

RET FRC Model Solutions

Spring 2024

1. Learning Objectives:

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

Learning Outcomes:

- (7c) Explain and apply all of the applicable standards of practice related to valuing pension benefits.

Sources:

Events Occurring After the Calculation Date of an Actuarial Opinion for a Pension Plan, CIA Revised Educational Note, Jan 2015

CIA Consolidated Standards of Practice, sections 1420-1430

Commentary on Question:

In order to obtain full marks on this question, candidates were expected to reference the relevant Standards of Practice and lay out the different implications including impact on assumptions, plan funding, contribution requirements and reporting.

Solution:

- (a) Describe how the asset mix change affects the December 31, 2023 valuation taking into consideration the Standards of Practice.

Commentary on Question:

While most candidates were able to indicate how to apply the Standards of Practice to this situation and the impact on discount rate, generally, candidates did not describe the effects on plan funding and contribution requirements. Some candidates did not correctly indicate that this was a definitive subsequent event.

When an actuary provides an opinion about the funding or funded status of a plan as at a certain calculation date, he or she would comply with all aspects of the Standards of Practice. This includes, among other things, ensuring that the assumptions are appropriate at that calculation date.

Based on the Standards of Practice, if an event is definitive (like this one) before the report date, it is a subsequent event and it should be taken into account in the calculations and should be described in the report.

1. Continued

In this situation, the discount rate used in the going concern valuation is not accurate anymore. The actuary needs to reflect this subsequent event in the valuation because it will increase the actuarial present value of the projected benefits at the calculation date.

The actuary should provide an opinion on the funding of the plan (going concern basis) as at the calculation date by valuing all benefits using the new discount rate as at the calculation date. Subject to regulatory and legislative considerations, the change in normal cost and special going concern payments associated with the event could either:

- Commence at the calculation date, even if the effective date of the event falls at a later date; or
- Commence at the effective date of the event. The assumptions used to determine the updated normal cost and special going concern payments would be appropriate as at the calculation date, not the effective date of the event.

- (b) Describe how the asset mix change would have affected the December 31, 2023 valuation if you had learned of the change after the valuation report was filed.

Commentary on Question:

Most candidates correctly indicated that the actuary would need to use their judgement to determine the appropriate course of action, but did not clearly describe how the various financial impacts affect that determination, and how they should be disclosed.

If an actuary becomes aware of an event that becomes definitive (like this one) after the report date, then the actuary may need to withdraw or amend the report. The actuary must use his professional judgement to determine if it should be withdrawn or amended.

Since the purpose of the work is to report on the entity as it was at the calculation date, and because the change in the asset mix has a material impact on the financial results of the valuation as it makes the plan's financial position different as at the valuation date, the report must be amended (withdrawn and refilled) to recognize the updated discount rate and plan's financial position.

It must include a description of the subsequent event and the impact it has on the financial results of the valuation (going concern position and required contributions).

2. 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.

Learning Outcomes:

- ((3a) Differentiate between the various purposes for valuing pension plans:
 - (i) Funding
 - (ii) Solvency
 - (iii) Termination/wind-up/conversion
- (3b) Perform periodic valuations of ongoing plans, calculating normal cost and actuarial liability, using a variety of cost methods.
- (3e) Perform valuations for special purposes, including:
 - (i) Plan termination/wind-up/conversion valuations
 - (ii) Hypothetical wind-up and solvency valuations
 - (iii) Shared risk pension plan valuations
- (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.

Sources:

FR-133-17: Actuarial Equivalence Calculations

ASOP 4: Measuring Pension Obligations and Determining Pension Plan Costs or Contributions, Dec 2021

Calculation of Incremental Cost on a Hypothetical Wind-Up or Solvency Basis, CIA Educational Note, Apr 2023

CIA Consolidated Standards of Practice, sections 3100-3500

Section 3500 of the Practice-Specific Standards for Pension Plans – Pension Commuted Values (Subsection 3570), CIA Educational Note, May 2023

Section 3500 of the Practice-Specific Standards for Pension Plans – Pension Commuted Values (other than Subsection 3570), CIA Educational Note, May 2023

2. Continued

Commentary on Question:

This question was meant to test the candidate's knowledge of valuation of liabilities, funding requirements in Ontario and measurement of gains/losses. Overall, candidates were well prepared for this question.

Solution:

- (a) Calculate the funded status of the plan on going concern, solvency and hypothetical wind-up bases as at January 1, 2023.

Commentary on Question:

Candidates performed relatively well on this question. One common mistake was the incorrect use of the appropriate annuity factor (wrong age or wrong rate). Some candidates calculated only the non-indexed liabilities.

Please see Excel spreadsheet for solution.

- (b) Calculate the minimum required and maximum permissible contributions for 2023 based on the January 1, 2023 valuation.

Commentary on Question:

Candidates did not calculate the minimum funding requirements correctly due to following reasons:

- *Including the special payment*
- *Missing offset of employee contribution*
- *Applying PFAD on indexed normal cost*
- *Missing expense*
- *Missing offset of actuarial available surplus*

Please see Excel spreadsheet for solution.

- (c) Calculate the funded status on a going concern basis as at January 1, 2024.

Commentary on Question:

Candidates performed relatively well on this question. One common mistake was the incorrect use of the appropriate annuity factor (wrong age or wrong rate). Some candidates calculated only the non-indexed liabilities.

Please see Excel spreadsheet for solution.

- (d) Calculate the actuarial gains and losses by source for the period between January 1, 2023 and December 31, 2023.

2. Continued

Commentary on Question:

Candidates performed relatively well on this question. Most candidates received points for the demographic and expense gains/losses however the gain/loss due to PFAD was incorrect in most cases.

Please see Excel spreadsheet for solution.

- (e) Explain why your client may have decided to file the January 1, 2024 valuation.

Commentary on Question:

This question was poorly answered as candidates limited their comments to the financial situation of the plan (which they got points for) but did not consider other factors.

Please see Excel spreadsheet for solution.

3. Learning Objectives:

2. The candidate will understand how to analyze/synthesize the factors that go into selection of actuarial assumptions for funding purposes.
5. The candidate will understand how to evaluate and apply regulatory policies and restrictions for registered retirement plans.

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.
- (5i) The candidate will be able to describe and apply regulation pertaining to contributions and benefits.

Sources:

Determination of Best Estimate Discount Rates for Going Concern Funding Valuations, CIA Educational Note

CIA Consolidated Standards of Practice, sections 3100-3500

R.R.O. 1990, Reg 909: General Regulations under Ontario Pension Benefits Act

Commentary on Question:

This question first asked candidates to determine a going concern discount rate and then introduced a de-risking glide-path investment strategy. Candidates who did well understood how the strategy could impact the determination of a going concern discount rate and that it would not impact the determination of the PfAD for the current valuation.

Solution:

- (a) Calculate the best estimate going concern discount rate using the building block approach.

Commentary on Question:

Most candidates properly adjusted the discount rate for expenses, however many candidates incorrectly added the weighted average real return to the long-term bond yield, rather than the long term expected inflation. It was also acceptable to increase the discount rate for a reasonable effect of diversification and rebalancing.

Nominal rate = real rate + inflation rate

$$\begin{aligned} &\text{Assumed investment return (real)} \\ &= 40\% \times 2.5\% + 25\% \times 4.8\% + 25\% \times 5.0\% + 10\% \times 4.5\% \\ &= 3.9\% \end{aligned}$$

3. Continued

| | |
|--|--------------|
| Long-term expected inflation | 2.20% |
| Assumed investment return (real) | 3.90% |
| Additional returns for active management | 0.30% |
| Active investment management expenses | -0.30% |
| Passive investment management expenses | -0.20% |
| Non-investment management expenses | -0.40% |
| Net discount rate | 5.50% |

- (b) Describe the considerations for establishing a going concern discount rate for the next valuation if the de-risking glide-path investment strategy is adopted by Company ABC.

Commentary on Question:

Candidates who did not perform as well provided general considerations for going concern discount rate determination, not specific considerations relating to a de-risking glide-path investment strategy.

The actuary should give consideration to the implications of any investment policy with an asset mix that is expected to evolve over time, such as a glide-path, on the expected future investment returns on the plan's assets.

Future changes to the investment policy after the valuation date due to the glide-path investment strategy are not required, but still permitted to be reflected in expected investment return assumption.

If the actuary chooses to reflect the glide-path, they could determine the expected timing of changes in asset mix taking into account all relevant factors including the glide-path triggers, expected asset return, expected solvency liability growth, regulatory funding requirements, and the plan's funding policy.

Alternatively, regardless of the glide-path, the actuary may use a discount rate based on the yields of investment grade debt securities which would reasonably match projected benefit cash flows, with an appropriately low level of risk.

- (c) Determine the PfAD applicable for a valuation at December 31, 2023 assuming Company ABC adopted the de-risking glide-path investment strategy and that the current target asset allocation in the SIPP has not changed.

3. Continued

Commentary on Question:

Generally this part of the question was done well except that many candidates did not reflect that only 75% of the allocation to long-term bonds met the minimum credit rating.

A = 5% since the plan is closed

Fixed income assets

= Fixed income component + 50% x alternative investment component
= 75% x 40% + 50% x (25% x 40% + 10%) since only 75% meets the minimum credit rating in the regulations
= 40%

B = 7% based on 60% allocation to non-fixed income for a closed plan

Benchmark discount rate

= 0.5% + long term bond yield + 5% x allocation to non-fixed income + 1.5% x allocation to fixed income
= 0.5% + 3% + 5% x 60% + 1.5% x 40%
= 7.1%

C = 0% since the gross discount rate of 6.1% (net of active management expenses only) from part (a) is less than the BDR = 7.1%

PfAD = A + B + C = 5% + 7% + 0% = 12%

4. 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.
7. The candidate will understand how to apply the standards of practice and professional conduct guidelines.

Learning Outcomes:

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

Sources:

CIA Section 3500 of the Practice-Specific Standards for Pension Plans – Pension Commuted Values (Subsection 3570)

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Calculate the non-indexed commuted value interest rates under Section 3500 of the Canadian Institute of Actuaries' Standards of Practice as at the date of termination.

Commentary on Question:

Most candidates did well on this part of the question and calculated the rates correctly. Some candidates did not round their final rates.

Non-Indexed₁₋₁₀ = 4.10%

Non-Indexed₁₀₊ = 4.50%

The calculation can be found in the Excel spreadsheet.

4. Continued

- (b) Calculate the implied inflation rates under Section 3500 of the Canadian Institute of Actuaries' Standards of Practice as at the date of termination.

Commentary on Question:
Same commentary as part (a)

$$C_{1-10} = 1.70\%$$

$$C_{10+} = 1.70\%$$

The calculation can be found in the Excel spreadsheet.

- (c) Calculate the commuted value at the members' date of termination assuming the members terminated:
- (i) Voluntarily; and
 - (ii) Involuntarily

Commentary on Question:
Generally, candidates struggled with calculating the commuted value for Member A. Candidates failed to correctly calculate the ITA reduction, the maximum bridge and applying the combined maximum pension. Most candidates did not increase the maximum lifetime pension by CPI+1%. Candidates did better on the calculation of Member B recognizing that the member was not eligible for grow-in benefits and the commuted value was the same under both scenarios. Most candidates failed to calculate the 50% rule refund for Member B.

The calculation can be found in the Excel spreadsheet.

5. 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:

Pension Mathematics for Actuaries, Anderson, Arthur W., 3rd Edition, 2006

Commentary on Question:

The question is trying to test whether candidates can apply the Aggregate Cost Method to calculate the normal cost and accrued liability. Candidates did not perform well for this question in general. Many candidates did not perform the test regarding the value of the pension not being less than 2 times the accumulated employee contributions with interest. Marks were given for calculations for funds either with or without employee contributions.

Solution:

- (a) Calculate the normal cost of the plan as at December 31, 2023.

| | | | |
|------------------|--|--|--|
| a) | | | |
| Aggr NC = | $(\sum PVFB - AL) / \sum PVFS \times \sum S$ | | |
| $\sum PVFB =$ | \$920,490 | | |
| $\sum PVFS =$ | \$2,594,379 | | |
| AL = | \$500,000 | | |
| $\sum S =$ | \$178,100 | | |
| Aggr NC = | \$28,866 | | |

5. Continued

| Member A: | | | | | | | | | |
|-----------|-----|---------|----------------|-------------------|-----------------|----------|-------|-------|-------|
| Year | Age | Service | 4% Earnings | 8% Ann Contr'n | 4% Total CWI | Accr Pen | q_t | q_t | I_x |
| 2023 | | | 75,000 | | | | | | |
| 2024 | 30 | 5 | 78,000 | 6,240 | 32,000 | 7,500 | 0.050 | 0.000 | 1.000 |
| 2025 | 31 | 6 | 81,120 | 6,490 | 39,645 | 9,360 | 0.050 | 0.000 | 0.950 |
| 2026 | 32 | 7 | 84,365 | 6,749 | 47,850 | 11,357 | 0.050 | 0.000 | 0.903 |
| 2027 | 33 | 8 | 87,739 | 7,019 | 56,648 | 13,498 | 0.050 | 0.000 | 0.857 |
| 2028 | 34 | 9 | 91,249 | 7,300 | 66,074 | 15,793 | 0.050 | 0.000 | 0.815 |
| 2029 | 35 | 10 | 94,899 | 7,592 | 76,162 | 18,250 | 0.000 | 0.000 | 0.774 |
| 2030 | 36 | 11 | 98,695 | 7,896 | 86,953 | 20,878 | 0.000 | 0.000 | 0.774 |
| 2031 | 37 | 12 | 102,643 | 8,211 | 98,484 | 23,687 | 0.000 | 0.000 | 0.774 |
| 2032 | 38 | 13 | 106,748 | 8,540 | 110,799 | 26,687 | 0.000 | 0.000 | 0.774 |
| 2033 | 39 | 14 | 111,018 | 8,881 | 123,942 | 29,890 | 0.000 | 0.000 | 0.774 |
| 2034 | 40 | 15 | 115,459 | 9,237 | 137,959 | 33,305 | 0.000 | 0.000 | 0.774 |
| 2035 | 41 | 16 | 120,077 | 9,606 | 152,899 | 36,947 | 0.000 | 0.000 | 0.774 |
| 2036 | 42 | 17 | 124,881 | 9,990 | 168,813 | 40,826 | 0.000 | 0.000 | 0.774 |
| 2037 | 43 | 18 | 129,876 | 10,390 | 185,756 | 44,957 | 0.000 | 0.000 | 0.774 |
| 2038 | 44 | 19 | 135,071 | 10,806 | 203,784 | 49,353 | 0.000 | 0.000 | 0.774 |
| 2039 | 45 | 20 | 140,474 | 11,238 | 222,957 | 54,028 | 0.000 | 0.000 | 0.774 |
| 2040 | 46 | 21 | 146,093 | 11,687 | 243,338 | 58,999 | 0.000 | 0.000 | 0.774 |
| 2041 | 47 | 22 | 151,936 | 12,155 | 264,992 | 64,281 | 0.000 | 0.000 | 0.774 |
| 2042 | 48 | 23 | 158,014 | 12,641 | 287,990 | 69,891 | 0.000 | 0.000 | 0.774 |
| 2043 | 49 | 24 | 164,334 | 13,147 | 312,404 | 75,847 | 0.000 | 0.000 | 0.774 |
| 2044 | 50 | 25 | 170,908 | 13,673 | 338,309 | 82,167 | 0.000 | 0.000 | 0.774 |
| 2045 | 51 | 26 | 177,744 | 14,220 | 365,788 | 88,872 | 0.000 | 0.000 | 0.774 |
| 2046 | 52 | 27 | 184,854 | 14,788 | 394,923 | 95,982 | 0.000 | 0.000 | 0.774 |
| 2047 | 53 | 28 | 192,248 | 15,380 | 425,804 | 103,518 | 0.000 | 0.000 | 0.774 |
| 2048 | 54 | 29 | 199,938 | 15,995 | 458,524 | 111,504 | 0.000 | 0.000 | 0.774 |
| 2049 | 55 | 30 | 207,935 | 16,635 | 493,180 | 119,963 | 0.000 | 0.500 | 0.774 |
| 2050 | 56 | 31 | 216,253 | 17,300 | 529,874 | 128,920 | 0.000 | 0.000 | 0.387 |
| 2051 | 57 | 32 | 224,903 | 17,992 | 568,716 | 138,402 | 0.000 | 0.000 | 0.387 |
| 2052 | 58 | 33 | 233,899 | 18,712 | 609,816 | 148,436 | 0.000 | 0.000 | 0.387 |
| 2053 | 59 | 34 | 243,255 | 19,460 | 653,295 | 159,051 | 0.000 | 0.000 | 0.387 |
| 2054 | 60 | 35 | 252,985 | 20,239 | 699,277 | 170,278 | 0.000 | 0.000 | 0.387 |
| 2055 | 61 | 36 | 263,104 | 21,048 | 747,891 | 182,149 | 0.000 | 0.000 | 0.387 |
| 2056 | 62 | 37 | 273,629 | 21,890 | 799,276 | 194,697 | 0.000 | 0.000 | 0.387 |
| 2057 | 63 | 38 | 284,574 | 22,766 | 853,575 | 207,958 | 0.000 | 0.000 | 0.387 |
| 2058 | 64 | 39 | 295,957 | 23,677 | 910,939 | 221,968 | 0.000 | 0.000 | 0.387 |
| 2059 | 65 | 40 | 307,795 | 24,624 | 971,527 | 236,765 | 0.000 | 1.000 | 0.387 |

5. Continued

| Member A: | | | | | | | | | |
|-----------|-----|---------|----------------|-----------|-----------|----------------|-----------|-----------|-----------|
| Year | Age | Service | Val of Def Pen | Term Ben | Term Liab | Val of Imm Pen | Rtmt Ben | Rtmt Liab | PVFS |
| 2023 | | | | | 19,327 | | | 356,289 | 1,609,199 |
| 2024 | 30 | 5 | 16,996 | 64,000 | 3,200 | 0 | 0 | 0 | 74,100 |
| 2025 | 31 | 6 | 22,272 | 79,290 | 3,587 | 0 | 0 | 0 | 69,725 |
| 2026 | 32 | 7 | 28,374 | 95,700 | 3,917 | 0 | 0 | 0 | 65,608 |
| 2027 | 33 | 8 | 35,411 | 113,296 | 4,196 | 0 | 0 | 0 | 61,734 |
| 2028 | 34 | 9 | 43,502 | 132,147 | 4,428 | 0 | 0 | 0 | 58,088 |
| 2029 | 35 | 10 | 74,628 | 152,325 | 0 | 0 | 0 | 0 | 57,535 |
| 2030 | 36 | 11 | 89,643 | 173,905 | 0 | 0 | 0 | 0 | 56,987 |
| 2031 | 37 | 12 | 106,789 | 196,969 | 0 | 0 | 0 | 0 | 56,444 |
| 2032 | 38 | 13 | 126,332 | 221,599 | 0 | 0 | 0 | 0 | 55,907 |
| 2033 | 39 | 14 | 148,566 | 247,884 | 0 | 0 | 0 | 0 | 55,374 |
| 2034 | 40 | 15 | 173,823 | 275,918 | 0 | 0 | 0 | 0 | 54,847 |
| 2035 | 41 | 16 | 202,469 | 305,797 | 0 | 0 | 0 | 0 | 54,325 |
| 2036 | 42 | 17 | 234,914 | 337,626 | 0 | 0 | 0 | 0 | 53,807 |
| 2037 | 43 | 18 | 271,616 | 371,511 | 0 | 0 | 0 | 0 | 53,295 |
| 2038 | 44 | 19 | 313,083 | 407,567 | 0 | 0 | 0 | 0 | 52,787 |
| 2039 | 45 | 20 | 359,880 | 445,914 | 0 | 0 | 0 | 0 | 52,285 |
| 2040 | 46 | 21 | 412,639 | 486,675 | 0 | 0 | 0 | 0 | 51,787 |
| 2041 | 47 | 22 | 472,059 | 529,985 | 0 | 0 | 0 | 0 | 51,293 |
| 2042 | 48 | 23 | 538,919 | 575,980 | 0 | 0 | 0 | 0 | 50,805 |
| 2043 | 49 | 24 | 614,087 | 624,807 | 0 | 0 | 0 | 0 | 50,321 |
| 2044 | 50 | 25 | 698,524 | 698,524 | 0 | 0 | 0 | 0 | 49,842 |
| 2045 | 51 | 26 | 793,300 | 793,300 | 0 | 0 | 0 | 0 | 49,367 |
| 2046 | 52 | 27 | 899,602 | 899,602 | 0 | 0 | 0 | 0 | 48,897 |
| 2047 | 53 | 28 | 1,018,749 | 1,018,749 | 0 | 0 | 0 | 0 | 48,431 |
| 2048 | 54 | 29 | 1,152,205 | 1,152,205 | 0 | 0 | 0 | 0 | 47,970 |
| 2049 | 55 | 30 | 0 | 0 | 0 | 1,301,595 | 1,301,595 | 148,707 | 23,757 |
| 2050 | 56 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 23,530 |
| 2051 | 57 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 23,306 |
| 2052 | 58 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | 23,084 |
| 2053 | 59 | 34 | 0 | 0 | 0 | 0 | 0 | 0 | 22,864 |
| 2054 | 60 | 35 | 0 | 0 | 0 | 0 | 0 | 0 | 22,647 |
| 2055 | 61 | 36 | 0 | 0 | 0 | 0 | 0 | 0 | 22,431 |
| 2056 | 62 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 22,217 |
| 2057 | 63 | 38 | 0 | 0 | 0 | 0 | 0 | 0 | 22,006 |
| 2058 | 64 | 39 | 0 | 0 | 0 | 0 | 0 | 0 | 21,796 |
| 2059 | 65 | 40 | 0 | 0 | 0 | 2,959,567 | 2,959,567 | 207,582 | 0 |

5. Continued

| Member B: | | | | | | | | | |
|-----------|-----|---------|----------|-------------|------------|----------|-------|-------|-------|
| Year | Age | Service | Earnings | Ann Contr'n | Total C'WI | Accr Pen | q_t | q_r | I_x |
| 2023 | | | 100,000 | | | | | | |
| 2024 | 50 | 15 | 104,000 | 8,320 | 190,000 | 30,000 | 0.000 | 0.000 | 1.000 |
| 2025 | 51 | 16 | 108,160 | 8,653 | 206,086 | 33,280 | 0.000 | 0.000 | 1.000 |
| 2026 | 52 | 17 | 112,486 | 8,999 | 223,156 | 36,774 | 0.000 | 0.000 | 1.000 |
| 2027 | 53 | 18 | 116,986 | 9,359 | 241,261 | 40,495 | 0.000 | 0.000 | 1.000 |
| 2028 | 54 | 19 | 121,665 | 9,733 | 260,457 | 44,455 | 0.000 | 0.000 | 1.000 |
| 2029 | 55 | 20 | 126,532 | 10,123 | 280,803 | 48,666 | 0.000 | 0.500 | 1.000 |
| 2030 | 56 | 21 | 131,593 | 10,527 | 302,361 | 53,143 | 0.000 | 0.000 | 0.500 |
| 2031 | 57 | 22 | 136,857 | 10,949 | 325,193 | 57,901 | 0.000 | 0.000 | 0.500 |
| 2032 | 58 | 23 | 142,331 | 11,386 | 349,368 | 62,954 | 0.000 | 0.000 | 0.500 |
| 2033 | 59 | 24 | 148,024 | 11,842 | 374,957 | 68,319 | 0.000 | 0.000 | 0.500 |
| 2034 | 60 | 25 | 153,945 | 12,316 | 402,034 | 74,012 | 0.000 | 0.000 | 0.500 |
| 2035 | 61 | 26 | 160,103 | 12,808 | 430,678 | 80,052 | 0.000 | 0.000 | 0.500 |
| 2036 | 62 | 27 | 166,507 | 13,321 | 460,969 | 86,456 | 0.000 | 0.000 | 0.500 |
| 2037 | 63 | 28 | 173,168 | 13,853 | 492,995 | 93,244 | 0.000 | 0.000 | 0.500 |
| 2038 | 64 | 29 | 180,094 | 14,408 | 526,845 | 100,437 | 0.000 | 0.000 | 0.500 |
| 2039 | 65 | 30 | 187,298 | 14,984 | 562,615 | 108,057 | 0.000 | 1.000 | 0.500 |

| Member B: | | | | | | | | | |
|-----------|-----|---------|----------------|----------|-----------|----------------|-----------|-----------|---------|
| Year | Age | Service | Val of Def Pen | Term Ben | Term Liab | Val of Imm Pen | Rtmt Ben | Rtmt Liab | PVFS |
| 2023 | | | | | 0 | | | 544,874 | 985,181 |
| 2024 | 50 | 15 | 255,038 | 380,000 | 0 | 0 | 0 | 0 | 104,000 |
| 2025 | 51 | 16 | 297,068 | 412,173 | 0 | 0 | 0 | 0 | 103,010 |
| 2026 | 52 | 17 | 344,673 | 446,311 | 0 | 0 | 0 | 0 | 102,028 |
| 2027 | 53 | 18 | 398,523 | 482,522 | 0 | 0 | 0 | 0 | 101,057 |
| 2028 | 54 | 19 | 459,364 | 520,915 | 0 | 0 | 0 | 0 | 100,094 |
| 2029 | 55 | 20 | 0 | 0 | 0 | 561,607 | 561,607 | 220,017 | 49,571 |
| 2030 | 56 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 49,098 |
| 2031 | 57 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 48,631 |
| 2032 | 58 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 48,168 |
| 2033 | 59 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 47,709 |
| 2034 | 60 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 47,255 |
| 2035 | 61 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 46,805 |
| 2036 | 62 | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 46,359 |
| 2037 | 63 | 28 | 0 | 0 | 0 | 0 | 0 | 0 | 45,917 |
| 2038 | 64 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 45,480 |
| 2039 | 65 | 30 | 0 | 0 | 0 | 1,350,708 | 1,350,708 | 324,857 | 0 |

- (b) Calculate the accrued liability and normal cost for the plan as at December 31, 2024.

| | |
|------------------|------------------|
| b) | |
| F = | \$609,500 |
| Σ PVFB = | \$833,663 |
| Σ PVFS = | \$1,794,574 |
| AL = | \$609,500 |
| Σ S = | \$81,510 |
| Aggr NC = | \$10,182 |

6. Learning Objectives:

4. The candidate will understand the principles and rationale behind regulation.

Learning Outcomes:

(4a) Describe the principles and motivations behind pension legislation and regulation.

(4b) Describe sources and framework of government regulation.

Sources:

FR-139-18: OECD Core Principles of Private Pension Regulation (Parts I and II, pp. 11-75)

FR-145-20: CAPSA Recommendations - Funding of Benefits for Plans Other than Defined Contribution Plans

FR-146-20: FSRA - Pension Sector Guiding Principles

Commentary on Question:

In order to receive full points on this question, candidates were to include at least one recommendation for each category of incentivizing retirement savings, enhancing benefit security and tax sheltering, and provide specific examples of features and how they would support each of the objectives. The solution below is not exhaustive, for example, some candidates included information on Ontario's PBGF as a way to enhance benefit security.

Solution:

The Government of Country XYZ is establishing a regulatory framework for employer-sponsored pension plans with the following objectives:

- Incentivize retirement savings
- Enhance benefit security
- Allow reasonable but limited tax-sheltering

Recommend five features from the Pension Benefits Act (Ontario) or the Income Tax Act (Canada) that the Government of Country XYZ could adopt in order to meet these objectives.

Justify your recommendations.

6. Continued

1. Incentivize retirement savings: PBA sets eligibility requirements for plan membership. Helps to encourage retirement savings by:
 - a. Setting requirement for employees of corporate entity to join pension plan after specific period of employment
 - b. Setting requirements for eligibility of members with part-time employment status
 - c. Allowing benefit to accrue and contributions to be remitted for a longer time over the career of an employee
2. Incentivize retirement savings: Modification of tax codes to provide tax advantages on retirement savings.
 - a. Identify employer/employee contributions as tax deductible
 - b. Investment income tax-free until withdrawn
 - c. Unused tax-free contribution room can be carried over to future years
3. Benefit security: Implement funding rules regarding employer minimum required contributions
 - a. Encourage benefit security in the case of corporate insolvency by establishing rules surrounding the timing and quantum of funding contributions
 - b. Funding rules consider both benefit security and long-term sustainability of cost of maintaining the pension plans.
4. Benefit security: Formalize investment rules/constraints
 - a. Investment Rules to ensure assets invested appropriately (“prudent portfolio approach”)
 - b. Plan sponsor has a fiduciary responsibility to monitor the performance of investment managers where plan assets are invested.
 - c. Requirement to file a Statement of Investment Policies and Procedures
5. Reasonable, but limited, tax sheltering: Limitations on the accrual of benefits
 - a. Set limits on lifetime pension benefit accruals
 - b. Set limit on the maximum tax-deductible employer contribution and maximum employee contributions
 - c. Set limits on maximum tax deferral room/RRSP room (e.g. PAs reduce RRSP room)

7. 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.

Commentary on Question:

This question was testing the candidates' ability to assess how different pension plans with different demographics impact mortality assumptions. Candidates were to describe the considerations for three distinct types of pension plans. While general commentary on considerations of mortality assumption setting were considered in the grading, full marks were given for specific considerations for the three plan types.

Most candidates were able to identify the more basic differences between the plans however more considerations and a holistic view of the mortality assumption (base table and mortality improvements) were needed by candidates to get full marks. Most candidates only listed considerations for the base table, without addressing the mortality improvements.

Solution:

Describe considerations in setting the going concern mortality assumption for the following pension plans:

- (i) a private sector pension plan for a small group of physicians;
- (ii) a large public sector pension plan covering firefighters; and
- (iii) the Canada Pension Plan

The Mortality Table and Improvement scale assumptions to be looked at separately for each of the three plan types.

- (i) Considerations specific to a private sector pension plan for a small group of physicians
 - Consider the size of the retiree group - given the number is small, their mortality experience would not be credible.
 - Consider the actual mortality gains and losses over the last few valuations. Look for trends or validity of current assumptions.
 - Look at any industry specific mortality studies published that may have a table specific for physicians.
 - Adjustments for plan characteristics not preferable as there is not credible experience.
 - For mortality improvement scale since the data is not credible consider using a published improvement scale.
 - Consider using the 2D generational mortality improvement scale.

7. Continued

- (ii) Considerations specific to a Large Public Sector Plan for firefighters
 - Given the description that the plan is large, there may be fully or at least partially credible experience.
 - Consider creating their own mortality table or adjusting a published table with partial credibility.
 - Prepare experience studies to validate experience and make adjustments.
 - Given the job nature of firefighters, mortality is likely to be very different from published tables for the general retiree population.
 - If enough experience, possible adjustment may be applied to the base mortality table to allow for the plan membership characteristics.
 - For mortality improvement scale consider whether the plan's experience is credible and over long enough period of time.
 - Consider using published tables for the improvement scale if not enough experience to justify an adjustment.

- (iii) Considerations specific to the Canada Pension Plan
 - There should be a lot of mortality experience at least more than 10,000 retiree lives.
 - The data would be very credible as social security plans would be considered a very large plan.
 - Create a customized mortality table.
 - Weight the table by pension amount or liability as it is more appropriate than using number of lives.
 - Must adjust base year to counteract Base Year effect.
 - There are likely frequent experience studies done, consider using the results from the experience studies to determine past gains and losses and whether mortality is tracking to the current assumptions.
 - For the mortality improvement scale, if data over long periods of time is available consider creating their own mortality improvement scale.