RET FRC Model Solutions
Spring 2025

1. Learning Objectives:

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

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

Learning Outcomes:

(3d) Analyze and communicate the impact on cost stability of a variety of asset valuation methods.

(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.).

(7b) Demonstrate compliance with requirements regarding the actuary's responsibilities to the participants, plans sponsors, etc.

Sources:

Guidance on Asset Valuation Methods, CIA Revised Educational Note, Feb 2024

Asset Valuation Methods under ERISA, Pension Forum, Sep 2002, Ch. 1, 3, 4 and 5

Survey of Asset Valuation Methods for Defined Benefit Pension Plans, section 2 only

CIA Consolidated Standards of Practice, sections 3100-3500

Commentary on Question:

This question asked candidates to critique a stated asset smoothing method, to list the advantages and disadvantages of asset smoothing and the considerations for changing an asset smoothing method.

Solution:

(a) Assess the appropriateness of the above asset smoothing valuation method, taking into consideration the Canadian Institute of Actuaries' guidance on asset valuation methods.

1. Continued

Commentary on Question:
Most candidates commented on the main general characteristics of an appropriate asset smoothing method, however may have missed connecting them to the asset smoothing method specified in the question.

- *Achieves objectives:* the primary objective is to minimize contribution rate volatility through deferred recognition of investment gain/loss. The stated method would help achieve this objective.
- *Tracks to market value:* the asset valuation method includes current market value as a component and ensures that the asset value is expected to track to market value over time.
- *Does not unduly deviate from market value:* In cases where the smoothed asset values significantly deviates from market value, the corridor would take effect.
- *Free of bias:* the smoothed value of assets should not be biased upwards or downwards. For this stated method, the corridor is biased downwards because the lower corridor allows the smoothed value to deviate more from the market value downwards (90% of MV) than the upper corridor would allow the smoothed value to deviate from the market value upwards (105% of MV).
- *Should not influence transactions:* the stated method smooths both recognized and unrecognized gains/losses and therefore does not influence transactions
- *Is consistent with the length of typical economic cycles:* Typically, an appropriate period over which recognition of gains/losses is recognized is five years or less. The stated method smooths gains/losses over seven years and is thus not appropriate.

(b) Describe the advantages and disadvantages of using asset smoothing for:

(i) Going concern valuations; and

(ii) Solvency valuations

Commentary on Question:
Candidates knew the advantages of asset smoothing but were less familiar with the disadvantages.

- Advantages (both going concern and solvency)
  - Smoothing will stabilize the short-term fluctuations in the market value of the plan assets
  - Smoothing will moderate the volatility of funding contributions.

1. Continued

- Disadvantages
  - Smoothing of assets would be appropriate only if permitted by law and stipulated by the terms of engagement (mainly solvency)
  - Smoothing the assets would also require smoothing the solvency liabilities. This is an added complexity to the solvency valuation. (solvency only)
  - Smoothing of assets is harder to communicate to clients and plan members. Market value approach is more easily understood. (both going concern and solvency)
  - Once smoothing method is adopted for a valuation, it must be applied consistently in future valuations unless otherwise justified by the circumstances of the plan (both going concern and solvency)

(c) Describe the considerations for changing the asset valuation methods from one actuarial valuation to the next, taking into account the actuarial standards of practice.

Commentary on Question:
Most candidates mentioned the disclosure and justification aspect of a change in smoothing method but missed the other points.

- Professional Integrity: Act with skill and care.
- Standards of Practice: the newly adopted asset valuation method should follow the CIA Standards of Practice and take into account any released guidance on asset valuation methods.
- Control of Work Products: Take reasonable steps to ensure that services are not used to mislead. Changing valuation method repeatedly may mislead unsophisticated audiences.
- Justification of methods: Need to justify why the change in the asset valuation method is warranted.
- Reporting and disclosure: change in asset smoothing methods requires that an actuary disclose the nature of the change, its rationale, and its impact.

2. Learning Objectives:

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

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

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.

(3f) Calculate actuarially equivalent benefits.

(6b) Evaluate funding restrictions imposed by regulations.

Sources:

Canadian Pensions and Retirement Income Planning, Willis Towers Watson, 6th Edition, 2017 Ch. 15

Morneau Shepell Handbook of Canadian Pension and Benefit Plans, 17th Edition, 2020 Ch. 3 and 6

Pension Mathematics for Actuaries, Anderson, Arthur W., 3rd Edition, 2006 Ch. 1, 2, 3, 4, 7

FR-108-13: Pension Funding Exercises

FR-114-23: R.R.O. 1990, Reg 909: General Regulations under Ontario Pension Benefits Act

FR-115-23: R.S.O. 1990, Ch. P.8 under Ontario Pension Benefits Act

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Calculate the funded status of the plan on going concern and solvency bases.

Commentary on Question:

This question was designed to test the candidate's knowledge of valuation of liabilities on going concern and solvency basis.

2. Continued

The majority of candidates were able to set up the calculation correctly to determine the going concern and Solvency liability and funded positions. However, for active members, some candidates applied the wrong service proration, used an incorrect annuity factor, or calculated the final average earnings incorrectly. Partial points were awarded to those who set up the calculation correctly but missed one step to get the right answer.

For deferred members, common mistakes were failing to apply the actuarial equivalent reduction, and using the factor from the incorrect age.

Candidates generally performed well in calculating the correct liabilities for retirees.

Please see Excel for the solution

(b) Calculate the minimum required and maximum permissible employer contributions for 2024 and the new amortization schedule.

Commentary on Question:

This question was designed to test candidates' understanding of the calculation of contribution requirements.

Candidates generally performed well in calculating the going concern excess and the solvency assets.

About 1/3 of candidates failed to calculate the blended solvency discount rate and the reduced solvency shortfall.

About half of the candidates understood that going concern special payments can be eliminated when there is a going concern excess. However, very few demonstrated knowledge that if the present value of existing solvency special payments exceeds the reduced solvency shortfall, the payment period for solvency special payments can be shortened.

Calculating the solvency amortization period was the weakest area on this question. Very few candidates were able to correctly demonstrate how to shorten the amortization period. Common mistakes included failing to factor in existing solvency special payments and not recognizing that solvency special payments should be calculated based on a reduced solvency ratio of 85%.

2. Continued

Over 2/3 of candidates were able to set up the formula to calculate the minimum required contributions and the maximum permissible contributions. Partial credit was given to those who did not arrive at the correct answer but demonstrated an understanding of the calculation approach. Common mistakes included failing to eliminate going concern special payments, including incorrect solvency special payments in the minimum contribution calculation.

Please see Excel for the solution.

(c) Calculate the gains and losses by source on a going concern basis for 2024.

Commentary on Question:
This question was meant to test the candidate's knowledge of measurement of gains/losses.

Candidates were generally not as well prepared for Part C. Most candidates were able to calculate the actual liability, project the expected liability at the end of 2024, and demonstrate how to calculate the investment gain and loss. About half of the candidates performed well on the termination and retirement experience calculations. However, common mistakes included:

- *Investment gain and loss: Some candidates applied incorrect timing for interest calculations, such as including half-year interest on end-of-year payments. Others included expenses in the expected asset calculation.*
- *Normal cost contribution gain and loss: Many candidates failed to exclude special payments from contributions when calculating this component.*
- *Annuity purchase experience: Many candidates incorrectly calculated this by subtracting the annuity purchase premium from expected liabilities, instead of subtracting the annuity premium from actual liabilities.*
- *Most candidates did not calculate special payments with interest*
- *Most candidates did not calculate the mortality gains and losses.*

Please see Excel for the 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.

Learning Outcomes:

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

Sources:

ASOP No. 27, Selection of Economic Assumptions for Measuring Pension Obligations (Effective Aug. 1, 2021)

ASOP No. 35, Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations (Effective Aug. 1, 2021)

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Describe the considerations for setting the going concern discount rate for the January 1, 2025 funding valuation.

Commentary on Question:

This question was meant to test the candidates' ability to assess a plan's characteristics when setting a discount rate. Many candidates explained the two methods for setting a discount rate (building block approach versus the bond yield approach) rather than describing the considerations for this specific plan. Most candidates were able to successfully comment on the relationship between the current asset allocation, expenses provisions, inflation, etc. to receive partial marks, however most candidates missed commentating on the plan's de-risking strategy and how to incorporate the phased asset allocation changes.

- A discount rate is used to calculate the present value of expected future plan payments.
- Funding valuations often use a discount rate related to the expected return on plan assets.
- The actuary should also consider reflecting the relationships among inflation, interest rates, and market appreciation or depreciation as well as the investment expense assumption (implicit in discount rate).
- The actuary will consider collecting or developing forward-looking expected investment returns by asset class and for the entire portfolio.

3. Continued

- As part of the plan's de-risking strategy, the plan's asset allocation will phrase into 15%/80%/5% in equities/fixed income/cash [from 60%/35%/5%] over a nine-year period. As a result,
  - The actuary may assume multiple investment return rates (such as select and ultimate investment return rates) in lieu of a single investment return rate.
  - For example, returns of x% at January 1, 2025, gradually decreased to y% over the 10-year period, then y% as at January 1, 2033.

(b) Describe the considerations for setting the following assumptions for the funding valuation as at January 1, 2025:

(i) Salary increase rates

(ii) Retirement rates

(iii) Termination rates

Commentary on Question:
Many candidates did well on part b) of the question. Most were able to describe the general considerations for setting demographic assumptions, however stronger candidates were able to relate the assumption back to the specific plan described in the question.

(i) **Salary increase rates**

- The assumption used to measure the anticipated year-to-year change in compensation is referred to as the compensation increase assumption.
- It may be a single rate, it may vary by age or service, or it may vary over future years.
- Considering the plan is closed to new entrant and active members' seniority, the future rates may reflect such pattern/trend.
- Salaries will be increased by 6% per year for the next three years following January 1, 2025, the salary increase rates should factor this in.
- The actuary should consult with the plan sponsor to confirm any anticipated changes in compensation practice following the three-year period.
- The current inflation assumption is 2% with a salary increase assumption of 3.5%. If the compensation practice remains (i.e., based on inflation, productivity growth and merit adjustments), the actuary should review each of these components and to determine the anticipated year-to-year change in compensation.

3. Continued

(ii) **Retirement rates**

- The average age of the plan's active membership is 55 with average service of 25 (average point of 80).
- The change in early retirement provision will have a mixed effect of retention and encourage early retirement. It is expected that members above and below 85 points will react differently. Hence, the provision change should result in a different retirement assumption.
- It is recommended to update the retirement assumption to either a points-based or an age and continuous service-based table. The assumption should consider both a member's age and their service as it is anticipated to impact experience.
- Given the early retirement subsidies, the assumption may need to be revisited in future valuations to better reflect actual plan experience.

(iii) **Termination rates**

- The plan was closed to new entrants years ago, with average age of the plan's active membership of 55 and average service of 25.
- The plan does not offer early retirement benefits for members terminated from the plan under age 55, and early retirement benefits were improved for retirement from active service.
- The current termination rates may no longer be relevant, and termination of membership may reduce enough to no longer be material to the liabilities.

4.

Learning Objectives:

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

Learning Outcomes:

(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

(3f) Calculate actuarially equivalent benefits.

Sources:

Section 3500 of the Practice-Specific Standards for Pension Plans – Pension Commuted Values (Subsection 3570), CIA Educational Note, Aug 2020

CIA Section 3500 of the Practice-Specific Standards for Pension Plans – Pension Commuted Values (other than Subsection 3570), CIA Educational Note, Aug 2020

FR-153-21: FSRA - Limitations on Commuted Value Transfers and Annuity Purchases (DB Pension Plans)

Commentary on Question:

Commentary listed underneath question component.

Solution:

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

Commentary on Question:

Candidates did very well overall on this part of the question. The majority was able to correctly determine the interest rates to use and annualize the rates and then determine the appropriate spreads and rates.

Rates for February termination should reflect a 1 month lag – Use January 2024 rates

1st annualize all of the published rates = (1+rate/2)^2-1

4. Continued

Month	Government of Canada 7-year Bond (V122542)	Government of Canada Long-term Bond (V122544)	Government of Canada 10-year Bond (V122553)
Jan 2024	3.35%	3.30%	1.64%

Month	Mid-Term Provincial Bond Index	Mid-Term Corporate Bond Index	Mid-Term Federal Non-Agency Bond Index
Jan 2024	3.95%	4.96%	3.38%

Month	Long-Term Provincial Bond Index	Long-Term Corporate Bond Index	Long-Term Federal Non-Agency Bond Index
Jan 2024	4.31%	5.12%	3.33%

Calculate the spreads

Provincial Select (PS) = Mid-Term Provincial Bond Index - Mid-Term Federal Non-Agency Bond Index = 3.95% - 3.38% = 0.57%
Corporate Select (CS) = Mid-Term Corporate Bond Index - Mid-Term Federal Non-Agency Bond Index = 4.96% - 3.38% = 1.58%
Provincial Ultimate (PS10) = Long-Term Provincial Bond Index - Long-Term Federal Non-Agency Bond Index = 4.31% - 3.33% = 0.98%
Corporate Ultimate (CS10) = Long-Term Corporate Bond Index - Long-Term Federal Non-Agency Bond Index = 5.12% - 3.33% = 1.80%

Calculate S and S10

S = 2/3 * PS + 1/3 * CS = 0.91%
S10 = 2/3 * PS10 + 1/3 * CS10 = 1.25%

February 2024 raw non-indexed rate Select = Government of Canada 7-year Bond (V122542) + S = 3.35% + 0.91% = 4.26%

February 2024 raw non-indexed rate Ultimate = Government of Canada Long-term Bond (V122544) + (Government of Canada Long-term Bond (V122544) - Government of Canada 7-year Bond (V122542)) x 0.5 + S10 = 3.30% + (3.30% - 3.35%) x 0.5 + 1.25% = 4.52%

February 2024 non-indexed CV rates are 4.30% per year for 10 years and 4.50% per year thereafter.

4. Continued

(b) Calculate the commuted value for the member at their date of termination.

Commentary on Question:
Most candidates were able to successfully calculate the benefit and plan reduction however most did not test versus the actuarial equivalence and may gave grow-in where the member was not entitled to it.

Voluntary Termination – No Grow-in

Calculate the value at each age from 55 to 65. Determine the plan reduction and compare to the actuarial equivalent reduction to ensure that the plan reduction applied is at least as generous as actuarial equivalent.

Age at Termination	44						
	Age at Retirement	Deferral Period	Annuity Factor	Plan Reduction	Actuarial Equivalent Reduction	Reduced Pension Payable	Value
Deferred to 55	55	11	10.7	50%	45%	$9,650	103,250
Deferred to 56	56	12	10.1	45%	42%	$10,223	103,250
Deferred to 57	57	13	9.5	40%	38%	$10,868	103,250
Deferred to 58	58	14	9.0	35%	34%	$11,472	103,250
Deferred to 59	59	15	8.5	30%	31%	$12,250	104,125
Deferred to 60	60	16	8.0	25%	26%	$13,125	105,000
Deferred to 61	61	17	7.5	20%	21%	$14,000	105,000
Deferred to 62	62	18	7.1	15%	17%	$14,875	105,613
Deferred to 63	63	19	6.7	10%	12%	$15,750	105,525
Deferred to 64	64	20	6.3	5%	6%	$16,625	104,738
Deferred to 65	65	21	5.9	0%	0%	$17,500	103,250

The Optimate CV is at age 62 = 105,612.50
The Earliest Unreduced Age is at 65 = 103,250.00

The Commuted Value is $104,431,25 (50% of Optimal and Earliest Unreduced Age)

(c) Describe the considerations in paying out the commuted value to this member.

Commentary on Question:
This part of the question tested Candidates' knowledge of how a Commuted Value payment is impacted where the payments would be limited by the transfer deficiencies. While most candidates were able to touch on some of the considerations applicable, many were not able to focus their considerations around the payment of Commuted Value.

4. Continued

Before CV payment

5% of Market Value of Assets	$125,000.00
Termination Payments (June 2023 to Feb 2024)	$540,000.00
Transfer Ratio	77%
Transfer Deficiencies paid	$124,200.00
CV payments higher than 5% of market value?	**No**

After CV Payment

Upcoming CV	$104,431.25
Portion above transfer ratio	$24,019.19
Total Transfer deficiencies after this payment	$148,219.19
CV payments higher than 5% of market value?	**Yes**

In paying out the Commuted Value to the member the following must be considered:

- given the transfer ratio is less than 100% at the last filed valuation date. There may be limitations on the amount of commuted value that can be transferred from the pension plan.
- the pension plan would only be permitted to pay out 100% of CV for this member if:
    - transfer deficiency payment is made to the pension fund equal to the (1 – transfer ratio) x CV; or
    - the aggregate of all transfer deficiencies for all transfers is less than 5% of plan assets
    - There have been $540,000 lump sum payments made since the last valuation. 5% of market value of assets at last valuation is $125,000. Of the lump sum payments made $124,200 ($540,000 * (1-77%)) represents the transfer deficiencies paid.
    - The CV calculated in b) is $104,431.25, $24,019.19 of this would be transfer deficiency
    - The total deficiencies already paid ($124,200) plus the members' transfer deficiency ($24,019.19) would exceed 5% of the market value of assets.

4. Continued

- The member will receive $80,412.06 (77% of $104,431.25) at February 1, 2024. The remaining $24,019.19 can only be paid:
    - Once a transfer deficiency payment of $24,019.19 has been remitted to the fund; or
    - a new valuation is filed with transfer ratio above 100%; or
    - a new valuation is filed and the payment is made before the transfer deficiencies exceed 5% of the assets based on the new valuation; or
    - 5 years have passed since the date of the initial transfer.

5. 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-145-20: CAPSA Recommendations - Funding of Benefits for Plans Other than Defined Contribution Plans

Ontario PBA

Commentary on Question:

This question was testing the knowledge of the Regulations and the CAPSA Recommendations by asking candidates to compare and contrast the two sources. Candidates generally struggled with the question. Some candidates were able to partially answer (i) and (ii) but generally were not able to clearly describe similarities and differences. Many candidates struggled with (iii) (iv) and (v) with insufficient or incorrect answers.

Solution:

(a) Compare and contrast the CAPSA Recommendations on Funding of Benefits for Plans other than Defined Contribution Plans to the Ontario Pension Benefits Act in respect of the following:

(i) Going concern and solvency funding;

(ii) Amortization periods;

(iii) Side car funds;

(iv) Letters of credit; and

(v) Contribution holidays

Commentary on Question:

Commentary on part (a), if appropriate. Click here to enter text.

5. Continued

(i) Going concern and solvency funding

- Solvency funding rules can be modified/eased where funding on a solvency basis would be required if a plan's funded status falls below a prescribed threshold, only if there are other provisions that safeguard benefit security, such as a strengthened going concern basis. Modifying solvency funding rules can reduce the volatility of cash contribution requirements reducing the financial strain on plan sponsors.
- The going concern basis can be strengthened through the inclusion of a funding margin such as a Provision for Adverse Deviation (PfAD).
- The solvency funding threshold should be determined in consideration of the level of funding margin included in going concern – i.e. lower going concern funding margins would correspond to higher solvency funding thresholds.
- The PfAD should be prescribed and the number of factors to be considered in setting the PfAD should be limited to 3 or 4 factors.
- These recommendations align with the Ontario Pension Benefits Act which has taken the approach of reducing solvency funding requirements while strengthening going concern funding.
- Solvency funding requirements have eased, now only requiring funding up to 85%
- Going concern funding has been strengthened, requiring going deficits and normal cost be funded with the inclusion of a PfAD.
- The PfAD is prescribed based on whether the plan is closed to new members, asset mix, and the plan's discount rate assumption; these factors align with the CAPSA recommendation.

(ii) Amortization periods

- CAPSA recommendations suggest that where solvency funding is modified, the amortization period for funding going concern deficits should be no longer than a 10-year period and each valuation should allow for a fresh start which may contribute towards greater stability in contribution levels while also contributing to benefit security.
- Solvency amortization payments should be funded over a period of no more than five years and could allow for a fresh start each valuation.
- These recommendations align with the Ontario Pension Benefits Act which requires going concern deficits be amortized over 10 years and solvency deficits be amortized over 5 years. Ontario rules are using the maximum amortization period recommended by CAPSA.
- Ontario allows fresh start of deficit amortizations for going concern, but not for solvency deficit amortizations.

5. Continued

(iii) Side car funds

- CAPSA recommends that policymakers consider the creation of a side car fund/banker's clause/funding reserve, which would be a sub-account created to receive and hold specific employer contributions.
- This account can be real or notional, no separate trust / segregation of funds would be necessary. These employer contributions may be recovered by the employer, if certain conditions are satisfied, which would help address the issue of trapped capital and alleviate the asymmetric risk borne on employers to bear responsibility of funding shortfalls with limited ability to recovering excess/surplus assets.
- 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 upwards reward potential for plan sponsor for funding the plan.

(iv) Letters of credit

- CAPSA recommendations suggest that a letter of credit should be available to plan sponsors for plan funding, subject to a specified limit based on the size of the plan's liability.
- Would reduce capital requirements for funding a pension plan without impairing the security of benefits as the fee for issuing a letter of credit to secure solvency payments will be significantly less than contributing the solvency payments
- This recommendation aligns with the Ontario Pension Benefits Act as 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 85% solvency funding threshold).

(v) Contribution Holidays

- CAPSA recommends that legislation may set out the conditions under which a contribution holiday can be taken to recover excess funds. These requirements could include requirements such as the following:
  a. Assets available for contribution holiday be restricted to assets in excess of a prescribed liability or funded status threshold;
  b. Limiting the contribution holiday to a prescribed annual limit, or percentage of available excess assets;
  c. Disclosure of contribution holiday to relevant authority and plan beneficiaries;
  d. Use of contribution holiday be subject to annual confirmation through actuarial filing; and
  e. The Superintendent may order a cessation of the contribution holiday, where circumstances warrant.

5. Continued

- These recommendations align with the Ontario Pension Benefits Act, which permits use of surplus for contribution holidays if: no amortization payments are required; the plan is fully funded on a going concern basis (including the PfAD); and the plan's transfer ratio (solvency ratio for public sector plans) is not less than 105%.
- Ontario requires disclosure of a contribution holiday to the regulator and to plan beneficiaries, and use of surplus is subject to annual confirmation through an actuarial filing.

6. 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:

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

(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:

A well-prepared candidate will be able to calculate unfunded liability and normal cost using the Entry Age Normal cost method. They will also be able to reconcile experience gains/losses in respect of these items.

Solution:

(a) Calculate the employer normal cost and the unfunded actuarial liability as at January 1, 2024.

Commentary on Question:

Candidates struggled with parts (a) and (b) of this question. Most candidates were able to calculate the liability of the inactive members but struggled with the active members. One common mistake was that candidates did not subtract the member contributions when providing the employer normal cost.

The calculation can be found in the Excel spreadsheet.

(b) Calculate the unfunded actuarial liability as at January 1, 2025.

The calculation can be found in the Excel spreadsheet.

(c) Calculate the gains and losses by source for 2024.

Commentary on Question:

Generally, candidates that attempted this question did well. Candidates were not penalized for errors in previous calculations. They were able to identify the gains and losses by source.

The calculation can be found in the Excel spreadsheet.

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.

(3a) Differentiate between the various purposes for valuing pension plans:
- (i) Funding
- (ii) Solvency
- (iii) Termination/wind-up/conversion

Sources:

FR-121-21: Assumptions for Hypothetical Wind-Up and Solvency Valuations with Effective Dates between December 31, 2019, and December 30, 2020

FR-151-21: CAPSA Guidance Solvency or Hypothetical Wind-up Liabilities Based on Actual Life Insurance Company Annuity Quotation

ASOP 35: Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations

Selection of Mortality Assumptions for Pension Plan Actuarial Valuations, CIA Educational Note, Dec 2017

Expenses in Funding Valuations for Pension Plans, CIA Revised Educational Note, Sep 2014

Reflecting Increasing Maximum Pensions Under the Income Tax Act in Solvency, Hypothetical Wind-up and Wind-up Valuations, CIA Revised Educational Note, Jan 2015

Task Force Report on Mortality Improvement, CIA Final Report, Sep 2017

Guidance for Assumptions for Hypothetical Wind-Up and Solvency Valuations Update – Effective September 30, 2022, and Applicable to Valuations with Effective Dates Between September 30, 2022, and December 30, 2022, CIA Educational Noe Supplement

Calculation of Incremental Cost on a Hypothetical Wind-Up or Solvency Basis, CIA Educational Note, Dec 2010

7. Continued

Commentary on Question:
Generally, candidates did not perform well on this question. Most candidates did not provide enough answers to obtain full credit.

Solution:
(a) Describe the considerations for setting the assumptions required to calculate the solvency incremental cost (SIC).

- Financial assumptions would be consistent with the solvency valuation at time 0.
- Demographic assumptions would typically be consistent with the going-concern valuation at time 0, unless there is an expectation that the experience would be different from the going-concern assumptions and in that case, alternative assumptions can be used between time 0 and time t.
  - Benefit Payments: Expected pension payments and lump sum benefits between time 0 and time t should be reflected in the SIC.
  - Decrements: Expected terminations, retirements, disabilities, and deaths between time 0 and time t should be reflected in the SIC.
- New Entrants:
  - If the plan is open, assumptions should be made for the number of new entrants between time 0 and time t and demographic assumptions during that period.
  - If the plan is closed, assumptions are not required.
- Additional considerations:
  - Pending amendments: The incremental cost would include the effect of a pending amendment to the pension plan consistent with the *Standards of Practice*.
  - Benefit Improvements: Expected changes between time 0 and time t in benefits provided should be reflected in the SIC (e.g. scheduled increase in the monthly pensions of retired members).
  - Expected changes in benefits: The incremental cost would allow for the expected changes in benefits due to factors such as members becoming eligible for early retirement "grow-in" benefits, or members becoming eligible for unreduced or subsidized early retirement benefits.
  - Interest Rate(s):
    - Where the interest rate(s) that would be used to value the projected hypothetical wind-up or solvency liability for a particular member at time t would be different from the interest rate(s) used at time 0 (e.g., because the probability of method of settlement is expected to be different at time t than it was at time 0, or because smoothed interest rates are being used), the actuary would account for the change in interest rates.

7. Continued

- In relation to the smoothing of interest rates, it would be appropriate to assume that the unsmoothed interest rates at time t remain at the same levels applicable at time 0.

(b) Describe the considerations for setting the solvency assumptions for benefits assumed to be settled by purchase of annuities for:

(i) the group included in the annuity quote; and

(ii) active members

(i) group included in the annuity quote;

- The actuary would consider any relevant annuity bona fide quotes for the plan or related plans, such as the recent quote received in October 2024.
- If relying on a bona fide annuity quote for the valuation, the actuary would consider factors such as the following:
  - The length of time between the valuation date and the quotation date.
  - Any changes in market conditions between the valuation date and the quotation date, which may include factors specific to the insurer providing the bona fide annuity quote.
  - Any changes in the demographics of the annuity group between the valuation date and the quotation date.

(ii) active members

- Annuity purchase discount rates
  - The annuity purchase discount rates are to be determined by reference to the CIA guidance (which is updated quarterly)
  - The CIA guidance suggests that annuity purchase discount rates can be based on a spread over long-term government of Canada bond yields.
  - The annuity purchase discount rates would vary depending on the duration of the active group.
    - For this high duration group, a reasonable approach would be to decrease the spread by approximately 10 basis points for each one-year increase in duration above the duration of the high duration block of the CIA guidance (11.7 based on latest guidance in 2024). Other approaches may also be reasonable.
  - The annuity purchase discount rates differ for non-indexed and indexed pensions.

7. Continued

- Mortality assumption for Annuity Purchase
  - The mortality table is not prescribed and in the case of an actual annuity purchase, it would be set based on the selected annuity purchase provider's implied mortality assumption.
  - The CIA releases guidance on the mortality table to use for annuity purchase, which is the 2014 Combined Canadian Pensioners' Mortality Table (CPM2014) with the CPM Improvement Scale B (CPM-B) with no mortality adjustments (CPM2014Proj) in the latest guidance.
  - The actuary should consider making an adjustment to the regular annuity purchase assumptions where there is demonstrated substandard or super-standard mortality or where an insurer might be expected to assume so. In such cases, the actuary would be expected to make an adjustment to the mortality assumption in a manner consistent with the underlying annuity purchase basis.
- Increases in average wage index
  - The actuary should consider whether an assumption regarding the average wage index is required for the valuation. It is often used to project YMPE or ITA maximum pension limits beyond the valuation date.
  - If the plan terms require YMPE projections or the ITA maximum pension limits to be determined at the date of commencement, then using an average wage index assumption for the solvency assumption should be included.
  - The increase in the average wage index is prescribed to increase at rates that are one percentage point higher than the rates of increase in the Consumer Price Index, which is also a prescribed rate on a solvency basis.
- Wind-up expenses
  - The following is a non-exhaustive list of expenses that the actuary would consider:
    - Actuarial and consulting fees, including the wind-up report(s);
    - Fees imposed by a regulatory authority;
    - Legal fees;
    - Costs related to the settlement of benefits (e.g., commissions or fees to buy annuities);
    - Administration fees (e.g., preparing and sending option forms to members, answering queries, processing requests from members);
    - Custodial and investment management fees; and
    - Fees linked to the appointment of an administrator in the case of a bankrupt sponsor.
  - The expected length of the wind-up process should be considered.
  - The actuary need not consider legal and other expenses related to the resolution of surplus or deficit issues.
  - The actuary may rely on historical data of other plan terminations, making allowance for the different size and complexity of the plans.

7. Continued

- Additional situations that may result in uncertainty regarding expenses include the cost of settling annuities for a very large pension plan or in situations for some public sector pension plans, benefit entitlements on wind-up are not defined.