RET FRC Model Solutions
Fall 2018

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.

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

(7f) Recognize situations and actions that violate or compromise Standards or Professional Conduct Guidelines.

Sources:

ASOP 23, CSOP 1530, 1610, 1640

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Identify potentially incorrect, missing or incomplete data required to calculate the liabilities.

Commentary on Question:

Candidates generally answered this part well, listing most of the items that were missing or incomplete to get full credit.

1. Continued

For active members, the following items are missing or incorrect:

1. Missing credited service for all members
2. Missing salary rate for a two of active members
3. Incorrect date of birth for an active member as the date of birth is in the future

For retirees/beneficiaries, the following items are missing or incomplete:

1. Missing annuity form of pension for all retirees and beneficiaries
2. Missing information required to value pensions with a guarantee period (e.g., date of retirement or date of birth or age at retirement.)
3. Missing spouse age for one retiree (if the member has a JS form)
4. Monthly pension appears for two retirees appears high compared to others with similar service at retirement. Need to verify if annual/monthly pension provided.

(b) Describe how you would proceed, taking into consideration the standards of practice regarding the sufficiency and reliability of the data.

Commentary on Question:
The question was answered well by some candidates, but most candidates did not explain all the items required to earn full credit. Many candidates did not state that the actuary has an option to refuse the assignment if the data is not adequate for the assignment. The question also required details on what assumptions/adjustments to apply to the data before analysis in the scenario where the assignment is accepted. Some candidates did not detail the disclosure requirements if adjustments/assumptions were. applied to the data.

The current data is not of acceptable quality to perform the valuation. There are two options on how to proceed:

- Refuse to complete the assignment given the data is inadequate to perform the work for the purpose of the valuation.
- Make adjustments or apply assumptions to the data, based on judgment, before analysis is performed.
-

If the assignment is accepted , the following adjustments could be made to the data:

- Assume credited service to be equal to the average credited service from ABC Plan, or an estimate based on the age/service table from a prior valuation.
- Proxy missing salary rate using the best average earnings with adjustments.
- Correct date of birth for one active member by using the date from a prior valuation or estimate based on the average date of birth.

1. Continued

- Assume the incorrect date of birth is 07/05/1969 instead of 07/05/2069 or assume the date of birth is the average of the dates of birth for the other active members.
- Assume each retiree's and beneficiaries' form of pension to be the normal form under the ABC plan, reflecting the death benefit in the case of beneficiaries.
- Estimate missing spouse age based on the retirees age (e.g. same as retiree or +- years based on the valuation assumption).
- If there is a bridge benefit it could be estimated using average plan salary / YMPE and service provided For the two retirees with high pension amounts of $27,830 and $25,600, assume that such amounts are annual amounts instead of monthly and convert such amounts to a monthly pension by dividing by 12.

Disclosure requirements:

- Disclose any significant adjustments or assumptions applied to the data made by the actuary to allow analysis to be performed.
- Given the uncertainty in the data, the resulting liabilities could be materially different from the results that would have been produced had correct data been provided and used to determine the liabilities. In addition, if the data adjustments were made to create a bias in the resulting liabilities (e.g., conservative), then disclose the potential existence of the bias.
- If possible, disclose the nature and potential magnitude of the uncertainty in the liabilities.
- Adjust the resulting liabilities to compensate for the data deficiencies (e.g. disclose a range of reasonable estimates that the liabilities based on correct data is expected to be within) and disclose such adjustments to the liabilities.

2. Learning Objectives:

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

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

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.

(7f) Recognize situations and actions that violate or compromise Standards or Professional Conduct Guidelines.

Sources:

ASOP 27, ASOP 35, CIA Code of Conduct, CIA Standards of Practice (1000 – 1800), CIA Standards of Practice (3200)

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Describe the process for setting the following going concern assumptions for the valuation of the Pension Plan for Employees of DPC Limited:

(i) Inflation

(ii) Salary scale

(iii) Retirement scale for active members

(iv) Proportion with spouse and age difference

Commentary on Question:

Most candidates did well on this part of the question although some stuggled to include enough information to receive full grading points. Grading points were not assigned for assumption setting or critiquing the assumptions. Describing the process for setting each assumption based on ASOP would provide candidates with full marks.

2. Continued

(i) *Inflation Assumption*

- Consider whether to use an approach that treats inflation as an explicit component of another economic assumption or as an independent assumption.
- Review appropriate inflation data including consumer price indices, the implicit price deflator, forecasts of inflation, yields on government securities of various maturities and yields on nominal and inflation-indexed debt
- Decide whether to use a select and ultimate rate or a single inflation rate

(ii) *Salary Scale Assumption*

- Generally a participant's compensation will increase over the long term in accordance with inflation, productivity growth and merit adjustments.
- Determine whether the assumption will be a single rate, vary by age and service, vary over future years (or select/ultimate rates) or vary by employee group
- The actuary should review the available compensation data including sponsor's current compensation practice and any anticipated changes in this practice, Current compensation distributions by age or service, historical compensation increases and practices, industry or geographic trends, and historical national wage increases and productivity growth.
- Perform an experience study and review past gains & losses.
- When using any company specific data ensure the credibility of the data. As this is a large plan there would likely be credible or partially credible data.
- Actuary may also consider factors specific to each measurement including Compensation Practice, Competitive Factors, and Compensation volatility.

(iii) *Retirement Scale for Active Members*

- The actuary should analyze whether this assumption is needed given the characteristics of the plan e.g., subsidies for early retirement and bridge benefits
- The assumption should be selected from the relevant assumption universe and the significance of the assumption should be determined.
- Consideration should be given to how the assumption is expressed. The assumption may be reflected as a single age or as one or more tables given the availability data or information relevant to the assumption being selected, size of covered population, degree to which a parameter is anticipated to affect experience.
- Perform an experience study and review past gains & losses.

2. Continued

- The actuary should take into account factors including
  - Employer specific or job-related factors
  - The plan design
  - The design of and date of anticipate payment from social insurance programs
  - The availability of other employer sponsored postretirement benefit programs
- The actuary is to select a reasonable assumption by ensuring it is appropriate for the purpose of the measurement, it reflects the actuary's professional judgement, it takes into account historical and current demographics data relevant at the measurement date, reflects actuary's best estimate of future experience and has no significant bias.
- This process does not need to be set at each measurement date provided that in the actuary's professional judgement the assumption continues to be reasonable.

(iv) *Proportion with spouse at retirement*

- The actuary should analyze whether this assumption is needed given the characteristics of the plan (e.g., subsidies for married members such as enhanced normal form of pension and pre-retirement death benefits).
- The assumption should be selected from the relevant assumption universe and the significance of the assumption should be determined.
- The actuary should determine whether marriage affects the payment of benefits, the amount or type of benefits or the continuation of benefit payments.
- If a married assumption is used it may also be necessary to make an assumption regarding beneficiary ages.
- Perform an experience study and review past gains & losses.
- This process does not need to be set at each measurement date provided that in the actuary's professional judgement the assumption continues to be reasonable.

(b) The CFO of DPC asks you to change the retirement assumption to age 65 for all members.

Assess the appropriateness of changing the retirement assumption, taking into consideration professional standards.

2. Continued

Commentary on Question:
Candidates who did well on this question were able to relate how the CFO's request would violate actuarial standards and for what reasons. Candidates who only stated which standards would apply without relating it back to the CFO's request received only part marks.

An assumed retirement age of 65 for all members is not expected to be best estimate for the following reasons:

- There are two plan provisions that would encourage members to retire early:
    1) Accrued benefit is reduced by 0.25% per month that early retirement precedes age 62 for active participants. They are able to go unreduced at age 62.
    2) Bridge Benefit $20 per month times all years of service for retirements from active status after age 55.
- The current assumption of assuming 50% of actives leave at 55 and remainder at 62 (or attained age if later) may be a better estimate given the early retirement subsidies (unreduced pension and bridge benefit)
- DPC is located in Canada where government pension programs (CPP and OAS) can commence as early as age 60.
- Given the size of DPC's active membership, a single age retirement assumption does not reflect possible demographic experience of the plan that may yield a biased assumption.
- The assumption as proposed by the CFO assumes members will continue employment past their pension unreduced date and will forego bridge benefits. In absence of justification, this cannot be considered a best estimate of expected future experience**.**
- Using this assumption as proposed, would not be following the CSOP 3230.01 which is against the CIA Code of Conduct (Standards of Practice – Rule 3).
- The assumption change is not reasonable or appropriate and under the CIA code of conduct it is the professional responsibility of the member to not be associated with anything which the members know or shown is false or misleading – i.e. using an unreasonable assumption (Professional Integrity - Rule 1 (1-2))
- The appropriate model or data assumption for a matter should be the best estimate assumption of that matter and taking account of the circumstances of the case, past experience data, the relationship of past to expected future experience, anti-selection, the relationship among matters. Using the proposed assumption does not do this (CIA standards of practice - 1730 Appropriate Assumptions (1730.01)

3. Learning Objectives:

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

Learning Outcomes:

(6a) Evaluate retirement funding alternatives for the plan sponsor, shareholders and the participants, and , for public pension plans, taxpayers.

(6b) Evaluate funding restrictions imposed by regulations.

Sources:

FR-135-17, FR-136-17, FR-137-17 and Quebec: Final regulation on the stabilization provision for private section pension plans

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Determine the minimum funding requirements for 2019.

Show all work.

Commentary on Question:

Candidates generally did well on part a.

Calculate Stabilization Provision

Duration of assets: 38.7M/86.0M * 7 years = duration of 3.15 years
Asset duration/liability duration = 3.15 years / 12 years = 26.25%

The variable income securities = 47.3/86.0 = 55%, so the stabilization provision is between 14 and 16

The stabilization provision = 16 - (26.25-25)/(50-25)*(16-14) =15.9%.

Apply SP to NC

Normal cost to fund is: 2.5M * 1.159 = $2,897,500

Calculate payments using appropriate amortization and going-concern position

Funding target = (1+ 15.9% - 5%) * going concern liability = 94,265,000
Deficit = funding target – assets = 8,265,000

Deficit to be amortized over 12 years @ 6%.

3. Continued

Annual amount payable monthly = 8,265,000/8.65 = 955,491

Determine contribution requirements for 2019
$2,897,500 + $955,491 = $3,852,991

(b) Calculate the minimum contribution requirements for the last six months of 2019 following the plan amendment.

Show all work.

Commentary on Question:
Very few candidates recognized that the improvement needed to be funded over 5 years and the roll forward seemed to be a challenge.

Asset roll forward to June 30:

86,000,000(1+6%/2) - 6*250,000*(1+6%/4) + 3,852,991/2*(1+6%/4) = 89,012,893*

Actives roll forward

*(30,000,000 + 2,500,000 / 2) * (1 + 6%/2) = 32,187,500*
Deferreds roll forward
5,000,000 * (1+6%/2) = 5,150,000

Retirees roll forward:
50,000,000 *(1+6%/2) - 6*2,500,000 * (1+6%/4) = 49,977,500

Total AL: $87,315,000
Surplus: $1,668,996

Contribution:
Normal cost is same as calculated in A), but with 1/2 year interest:
= 2,500,000 * 1.03 = 2,575,000

Stabilization provision target does not change from A), so 15.9%
2,575,000 * 1.159 = $2,984,425

Stabilization deficit to amortize:
(1+15.9% - 5%) * 87,315,000 - 88,983,996 = $7,848,340

Amortization over 11.5 years (since amortization period decreases to 10 gradually) = 8.40

Amortization payment: $934,199 = 7,848,340 / 8.40

3. Continued

Calculate cost of improvement at June 30 and related funding schedule:
Cost of improvement = 2% * 49,977,500 = 999,550

Amortize over 5 years given financial position is higher than 90% on going-concern basis.

Annual amount payable monthly = (1 + 15.9%) * 999,550/4.35 = 266,317

Determine contributions for last 6 months of 2019
(2,984,425 + 934,199 + 266,317)/2 = 4,184,941/2 = 2,092,471

(c) Explain in words how the minimum contribution requirements would change due to the plan amendment if the Plan were 70% funded on a going concern basis.

Commentary on Question:
Almost no candidates got points on this question. A handful recognized the need for immediate funding.

Different treatment if going-concern is over or under 90%
If the plan was funded below 90%, the entire cost of the improvement would need to be funded immediately instead of being amortized over 5 years.

4. 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:

(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:

FR-121-17: Assumptions for Hypothetical Wind-Up and Solvency Valuations with Effective Dates between December 31, 2017, and December 30, 2018

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

Selecting and Documenting Mortality Assumptions, American Academy of Actuaries

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

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Describe the considerations in setting the base mortality table assumption for the going-concern valuation of a defined benefit pension plan.

Commentary on Question:

Candidates were expected to describe the general considerations that apply to the base mortality table. No points were awarded for simply listing items without explanations. No points were awarded for describing mortality improvements. There were lots of items to consider but candidates were not expected to cover all of them to get full marks. Most candidates were able to describe general considerations regarding experience, credibility, plan characteristics, but successful candidates were also able to describe the impact of the factors (collar, industry, pension size, size of plan) on the mortality for the group.

- The actuary would apply judgment in selecting a best estimate mortality assumption for the plan under review. For the base mortality table at the valuation date, we are looking at the best estimate of the current rates of mortality for the plan.

4. Continued

- The first step in developing an appropriate best estimate mortality assumption is to determine the best estimate of the current levels of mortality
  - Consider plan's actual mortality experience
  - Consider credibility of that experience
  - Consider experience of similar plans
  - Consider experience of members with similar longevity characteristics
  - Look at published tables
  - If the best estimate of current levels of mortality is derived from an analysis of actual experience, appropriate adjustments would be made to project the mortality rates to the valuation date
- Consider whether any adjustments for plan characteristics are needed i.e. an adjustment for blue collar or a private sector adjustment.
- Other factors being equal, rates of mortality are greater
  - For former blue collar workers than for former white collar workers;
  - For former private sector workers than for former public sector workers; and
  - For pensioners receiving small pensions than for pensioners receiving large pensions.
- Caution would be used in deriving adjustments for variations in more than one plan characteristic at the same time, as the combined effect may overstate or understate the actual relationship
- Adjustments to the base mortality table should only be performed when the plan has a partially to fully credible experience.
- In using experience studies to establish tables for actuarial valuation purposes, determining results weighted on benefit amount (or liability), rather than on number of lives, generally yields more appropriate results
- Published mortality studies provide substantial information to assist the actuary in determining the best estimate of current levels of mortality, particularly if plan experience is not credible.
- In general, it would normally be inappropriate to use mortality tables derived from:
  - General population, as mortality experience for general population differs significantly from the subset of the population that participates in pension plans. General population mortality tends to be higher than under pension plans Individual annuitant data, as mortality experience under individual annuity contracts tends to be lower than under pension plans due to anti-selection by the purchasers of individual annuities

4. Continued

- The level of credibility to lend to a plan's experience depends on the plan size
  - It is preferable to reflect actual credible experience of the plan under review, rather than to rely solely on published mortality studies, when sufficient plan experience is available
  - Very large plans (10,000-plus retirees):
    - preparing plan-specific mortality tables; or
    - mortality tables may be customized to reflect the experience of the specific plan
  - Mid-size plans (1,000 to 10,000 retirees):
    - Unlikely the mortality experience would be assessed to be fully statistically credible
    - Studies at this level may be used, after accounting for the credibility of the mortality experience, to select appropriate published mortality tables or develop broad adjustments to such tables (e.g., 90%or 110% of the standard table rates)
  - Small plans (100+ retirees)
    - Number of retirees is insufficient to conduct a credible mortality experience study
    - Useful to examine the experience gain/loss related to pensioner mortality arising from past actuarial valuations to validate the mortality assumption and any strong trend in mortality experience
  - Very small plans
    - An appropriate published mortality table would be selected, adjusting for the characteristics of the plan
- An assumption is reasonable if it has the following characteristics:
  - It is appropriate for the purpose of the measurement;
  - It reflects the actuary's professional judgment;
  - It takes into account historical and current demographic data that is relevant as of the measurement date; and
  - It has no significant bias
- The actuary should take into account the balance between refined demographic assumptions and materiality

(b) Describe the considerations in setting the annuity purchase mortality assumption for the solvency valuation in accordance with the CIA Educational Note on Assumptions for Hypothetical Wind-up and Solvency Valuations for each of the following separate groups:

(i) 200 retired professors

(ii) 5,000 retired coal miners

(iii) 20,000 retired office workers

4. Continued

Commentary on Question:
Candidates were expected to describe considerations specific to the CIA annuity proxy mortality table assumption applicable to the groups listed. No points were awarded for simply listing items without explanations. There were lots of items to consider but candidates were not expected to cover all of them to get full marks. Candidates were expected to look at this question from an annuity purchase point of view, thinking of how the insurer would price them. Insurer would price the group with a higher mortality for some characteristics and lower for other. Candidates were expected to identify the characteristics, based on credibility of the plan, and comment how the insurance companies would quote the group. Most candidates identified the characteristics but didn't cover the insurer's considerations.

<u>Applicable to all three groups</u>

- Annuity Proxy recommends using the CPM2014 base mortality table
- Insurers are increasingly considering occupational and demographic factors in establishing mortality assumptions for the pricing basis of specific group annuities.
- The factors an insurer may consider are
  - the credibility of experience,
  - the experience of similar plans,
  - published mortality studies,
  - plan provisions that expose the group to anti-selection or tail risk, and
  - possible adjustments based on characteristics such as collar type, industry, and pension size.
- An adjustment to regular annuity purchase assumptions would be expected where an insurer might be expected to assume significantly shorter or longer-than-average pension plan longevity
- The actuary would be expected to make an adjustment to the mortality assumption in a manner consistent with the underlying annuity purchase basis

(i) Considerations specific to 200 retired professors (Small Group)

- Consider the size of the retiree group. Given that it is a small number their mortality experience would not be credible.
- Consider industry specific mortality studies (e.g., post-secondary education)
- Given the above, we would expect that insurers may consider reflecting lower mortality rates relative to CPM2014.
- Although plan experience is not credible, we can expect insurers to consider credible industry specific mortality studies to make adjustments to the mortality table.
- For the annuity proxy assumption setting, could consider changing the solvency base mortality table assumption from CPM2014 to CPM2014Publ or apply a multiplier less than 100% to the CPM2014 table (reflecting input from industry specific studies or judgment).

4. Continued

(ii) Considerations specific to 5,000 retired coal miners (Large group)

- Plan mortality experience may be fully or partially credible
- Prepare experience studies to validate experience and determine adjustments to base table
- May also consider mining industry specific mortality studies.
- Given the above, we would expect that insurers may consider reflecting higher mortality rates relative to CPM2014.
- For the annuity proxy assumption setting, could consider changing the solvency base mortality table assumption from CPM2014 to CPM2014Priv or apply a multiplier greater than 100% to the CPM2014 table (reflecting the credibility of the experience study, input from industry specific studies and judgment).

(iii) Considerations specific to 20,000 retired office workers (Very large size group)

- There should be a lot of mortality experience, and therefore be very credible
- 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.
- Given the above, we would expect that insurers may consider reflecting the plan specific mortality experience relative to CPM2014.
- However, due to capacity constraints within the Canadian group annuity market, pension plans with very large liabilities may have difficulty purchasing a single group annuity to settle their immediate and deferred pension liabilities, which may affect pricing of the block.
- For the annuity proxy assumption setting, could consider changing the solvency base mortality table assumption from CPM2014 to a table that reflects the experience of the plan and judgment.
- Could consider changing the solvency base mortality table assumption to the CPM2014 for public sector which would likely be closer to the mortality the insurers will use for pricing.

5. Learning Objectives:

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

Learning Outcomes:

(5f) The candidate will be able to describe and apply regulation pertaining to plan merger or spin-off.

(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.

Sources:

FR-129-16 Pension Asset Transfers made easier, Pension Benefits and Executive Compensation, February 2014

FR-131-16 FSCO Q&A on Asset Transfers for Plan Administrators and Actuaries

FR-123-17 Pension Benefits Act–Ontario Regulation 310/13

Commentary on Question:

This question was testing candidates' knowledge on the rules for a plan merger in Ontario in accordance with section 81 of the Pension Benefits Act of Ontario (PBA). Candidates were expected to know the conditions for the merger to be accepted by the Superintendent and be able to apply them to calculate the required contribution. Unsuccessful candidates did not know state the requirements or were not able to apply them correctly for the calculations.

Solution:

(a) List the funding requirements contained in the Ontario Asset Transfer Regulation that must be satisfied for the Superintendent to consent to this merger.

Commentary on Question:

Some candidates thought the first requirement was to have solvency ratio higher than 85%, which is in accordance with section 80 of the PBA, although this question was testing section 81 of the PBA.

5. Continued

A transfer of assets would not be authorized unless, after the transfer, at least one of the following conditions would be satisfied:

1. The solvency ratio of the successor pension plan is at least 1.0; or
2. The solvency ratio of the successor pension plan is,
   i. No more than 0.05 below the solvency ratio of the original pension plan before the transfer, and
   ii. No more than 0.05 below the solvency ratio of the successor pension plan before the transfer.

(b) Calculate the lump sum amount that Company XYZ needs to contribute to Plan B, the successor plan, in order for the Superintendent to consent to the merger.

Show all work.

Commentary on Question:
Commentary on part (b), if appropriate. Click here to enter text.

	Before Merger		**After Merger**
(in $millions)	**Plan A**	**Plan B**	**Plan B (successor plan)**
Market value of assets	$250	$500	$750 (250+500)
Going concern liabilities	$200	$600	$800 (200+600)
Solvency liabilities	$320	$750	$1070 (320+750)
Solvency ratio	0.7813 (=250/320)	0.6667 (=500/750)	0.7009 (=750/1070)
Minimum solvency ratio required after the transfer (0.05 of solvency ratio)	0.7313	0.6167	n/a

1. The solvency ratio of the successor pension plan is at least 1.0 (0.7009 < 1.0 => Not met)
   OR
2. The solvency ratio of the successor pension plan is,
   i. No more than 0.05 below the solvency ratio of the original pension plan before the transfer, and (0.7009 < 0.7313 => not met)
   ii. No more than 0.05 below the solvency ratio of the successor pension plan before the transfer. (0.7009 > 0.6167 => met)

Based on the current solvency ratios of Plan A and Plan B before the asset transfer, the merger would not be accepted and the transfer of assets would not be authorized given the conditions (after the merger) outlined above were not met.

5. Continued

In order to get the superintendent's consent for the merger and asset transfer, the company must remit a one-time lump sum contribution of $32.44 million to Plan B such that one of the above conditions would be met.

After the remittance of $32.44 million to Plan B
(6 points if candidate can demonstrate how to calculate the $32.44M such that the revised solvency ratio met the required conditions)

	Before Merger		After Merger
(in $millions)	**Plan A**	**Plan B**	**Plan B (successor plan)**
Market value of assets	$250	$532.44	$782.44 (250+532.44)
Going concern liabilities	$200	$600	$800 (200+600)
Solvency liabilities	$320	$750	$1070 (320+750)
Solvency ratio	0.7813 (=250/320)	0.7099 (=532.44/750)	0.7313 (=782.44/1070)
Minimum solvency ratio required after the transfer (0.05 of solvency ratio)	0.7313	0.6599	

- The solvency ratio of the successor pension plan is at least 1.0 (0.7313 < 1.0 => Not met)

  OR
- The solvency ratio of the successor pension plan is,
  i. No more than 0.05 below the solvency ratio of the original pension plan before the transfer, and (solvency ratio of merged plan is at least 0.7313 => met)

No more than 0.05 below the solvency ratio of the successor pension plan before the transfer. (0.7313 > 0.6167 => met)

(c) Describe the conditions that must be met with respect to members' benefits in the successor plan after the merger.

Commentary on Question:
Successful candidates were able to describe at least two conditions that would need to be met in respect to the member's benefits.

5. Continued

- DB assets must be used to provide DB benefits under the successor plan
- The commuted value of the accrued benefits (to be provided under the successor plan) cannot be less than the commuted value of the benefits under the original plan determined as of the effective date of the asset transfer (adjusted for any payments from the original plan to a prescribed retirement savings arrangement or directly to the members).
- The amount of accrued basic pension benefits under the successor plan must at least be equal to 85% of the accrued basic pension benefits under the original plan.
- The transferred member is entitled in the merged (or successor) plan for the period of membership in the original plan for purposes of determining eligibility of membership and benefit entitlements in the successor plans.

6. Learning Objectives:

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

Learning Outcomes:

(5e) The candidate will be able to describe and apply regulation pertaining to plan conversion.

Sources:

Ontario Pension Benefit Aact
FSCO policy on conversion of a plan from defined benefit to defined contribution
FR-111-13 OSFI Guidelines for Converting DB to DC

Commentary on Question:

The solution to the question should compare and contrast the requirements under the two jurisdictions for converting a DB to a DC plan. Most candidates listed some of the rules, many but did not compare the regulations under the two jurisdictions.

Solution:

Compare and contrast the requirements of the Office of the Superintendent of Financial Institutions (OSFI) and the Financial Services Commission of Ontario (FSCO) for converting a defined benefit pension plan to a defined contribution pension plan for all service with respect to the following:

(i) Minimum value of converted benefits

(ii) Ancillary benefits

(iii) Salary projection

(iv) Application of the 50% cost-sharing rule

(v) Funding shortfalls

(vi) Options to members

6. Continued

(i) Minimum value of converted benefits

OSFI and FSCO have similar requirements

- The minimum value of converted benefits must equal member's transfer value based on CIA recommendation and calculated as if terminated on conversion and the value of ancillary benefits (bridge / early retirement) must be taken into account

(ii) Ancillary benefits

OSFI and FSCO have similar requirements if members met all eligibility requirements under the plan

- the value of the ancillary benefits must be taken into account
- this ensures that the conversion does not reduce benefits already earned up to the date of the conversion

(iii) Salary projection

OSFI and FSCO have similar requirements in that if the plan benefits are based on final average or best average earnings

- The conversion value must be calculated with project salaries.
- Reasonable termination rates can be used as not all members will reach NRD

One difference is that FSCO allows a plan to be amended to freeze salary, but must provide notice as part of the amendment

(iv) Application of the 50% cost-sharing rule

OSFI and FSCO have similar requirements in that if member's contribution plus interest to the plan exceeds 50% of the CV at the date of the conversion, the amount must be added to the conversion amount.

Differences are:

- FSCO: apply to post 1986 benefits (unless specify to include pre 87 benefits)
- OSFI: apply to total benefits

(v) Funding shortfalls

- FSCO
  - The sponsor must contribute the shortfall to the plan in a lump sum.
  - Lump sum, if necessary, to ensure the solvency ratio for the DB plan after the conversion is not less than that before the conversion

6. Continued

- OSFI
  - if there is a shortfall, if plan is not fully funded, plan can be converted and shortfall can be addressed in one of two ways:
    1. for each member, initiate full DC value and make up deficiency from corporate sources
    2. Transfers into DC account limited to value of member's entitlement multiplied by ratio of the plan asset to liability. the employer sets up amortization schedule to fund deficit within 5 years, reporting special payments to OSFI as they are made
  - if there are DB benefits remaining, solvency ratio of DB must be at least equal to the plan's solvency ratio prior to conversion

(vi) Options to members

OSFI and FSCO have similar requirements

- Give option to members to preserve accrued benefit in DB plan
  - through an annuity purchase
  - Maintain a pension fund
- Or provide option to convert benefit into a defined contribution form

7. 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.

(5h) The candidate will be able to describe and apply regulation pertaining to members' rights.

Sources:

FR -114-17, FR – 115-17, FSCO Policy – application for surplus on full wind-up of a pension plan

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Calculate the funded position of the plan.

Show all work.

Commentary on Question:

The key concepts tested in this question are grow-in and optimal age. It was generally well done, although some candidates incorrectly used projected service to calculate accrued benefits when the projected service should only be used to determine eligibility.

Grow-in applies to wind-up in Ontario

The active member would have had 15 years of service in a year
and become eligible for the enhanced early retirement benefit

Optimal age is age 61 with 15 years of service

Accrued benefit at normal retirement date = 1.5% * 14 * 90,000 = 18,900

Active liability = 18,900 * 17.1= 323,190

Funded position: Surplus = $21,000,000 – (323,190 + 20,000,000) = 676,810
(Or funded ratio = 21,000,000/20,323,190 = 103.33%)

7. Continued

(b) Describe the process to be followed in order to distribute surplus to an employer on plan wind-up.

Commentary on Question:
*This is a recall question, but many candidates did not convey the material in their res*ponses (*FSCO Policy – application for surplus on full wind-up of a pension plan). The key words are "surplus to an employer", but many candidates ended up describing the wind-up process in general.*

- Employer must apply and no payment may be made without the consent of Superintendent of Financial Services
- The employer must satisfy the Superintendent that the plan provides for the payment of surplus to the employer on wind up
- Otherwise if a pension plan does not provide for payment of surplus to the employer, surplus accrued after December 31, 1986 shall be distributed proportionately on the wind up of the pension plan among members, former members, retired members and other persons entitled to payments
- Surplus Notice Requirement: a full and fair notice should be transmitted to the affected members, former members and other affected persons
- Obtained the number of Written Agreements required from affected members and others
- The Superintendent is satisfied, based on reports provided with the employer's application for payment of the surplus, that the pension plan has a surplus
- provision has been made for the payment of all liabilities of the pension plan as calculated for purposes of the termination of the pension plan

(c) Calculate the commuted value of benefits for the active member if the plan does not wind-up and the member terminates employment voluntarily on January 1, 2018.

Show all work.

Commentary on Question:
Most candidates applied the correct early retirement reduction, but not many were aware that best age calculation still applies.

Since the termination is voluntary, grow-in does not apply here. And since the member does not have 15 years of service, he is subject to the 6% early retirement reduction from age 65.

7. Continued

Best age calculation still applies – but the value of early retirement pension based on a 6% reduction at each early retirement age is lower than the actuarial equivalent of pension at 65.

The commuted value is (1.5% * 14 * 90,000) * 13.8
= 18,900 * 13.8
= $260,820.

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.

(3c) Analyze and communicate the pattern of cost recognition that arises under a variety of funding methods

Sources:

Anderson, FR-132-17: Chapter 5 of A Problem-Solving Approach to Pension Funding and Valuation, Second Edition, An actuarial balance sheet approach to assessing sustainability of target benefit plans

Commentary on Question:

Candidates were tested on whether they know how to calculate the accrued liability and normal cost under various cost methods. Candidates had to know the strengths and weaknesses of each cost method and make a recommendation based on the desired objectives identified in the question.

Solution:

(a) Calculate the normal cost and the actuarial liability as at January 1, 2019 under the following methods:

(i) Projected Unit Credit method

(ii) Entry Age Normal method

Show all work.

Commentary on Question:

In general, candidates did well in part a) of this question. Most candidates were able to correctly calculate the AL and NC under the PUC and EAN cost methods.

PUC Cost Method:

Member A:

$NC_{30} = 80 * 12 * (1- 5*.04) * v^{30} * \ddot{a}_{60}^{(12)} = 3,178.37$
$AL_{30} = 80 * 12 * (1- 5*.04) * 10 * v^{30} * \ddot{a}_{60}^{(12)} = 31,783.68$

8. Continued

Member B:

$NC_{50} = 80 * 12 * (1- 5*.04) * v^{10} * \ddot{a}_{60}^{(12)} = 7{,}665.32$
$AL_{50} = 80 * 12 * (1- 5*.04) * 30 * v^{10} * \ddot{a}_{60}^{(12)} = 229{,}959.45$

Total Normal Cost at January 1, 2019 = 10,843.69
Total AL at January 1, 2019 = 261,743.13

EAN Cost Method:

EAN NC = PVFB / $\ddot{a}_{(y-w)}$

$PVFB_{20} = 80 * 12 * (1-5*.04) * (60 – 20) * v^{40} * \ddot{a}_{60}^{(12)} = 81{,}865.57$

a (due, n=40, i) = 19.229656

$NC_w = 4{,}257.26$

$NC_A = NC_B = 4{,}257.26$

$AL_A = NC_w * S\,(due, 10, i) = 4{,}257.26 * 12.841179 = 54{,}668.24$

$AL_B = NC_w * S\,(due, 30, i) = 4{,}257.26 * 63.752388 = 271{,}410.49$

Total NC at January 1, 2019 = 8,514.52
Total AL at January 1, 2019 = 326,078.73

(b) The CEO of Company XYZ has requested that you help ensure that contributions are as stable as possible over the long term.

Recommend an appropriate funding method.

Justify your recommendation.

Commentary on Question:
Candidates did not perform well in this part of the question. The answer was from the study note on target benefit plans and candidates did make the connection; perhaps since the type of plan in this question was not a target benefit plan.

8. Continued

Recommend using EAN over PUC as a funding target for the following reasons:

- Accrued liability (AL) under PUC is always less than AL under EAN
- Normal cost (NC) under PUC increases with age of the member but stays level under EAN
- Under PUC, funding adequacy is an illusion if purpose is to maintain a fixed contribution rate. The shortfall is equal to the difference between the EAN AL and the PUC AL
- Shortfall could be passed to future generations. Use of PUC method has intergenerational risk transfer
- Rising pattern of PUC normal costs over a member's career means that the fixed contribution rate cannot cover the member's NC. Excess in the early career should be applied to fund the benefits in later years and not be used to improve the funded ratio at the present time.
- EAN method should be used to avoid obscure transfer of risk across different generations and to maintain long-term sustainability

Would recommend the EAN cost method as cost would be more predictable and stable compared to the PUC. This is the CEO's largest concern and the EAN addresses the concern the best.

9. 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:
Alternative Settlement methods for hypothetical wind-up and solvency valuations (CIA)

Alternative Settlement methods for solvency valuations (FSCO)

FR-121-17

Commentary on Question:
The objective of the question was to test the candidate's understanding of replicating portfolio construction, and other alternative settlement methods.

Solution:
(a) Describe how you would build a replicating portfolio for the purpose of calculating the hypothetical wind-up liabilities in accordance with the CIA Educational Note on Alternative Settlement Methods for Hypothetical Wind-up and Solvency Valuations.

Commentary on Question:
A common error made by candidates was to focus on matching durations of assets and liabilities, as opposed to matching cash flows.

- Replicating portfolio approach is to establish a portfolio of assets that produces cash flows that match the expected benefit payments to plan members.

9. Continued

In developing the expected benefit cash flows, the actuary would:

- Reflect plan-specific mortality experience (or, reflect the experience of groups with similar characteristics such as occupation, demographics and pension size);
- Make an appropriate allowance for future mortality improvements on a fully generational basis; and
- Make reasonable best-estimate assumptions regarding the exercise of any remaining options by the plan members

Considerations related to the assets:

- Assume the primary asset class used is investment-grade fixed-income investments, including a substantial allocation to high-quality fixed-income investments.
- Consider fixed-income investments to match these later cash flows through re-investing cash flows
- Reasonable assumption on the level of expenses that would be associated with establishing and maintaining such a portfolio and administering the ongoing payment of benefits.

Other considerations:

- Under the replicating portfolio approach, there would typically be no recourse to additional funding from the plan sponsor or any other entity if the initial assets set aside prove to be insufficient to provide the benefits.
- Include a margin for adverse deviations to ensure a high probability that the benefit promises will ultimately be met. The margin would include provisions for contingencies such as, but not necessarily limited to, longevity experience, inflation experience, asset defaults and/or downgrades, and reinvestment risk due to cash flow mismatches.
- In the absence of legislative requirements or an applicable regulatory policy, the actuary would make an assumption regarding the size of the margin that the regulator would likely require in an actual wind-up scenario, considering any precedents or indications from regulators.

(b) Describe the three other alternative settlement methods contained in the CIA Educational Note.

Commentary on Question:
*For the first alternative method listed, a candidate needed to indicate a **series** of annuity purchases.*

9. Continued

1. The purchase of a series of annuities over a period of a few years
- The liability would be determined as the present value of the series of annuity premiums, and pension payments expected to be paid from the pension fund.
- The present value would typically be determined based on yields on high-quality, zero-coupon, fixed-income securities with terms that match the expected timing of the annuity purchases and partial pension payments.
- The expenses associated with this settlement method would be reflected by making an explicit allowance for expenses and/or by using a net discount rate.

2. Lump sum payments to plan beneficiaries
- Under this approach, the actuary would assume that all members would be *required* to receive a lump sum payment in lieu of their entitlement to a deferred or immediate periodic pension.
- The lump sum approach alters the nature of the benefit entitlement and transfers all the investment risk and longevity risk from the pension plan to the plan members.
- A variation of this alternative is that some or all members may be given the option to receive a lump sum payment in lieu of their entitlement to a deferred or immediate periodic pension when such option would otherwise not be available.

3. An assumed modification to the terms of the benefit promise (e.g., substituting fixed rate increases for benefits indexed to CPI increases).
- Certain plan terms are altered in order to allow for the settlement of benefits through an annuity purchase.

(c) Describe when it would be appropriate to use an alternative settlement method for a hypothetical wind-up valuation.

Commentary on Question:
Successful candidates noted when a replicating portfolio should be applied, including the specific threshold amounts and other considerations an actuary should take into account.

- The use of a replicating portfolio is intended to apply only where it is believed that the group annuity capacity limitations will be exceeded at a single point in time.
  - The threshold, as per the CIA's guidance note, for a single annuity purchase is approximately $500 million for non-indexed annuities;
  - Approximately $200 for indexed annuities.

9. Continued

- An actuary may not solely rely on the capacity threshold since these thresholds may change over time.
- An actuary should also consider regulatory limitations on alternative settlement methods.

10. 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
FR-132-17 A Problem-Solving Approach to Pension Funding and Valuation, 2nd Ed., Ch. 5

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Calculate the total normal cost as at January 1, 2018.

Commentary on Question:

This question was generally well done.
Some candidates incorrectly used annuity due instead of annuity immediate for PVFY.

Suggested Solution:

$NC\text{-}ILP = \Sigma\ [(PVFB_x - AL_x)/\ PVFY_x\ ] = \Sigma\ [(PVFB_x - AL_x)/\ a_{(y-x)\rceil}\ ]$
At January 1, 2018, AL = 0

Employee A:

PVFB	=	$50 \times 12 \times 25 \times \ddot{a}_{65}^{(12)} \times v^{11}$	
	=	118,398	
PVFY	=	$\ddot{a}_{11\rceil.05}$	
	=	8.7217	
NC	=	(118,398 - 0) / 8.7217	= 13,575

Employee B:

PVFB	=	$50 \times 12 \times 30 \times \ddot{a}_{65}^{(12)} \times v^{21}$	
	=	87,223	
PVFY	=	$\ddot{a}_{21\rceil.05}$	
	=	13.4622	
NC	=	(87,223 - 0) / 13.4622	= 6,479

10. Continued

Employee C:

PVFB	=	$50 \times 12 \times 5 \times \ddot{a}_{65}^{(12)} \times v^{1}$	
	=	38,571	
PVFY	=	$\ddot{a}_{1\rceil .05}$	
	=	1.0	
NC	=	(38,571 - 0) / 1.0	= 38,571
Total NC	=	13,575 + 6,479 + 38,571	= $58,626

(b) Calculate the unfunded actuarial liability as at January 1, 2019.

Commentary on Question:
This question was also well done, although some did not apply the timing of the cash flows outlined in the question.

Suggested solution:

ILP AL_x	=	$(AL_{x-1} + NC_{x-1}) * (1+i)$
$UAL_x = AL_x - F_x$		
F_x	=	65,000 x 1.08 – 8,000 = 62,200

Employee A:

AL_1	=	$NC_0 \times 1.05$	
	=	13,575 x 1.05	= 14,254

Employee C:

AL_1	=	$NC_0 \times 1.05$	
	=	38,571 x 1.05	= 40,500
Total AL	=	22,806 + 64,800	= 54,754
UAL	=	54,754 – 62,200	= (7,446)

(c) Calculate the gains and losses, by source, for 2018.

Show all work.

Commentary on Question:
Most candidates were able to identify the sources of gains/losses, but not many were able to calculate each gain/loss correctly.

10. Continued

Suggested Solution:

Exp'd UAL_1 = UAL_0 x 1.05
= 0

Gains/(Losses)= 0 – (7,446) = 7,446

Gain on contributions:

Exp'd NC = 58,626 x 1.05
Act'l Conts = 65,000 x 1.05
Gain/(Loss) = 68,250 – 61,557 = 6,693

Gain on fund return:

Act'l F = 62,200 (see above)
Exp'd F = 65,000 x 1.05 – 8,000 = 60,250
Gain/(Loss) = 62,200 – 60,250 = 1,950

Loss on termination – Member B:

Exp'd AL = 6,479 x 1.05
= 6,803
Gain/(Loss) = AL – Refund
= 6,803 – 8,000 = (1,197)

Check:

Gains/(Losses) = 6,693 + 1,950 + (1,197) = 7,446

11. 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.

Learning Outcomes:

(3a) Differentiate between the various purposes for valuing pension plans:
- (iv) Funding
- (v) Solvency
- (vi) Termination/wind-up/conversion

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

(6b) Evaluate funding restrictions imposed by regulations.

Sources:

Ontario Pension Benefits Act

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

Morneau Shepell, Handbook of Canadian Pension and Benefit Plans, 16th Edition, 2016 – Ch. 9

Commentary on Question:

General commentary applicable to each part of the question: Calculations shown in model solution use compound interest, but use of simple interest was also accepted. Specific commentary on each part is provided separately.

Solution:

(a) Calculate the following for 2017 in accordance with the Pension Benefits Act (Ontario) as it existed prior to May 1, 2018 and the Income Tax Act:

(i) the minimum required employer contributions

(ii) the maximum permissible employer contributions.

Assume no deferral of amortization schedules.

11. Continued

Commentary on Question:
The question was intended to test candidates' knowledge of minimum and maximum funding requirements in the context of an Ontario-registered pension plan.

Candidates did extremely well on this question. They were able to determine there is a going concern surplus and a solvency deficit. Furthermore, they were able to determine that a new solvency schedule is required, after taking into account the present value of existing schedules. Finally, candidates were able to correctly identify/apply the minimum and maximum contribution rules.

Funded Positions at January 1, 2017
Going Concern Surplus/(Deficit) = $550,000 - $500,000 = $50,000 (surplus)
Solvency / Wind-up Excess/(Deficit) = $550,000 - $1,000 - $620,000 = -$71,000 (deficit)

Calculation of New Solvency Schedule
Present value of existing solvency schedules at January 1, 2018
$= \$4{,}000 * \ddot{a}_{3}^{(12)} + \$2{,}000 * \ddot{a}_{4}^{(12)} = \$4{,}000 * 2.87 + \$2{,}000 * 3.77 = \$19{,}020$

Remaining solvency deficit not funded given existing solvency schedules
= $71,000 - $19,020
= $51,980

Therefore, a new solvency amortization schedule is required, in the annual amount of
$= \$51{,}980 / \ddot{a}_{5}^{(12)} = \$51{,}980 / 4.64 = \$11{,}203$

Minimum Required Contributions
Minimum required employer contributions for 2017
= NC + solvency amortization payments
= $60,000 + $4,000 + $2,000 + $11,203 = $77,203

Maximum Permitted Contributions
Maximum 2017 employer contributions: limited to the NC + the larger of the GC deficit and hypothetical wind-up deficit
= NC + max (GC deficit, hypothetical wind-up deficit)
= $60,000 + max (0, $71,000)
= $131,000

(b) Calculate the estimated going concern and solvency positions at January 1, 2018.

11. Continued

Commentary on Question:
This question provided candidates all the necessary information to perform a roll-forward of the asset, going concern liability and solvency liability from January 1, 2017 to January 1, 2018. A few candidates did not seem to understand how to apply the solvency incremental cost to estimate the solvency liabilities as at January 1, 2018. In some cases, candidates assumed beginning of period or end of period cash flows, despite the fact that the question indicated that all cash flows are mid-period. In general, this question was also done very well.

Estimated Assets
Estimated MVA at January 1, 2018 (rollforward)
$550,000 * 1.21 + ($77,203 - $10,000) * 1.21^0.5
= $739,423

Estimated Going Concern Liabilities
GC Liabilities at January 1, 2018 (rollforward)
= $500,000 * 1.05 + ($60,000 - $10,000) * 1.05 ^0.5
= $576,235

Estimated Solvency Liabilities
Solvency Liabilities at January 1, 2018 (rollforward)
= $620,000 * 1.03 + ($70,000 - $10,000) * 1.03 ^0.5
= $699,493

Estimated Funded Positions at January 1, 2018
Going Concern Surplus/(Deficit) = $739,423 - $576,235 = $163,188 (128%)
Solvency / Wind-up Excess/(Deficit) = $739,423 - $1,000 - $699,493 = $38,930

(c) Calculate the maximum permissible employer contribution for 2018 in accordance with the Pension Benefits Act (Ontario) as it existed prior to May 1, 2018 and the Income Tax Act.

Show all work.

Commentary on Question:
The question was intended to test candidates' knowledge of maximum permissible employer contributions in scenarios where an excess actuarial surplus exists, but that excess surplus is less than the required normal cost contribution.

11. Continued

This question was poorly done by the majority of candidates. Some candidates were able to correctly identify that the going concern position is greater than 125% and that with a corresponding windup surplus, an excess actuarial surplus exists. However, in many cases they incorrectly assumed this meant that the maximum permissible contributions are $0. Only a few candidates correctly identified that the excess actuarial surplus was not enough to cover the <u>full</u> 2018 normal cost contribution requirement.

Maximum permitted contributions for 2018:

- Special payments: none (no deficits)
- Normal cost *(before application of any surplus):* $60,000
- The plan sponsor is not permitted to contribute due to the excess actuarial surplus (125%+ on going concern, with corresponding windup surplus). The surplus must be used towards the normal actuarial cost requirement, until the level of surplus falls below 125%.
- 125% of going concern liabilities: 125% * $576,235 = $720,294
- Amount in excess of 125%: $739,423 - $729,294 = $19,129
- Normal cost *(after application of excess surplus):* $60,000 – $19,129 = $40,871
- Maximum permitted contributions: $40,871

12. 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.

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

Sources:

References: Canadian Pensions and Retirement Income Planning, chpt 5, 11, Canada Revenue Agency PA Guide, Canada Revenue Agency PAR Guide

Commentary on Question:

Candidates were expected to provide explanations regarding the relationship between pension adjustments and lump sum commuted values for defined benefit versus defined contribution pension plans, as well as identify the principles underlying pension adjustment reversals.

Solution:

(a) Explain why the sum of the Pension Adjustments for Member B is higher than the sum of the Pension Adjustments for Member A, in spite of the fact that Member A's DC account balance and Member B's lump sum commuted value are the same at January 1, 2018.

Commentary on Question:

Candidates in general described properly the differences between the PA under the two different plans, and pointed out the factor of 9 in the calculation of a DB plan's PA. However, many candidates did not discuss the lump sum commuted value.

The Pension Adjustment (PA) for a money purchase plan such as Member A's plan is equal to all employer's contributions made in respect of a member, plus all member's contributions made, plus any forfeited amount allocated to the member, plus any surplus allocated to the member.

The PA for a defined benefit plan such as DPC Plan is equal to the benefit earned by the member in the year, multiplied by 9, minus $600. If the calculation results in a negative amount, then the PA is nil.

12. Continued

Under the Member A's plan, the PA represents the actual value of the benefits earned during the year while, under the DPC Plan, the PA represents the estimated value of the benefits earned during the year, using the factor of 9 minus $600. Member B's plan PAs are higher due to the fact that the factor of 9 is not plan specific so it does not reflect Member B's plan provisions.

Both members' benefits and PAs are dependent of their earnings – the members' earnings are unknown and could be a reason why their PAs are different.

The fact that Member A's DC account balance and Member B's lump sum commuted value are the same is a coincidence:

- For Member A's plan the cost of accrual is 9% of earnings while the cost of accrual in the DPC plan is 20.2% of earnings, based on the January 1, 2017 valuation – therefore, the two plans do not provide equivalent benefits (assuming a similar discount rate).
- Member A's DC account balance is highly dependent on asset returns in his DC account earned over time, while Member B's commuted value is highly dependent on the commuted value rates in effect and his age at his termination.

(b) List changes to the DPC Plan that would increase the lump sum value for DPC Plan members upon termination without increasing the members' Pension Adjustments.

Commentary on Question:
Many candidates generally listed changes to the DPC Plan that would not increase a member's PA; however, candidates listed items without describing a change to the DPC Plan and also made suggestions how to increase the lump sum value that did not involve changing the DPC Plan.
.

- Providing bridging benefits to deferred members
- Increasing bridging benefits
- Providing early retirement subsidies on termination
- Increasing post-retirement indexing
- Introducing pre-retirement indexing or indexing pensionable earnings
- Improving survivor benefits
- Improving normal form for single members
- Reducing the averaging period for Best average earnings

12. Continued

(c) Explain the principles underlying Pension Adjustment Reversals.

Commentary on Question:
To get full marks, a candidate needed to identify a number of points below. However, many candidates only discussed one principle of Pension Adjustment Reversals, did not fully explain the PAR calculation, and/or described when a PAR is calculated incorrectly.

- The purpose of the Pension Adjustment Reversal (PAR) is to give back to an individual his/her RRSP room that had been reduced (from PAs) for which the individual didn't receive benefits at termination/retirement.
- A PAR is calculated when an individual stops being a member of a plan after 1996 and the individual is paid out from the plan.
- PAR = Total PAs + PSPAs – post-1989 payout – PA transfer amount
  Where
  - Total PAs = total of the member's pension credits earned in the plan when he/she stopped being a member
  - PSPAs = total of the member's PSPAs received in respect of benefits earned in the plan before he/she stopped being a member
  - Post-1989 payout = payment for the member's post-1989 benefits
  - PA transfer amount = transferred PA amount following the member's transfer from another defined benefit provision of a registered pension plan
- Post-1989 payout excludes:
  - Payment for pre-1990 benefits
  - Transfer to another defined benefit provision of a registered pension plan
  - Payment of actuarial surplus
  - Return of contributions with interest following a plan amendment that reduces/eliminates member contributions
  - Payment for benefits when the plan was a specified multi-employer plan
  - Payment for foreign service that did not generate a PSPA
- PARs less than $50, or amended PARs for which the difference between the original is less than $250, do not have to be reported unless the employee or CRA asks that the PAR be reported accurately
- For a DPSP or money purchase pension plan (registered under legislation where vesting is not immediate), the PAR is the amount of employer contributions (which would have been PA'ed) that the individual is not entitled to when his/her membership ends.