question:

Most candidates performed quite well calculating the liability and normal cost using the Unit Credit method.

Member A

$$\begin{aligned} \text{AL} &= 20,000 \times 13.5 \times v^{10} \\ &= 165,757 \\ \text{NC} &= 2\% \times 80,000 \times 13.5 \times v^{10} \\ &= 13,261 \end{aligned}$$

Member B

$$\begin{aligned} \text{AL} &= 10,000 \times 13.5 \times v^{20} \\ &= 50,880 \\ \text{NC} &= 2\% \times 60,000 \times 13.5 \times v^{20} \\ &= 6,106 \\ \text{AL}_{2020} &= 165,757 + 50,880 &= 216,637 \\ \text{NC}_{2020} &= 13,261 + 6,106 &= 19,367 \end{aligned}$$

- (b) Calculate the total actuarial liability and normal cost as at January 1, 2020, using the Projected Unit Credit method, prorated on service.

Show all work.

8. Continued

Commentary on Question:

While some candidates were able to correctly determine the liability and normal cost using the PUC, prorated on service, method, others had some difficulty. For example, some candidates incorrectly projected the career average benefits to retirement, while others failed to prorate the liabilities on service, or did not correctly reflect the termination decrements.

Member A

$$\begin{aligned}
 B_y &= B_x + \sum b_x \text{ for all future years (since past termination age)} \\
 &= 20,000 + 2\% \times 80,000 \times s_{65-55}^{\overline{j}}; \text{ where } j = 3.5\% \\
 &= 38,770 \\
 AL &= 38,770 \times 15/25 \times 13.5 \times v^{10} \\
 &= 192,791 \\
 NC &= 38,770 \times 1/25 \times 13.5 \times v^{10} \\
 &= 12,853
 \end{aligned}$$

Member B

$$\begin{aligned}
 AL &= [(10,000 + 2\% \times 60,000 \times s_{65-45}^{\overline{j}}) \times .95^3 / 30 \\
 &\quad + (10,000 + 2\% \times 60,000 \times s_{48-45}^{\overline{j}}) \times .05 / 13 \\
 &\quad + (10,000 + 2\% \times 60,000 \times s_{49-45}^{\overline{j}}) \times .95 \times .05 / 14 \\
 &\quad + (10,000 + 2\% \times 60,000 \times s_{50-45}^{\overline{j}}) \times .95^2 \times .05 / 15] \times 10 \times 13.5 \times v^{20} \\
 &\text{where } j = 3.5\% \\
 &= 71,689 \\
 NC &= AL / 10 \\
 &= 7,169 \\
 PUC AL_{2020} &= 192,791 + 71,689 &= 264,480 \\
 PUC NC_{2020} &= 12,853 + 7,169 &= 20,022
 \end{aligned}$$

9. Learning Objectives:

2. The candidate will understand how to analyze/synthesize the factors that go into selection of actuarial assumptions for funding purposes.

Learning Outcomes:

(2b) Evaluate and recommend appropriate assumptions for funding purposes.

(2c) Evaluate actual experience, including comparisons to assumptions.

Sources:

Credibility Educational Resource for Pension Actuaries: Application of Credibility Theory to Mortality Assumptions

Selection of Mortality Assumptions for Pension Plan Actuarial Valuations

CIA Educational Note, Dec 2017

CIA Final Report

Commentary on Question:

Candidates answered this question well. In part a) many candidates did not mention credibility considerations of using amounts vs count weighted experience data and lost marks. In part b) most candidates correctly identified adjustments required to the standard mortality table. Although only a few candidates identified other adjustments that might be required such as size adjustments, industry, credibility etc.

Solution:

- (a) Assess the appropriateness of using amounts- versus counts-weighted results.

The actual/expected ratio for benefits vs counts differ significantly based on this experience study, reflecting the benefits are not homogenously distributed. Count and benefit weighted results will differ significantly.

Pension liabilities are amounts-weighted (i.e., individuals with higher benefit amounts contribute more to the pension liability than those with lower benefit amounts, all else being equal).

Benefit amounts are often a predictor of mortality rates. Therefore, amount weighted results will be more accurate to the degree that the distribution of amounts is similar in the future.

The standard mortality valuation tables are generally developed using amounts-weighting. So, if the experience study does not use amounts-weighting, there may be inconsistencies in the development of the appropriate adjustment.

9. Continued

Count weighted results might be appropriate for flat dollar benefit formulas, or plans with homogenous characteristics. However, this pension plan is a final average plan so a benefit weighted approach is appropriate.

Experience study performed on an amounts basis generally requires more exposures to achieve full credibility than a study based on number of lives. Therefore, a counts based study might offer better credibility.

- (b) Recommend adjustments to the standard mortality table based on the experience study.

The shape of the standard table is a good approximation of the shape of actual experience for earlier ages (where most of the actual experience is). Therefore, a scaling adjustment to the standard table is recommended.

The actual mortality is higher for ages prior to 75, therefore an upward adjustment to the standard mortality table is recommended. Based on the credibility criteria (full/partial), a credibility factor will be applied to actual/expected ratio in calculating a standard mortality table multiplier.

Size adjustments: A size adjustment might be appropriate if the pension plans benefit distribution varies significantly from the industry distribution

Adjustments by Sub-groups: Adjustments might also be required based on sub-groups such as Male/Female, White collar/Blue collar, Industry, public/private sector, and other socio-economic indicators

Adjustments by age-groups. Any such adjustments should consider credibility per age group and smoothing adjustments.

10. Learning Objectives:

3. The candidate will understand how to apply/synthesize the methods used to value pension benefits for various purposes.
5. The candidate will understand how to evaluate and apply regulatory policies and restrictions for registered retirement plans.
6. The candidate will understand how to apply the regulatory framework in the context of plan funding.
7. The candidate will understand how to apply the standards of practice and professional conduct guidelines.

Learning Outcomes:

- (5d) The candidate will be able to describe and apply regulation pertaining to plan termination/wind-up.
- (5i) The candidate will be able to describe and apply regulation pertaining to contributions and benefits.
- (7e) Explain and apply all of the applicable standards of practice related to valuing pension benefits.

Sources:

CIA CSOP 3100-3500
Ontario PBA

Commentary on Question:

In general, this question was well answered by candidates.

A few candidates applied the new CIA commuted value standards effective December 1, 2020. However, since the question asked for the commuted value at January 1, 2020, candidates were not given full points if they calculated the commuted value as 50% at the optimal age + 50% at the earliest unreduced age.

Solution:

- (a) Calculate the solvency liabilities for the two active members as at January 1, 2020.

Show all work.

Commentary on Question:

The majority of candidates identified that grow-in benefits apply, correctly identified the optimal age and calculated the commuted value correctly.

10. Continued

Member A

- FAE3= \$69,667
- Formula pension= FAE3*1.75%*Svc = \$69,667*1.75%*16 = \$19,506.7
- Age+Svc= 40+16 = 56
 - Age+Svc with 56 points, Member A entitled to grow-in benefit of an earliest retirement age of 60, as he already has 10+ years of service, reduction is 3% before age 60
 - Earliest unreduced age: 60
 - Optimal age: 55
 - CV for Member A= \$230,471

Age	Reductio n	Formula Pension	Factor v n x äx(12)	Value	Probabilit y	CV	Age	Continuing service
55	85%	\$16,580.67	13.9	\$230,471.28	100%	\$230,471.28	55	31
56	88%	\$17,165.87	13.2	\$226,589.45	0%	\$0.00	56	32
57	91%	\$17,751.07	12.6	\$223,663.45	0%	\$0.00	57	33
58	94%	\$18,336.27	12	\$220,035.21	0%	\$0.00	58	34
59	97%	\$18,921.47	11.4	\$215,704.73	0%	\$0.00	59	35
60	100%	\$19,506.67	10.9	\$212,622.68	0%	\$0.00	60	36
CV for Member A						\$230,471		

Member B

- FAE3= \$85,000
- Formula pension= FAE3*1.75%*Svc = \$85,000*1.75%*5 = \$7,437.50
- Age+Svc= 60+5 = 65
 - Age+Svc with 65 points, Member B already entitled to early retirement subsidy of 3% before 65. Member B does not have 10+ years of service, so he won't be eligible for the additional grow-in benefit (i.e., the 3% before 60), reduction is 3% before age 65
 - Earliest unreduced age: 60
 - Optimal age: 60
 - CV for Member B= \$123,909

Age	Reductio n	Formula Pension	Factor v n x äx(12)	Value	Probabilit y	CV	Age	Continuing service
60	85%	\$6,321.88	19.6	\$123,908.75	100%	\$123,908.75	60	5
61	88%	\$6,545.00	18.6	\$121,737.00	0%	\$0.00	61	6
62	91%	\$6,768.13	17.6	\$119,119.00	0%	\$0.00	62	7
63	94%	\$6,991.25	16.7	\$116,753.88	0%	\$0.00	63	8
64	97%	\$7,214.38	15.7	\$113,265.69	0%	\$0.00	64	9
65	100%	\$7,437.50	14.9	\$110,818.75	0%	\$0.00	65	10
CV for Member B						\$123,909		

10. Continued

- (b) Calculate the commuted value of the benefits for the two members, assuming that they terminate employment voluntarily on January 1, 2020.

Show all work.

Commentary on Question:

Most candidates correctly responded to this part of the question. However, for Member A, a few candidates incorrectly assumed that the optimal age was at age 55. For Member B, a few candidates incorrectly assumed that the optimal age was at age 65.

Both members are not entitled to grow-in benefits as they voluntarily terminated employment.

Member A

- FAE3= \$69,667
- Formula pension= FAE3*1.75%*Svc = \$69,667*1.75%*16 = \$19,506.7
- The member is not eligible for early retirement subsidies
- The member is entitled to the termination benefits (i.e. an actuarially reduced pension to normal retirement age)
- Optimal age: 65
 - CV for Member A= pension* $25| \ddot{a}_{40}^{(12)}$ =19,506.7*8.4=\$163,856

Member B

- FAE3= \$85,000
- Formula pension= FAE3*1.75%*Svc = \$85,000*1.75%*5 = \$7,437.50
- Reduction is 3% before age 65, since member is over age 55 but has less than 10 years of service
- Earliest unreduced age: 65
- Optimal age: 60
 - CV for Member B= pension*reduction* $5| \ddot{a}_{60}^{(12)}$ =7,437.50*(1-3%*5)*19.6=\$123,909

11. Learning Objectives:

5. The candidate will understand how to evaluate and apply regulatory policies and restrictions for registered retirement plans.

Learning Outcomes:

- (5d) The candidate will be able to describe and apply regulation pertaining to plan termination/wind-up.
- (5g) The candidate will be able to describe and apply regulation pertaining to reporting requirements.
- (5j) The candidate will be able to describe and apply regulation pertaining to individual savings plans.

Sources:

Canadian Pensions and Retirement Income Planning, Willis Towers Watson, 6th Edition, 2017, Chapters 4, 7 and 17 (Based on 4th Edition)

[Canada Revenue Agency, PA Guide](#)

Commentary on Question:

A well-prepared candidate will be able to determine Pension Adjustments, maximum transfer values, available RRSP room and maximum contributions to the different types of registered plans.

Solution:

- (a) Calculate the 2020 Pension Adjustment for each member.

Show all work.

Commentary on Question:

Quite a few candidates performed well calculating pension adjustments. However, a number of candidates neglected to annualize the earnings and/or prorate the service in the calculation, while some others did not apply the maximum pension limit.

General Formula = (9 x benefit entitlement) - \$600

Benefit Entitlement = Accrued Pension as plan is a career average earnings

Must annualize earnings:

$$S^A_{2020} = \$104,000 / 0.75 = \$138,667$$

$$S^B_{2020} = \$128,000 / 0.75 = \$170,667$$

$$\begin{aligned} AP^A_{2020} &= 0.75 \times \text{Min}[\$3,092.22; 0.015 \times \$58,700 + 0.02 \times (\$138,667 - \$58,700)] \\ &= 0.75 \times \text{Min}[\$3,092.22; \$2,479.84] = \$1,859.88 \end{aligned}$$

$$\begin{aligned} AP^B_{2020} &= 0.75 \times \text{Min}[\$3,092.22; 0.015 \times \$58,700 + 0.02 \times (\$170,667 - \$58,700)] \\ &= 0.75 \times \text{Min}[\$3,092.22; \$3,119.84] = \$2,319.17 \end{aligned}$$

$$PA^A_{2020} = (9 \times \$1,859.88) - \$600 = \$16,139$$

11. Continued

$$PA^B_{2020} = (9 \times \$2,319.17) - \$600 = \$20,272$$

No need to verify against prorated Pension Adjustment limit since Accrued pension was limited to the prorated maximum defined benefit limit.

- (b) Calculate the maximum transfer value for each member as at September 30, 2020.

Show all work.

Commentary on Question:

Candidates generally knew how to calculate the maximum transfer value, but most had some difficulty identifying the correct factor to be applied.

1. Calculate the accrued pension (AP) in 2020

From a) above

$$AP^A_{2020} = \$1,859.88$$

$$AP^B_{2020} = \$2,319.17$$

2. Calculate the total accrued pension as of September 30, 2020

$$AP^A_{Tot} = \$1,859.88 + \$72,405 = \$74,264.88$$

$$AP^B_{Tot} = \$2,319.17 + \$59,455 = \$61,774.17$$

3. Calculate transfer factor

Factor^A = 12.0 ; Since based on individual's attained age

Factor^B = $12.0 \times 0.20 + 12.2 \times 0.80 = 12.16$; Interpolated based on exact age

4. Calculate maximum transfer value

$$MTV^A = 12.0 \times \$74,264.88 = \$891,178.56$$

$$MTV^B = 12.16 \times \$61,774.17 = \$751,173.85$$

- (c) Calculate the 2021 available RRSP contribution room for each member.

Show all work.

Commentary on Question:

Candidates performed reasonably well in identifying the components of the calculation of available RRSP contribution room. The most common problems encountered were in applying the proper maximum to the earned income and using the correct PAs in the calculation.

11. Continued

	Member	A	B
1	RRSP Deduction Limit for 2020	\$6,400	\$8,600
2	Minus: Allowable RRSP Contributions Deduction for 2020 ²	\$2,000	\$0
3	Plus: 18% of 2020 Earned Income up to a Maximum of \$27,830 ³	\$25,380	\$27,830
4	Minus: 2020 Pension Adjustment	\$16,139	\$20,272
5	Minus: 2020 Net Past Service Pension Adjustment	\$0	\$0
6	Plus: 2020 Pension Adjustment Reversal	\$0	\$0
7	2021 RRSP Deduction Limit	\$13,641	\$16,158

3: 2020 RRSP limit calculated to be 9 times the 2020 defined benefit limit
 $= 9 \times \$3,092.22 = \$27,830$

A: 2020 earnings = 37,000 + 104,000 = 141,000

$\Rightarrow \text{Min} (\$27,830 ; \$141,000 \times 18\%) = \$25,380$

B: 2020 earnings = 46,000 + 128,000 = 174,000

$\Rightarrow \text{Min} (\$27,830 ; \$174,000 \times 18\%) = \$27,830$

5: Assumed to be \$0

6: Assumed to be \$0 since members aged 62 and 66 PAR would normally be NIL.
 Younger members would have been subject to a PAR. If Plan was underfunded and benefits were reduced, it would also have triggered a PAR.

7: $7 = 1 - 2 + 3 - 4 - 5 - 6$

A: $\text{RRSP}_{2021}^A = \$6,400 - \$2,000 + \$25,380 - \$16,139 - \$0 - \$0 = \$13,641$

B: $\text{RRSP}_{2021}^B = \$8,600 - \$0 + \$27,830 - \$20,272 - \$0 - \$0 = \$16,158$

- (d) Calculate the maximum of the combined employee and employer contributions in dollars that could be made in 2021 to:
- (i) a Defined Contribution Registered Pension Plan (DCRPP)
 - (ii) a Group Registered Retirement Savings Plan (Group RRSP)
 - (iii) a Deferred Profit Sharing Plan (DPSP)

Show all work.

Commentary on Question:

Most candidates had difficulty calculating the maximum contributions that could be made to the different types of registered plans. Many candidates did not apply the correct Money Purchase limits and very few recognized that Group RRSP limits are based on the previous years' salary and limits.

11. Continued

- (i) Under a DC plan, contributions are limited to 18% of salary, subject to the *ITA* yearly Money Purchase Limit.
- 2021 Money Purchase Limit = $\$3,170.00 \times 9 = \$28,530$
A: Min ($\$28,530$; $18\% \times 144,000$) = **$\$25,920$**
B: Min ($\$28,530$; $18\% \times 177,000$) = **$\$28,530$**
- (ii) Contributions to a Group RRSP are limited by the previous year salary, pension adjustment and the *ITA* yearly Money Purchase Limit of the previous year. Since it's the first year and employees were previously part of a defined benefit plan, contributions would be limited in 2021. Contributions are voluntary under a Group RRSP so it is the employee's responsibility to ensure contributions don't exceed his RRSP room.
- 2021 RRSP Limit = $\$3,092.22 \times 9 = \$27,830$
A: Min ($\$27,830$; $\$13,641$) = **$\$13,641$**
B: Min ($\$27,830$; $\$16,158$) = **$\$16,158$**
- (iii) Under a DPSP plan, employee contributions are not allowed, so contributions are limited to 9% of salary, subject to half of the *ITA* yearly Money Purchase Limit.
- 2021 Money Purchase Limit = $\$3,170.00 \times 9 = \$28,530$
2021 DPSP Limit = $\frac{1}{2} \times \$28,530 = \$14,265$
A: Min ($\$14,265$; $9\% \times 144,000$) = **$\$12,960$**
B: Min ($\$14,265$; $9\% \times 177,000$) = **$\$14,265$**

12. Learning Objectives:

7. The candidate will understand how to apply the standards of practice and professional conduct guidelines.

Learning Outcomes:

- (7b) Explain and apply the Professional Conduct Guidelines.
- (7d) Demonstrate compliance with requirements regarding the actuary's responsibilities to the participants, plans sponsors, etc.
- (7f) Recognize situations and actions that violate or compromise Standards or Professional Conduct Guidelines.
- (7g) Recommend a course of action to repair a violation of the Standards or Professional Conduct Guidelines.

Sources:

CIA Rules of Professional Conduct

SOA Code of Professional Conduct

CIA Guidance Document: General Advice on the Application of Rule 13

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Describe potential areas of non-compliance with rules of professional conduct.

Commentary on Question:

Many candidates listed one or two potential areas of non-compliance. Some candidates did not provide an appropriate description.

Derived from CIA Rules of Professional Conduct:

- *Professional Integrity*, Rule 1, Annotation 1-3: A member shall not engage in any professional conduct involving dishonesty, fraud, deceit or misrepresentation or commit any act that reflects adversely on the actuarial profession.
- *Disclosure*, Rule 4, Annotation 4-2: A member who is not financially and organizationally independent concerning any matter related to the performance of professional services should disclose to the client or employer any pertinent relationship which is not apparent in a full and timely manner.

12. Continued

- *Conflict of Interest, Rule 5:* A member shall not perform professional services involving an actual or potential conflict of interest unless:
 - (a) the member's ability to act fairly is unimpaired, [*ability to act fairly may not be impaired, but should disclose to relevant stakeholders*]
 - (b) there has been full and timely disclosure of the conflict to all known present and prospective direct users, and
 - (c) all known present and prospective direct users have expressly agreed to the performance of the services by the member.
 - *Confidentiality, Rule 7:* A member shall not disclose to another party any confidential information (in this case, information which the member has reason to believe that the client or employer may not wish to be divulged) obtained through a professional assignment performed for a client or employer.
- (b) Recommend a course of action, taking into consideration professional standards.

Commentary on Question:

Many candidates provided some steps of a course of action, but many candidates did not provide a complete recommendation.

- First, I would discuss the situation with the two actuaries representing Company ABC and Company XYZ to try to resolve the apparent noncompliance.
- If the members admit to the noncompliance, such as the lack of disclosure of relevant relationships, and rectifies the issues, users of the work must be notified, and the consequences of that notification must be resolved.
- The noncompliance is not resolved if any of the following takes place:
 - The member in apparent noncompliance did not agree to a discussion;
 - The discussion did not result in an agreement as to whether a noncompliance has taken place; or
 - There was agreement that noncompliance has taken place, but no corrective action was taken as a result.
- If there is no resolution:
 - I would report the noncompliance to the Canadian Institute of Actuaries Committee on Professional Conduct (CPC);
 - It may be appropriate to inform Company ABC/XYZ of lack of disclosure of relationship and potential conflicts of interest as it may violate internal corporate ethics guidelines.
- I would consider consulting in confidence with the chairperson (or vice-chairperson) of a designated CIA council if I had a question about the spirit or intent of the standards of practice in this case.