RET FRC Model Solutions
Spring 2016

1. 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:

Pension Mathematics for Actuaries, Anderson, 3rd Edition – Chapter 6

Selection of Actuarial Assumptions, Consultant Resource Manual, SOA Version, Mercer

Commentary on Question:

In general, this question was well answered by candidates. Most candidates were able to name a few considerations, but only few candidates were able to get more marks in naming 4 or more considerations. The considerations on the retirement assumptions were better addressed than the considerations on the termination assumptions.

Solution:

You are the actuary for the NOC Full-Time Salaried Pension Plan. The analyst working with you has proposed the following assumption changes for the going concern valuation of the plan:

(i) Retirement rates: 50% at age 55, 10% at ages 56 to 61; 100% at age 62

(ii) Termination rates: 10% increase to current termination rates at all ages below age 55, 0% for ages 55 and above

Describe considerations in assessing the appropriateness of these assumptions.

Retirement Considerations:

- Given the size of the plan, a table of retirement rates may generate more reasonable results and accurate cash flows
- Should consider the Salaried plan's design (the Salaried plan provides early retirement subsidy) that may influence members to retire early
- Compare the impact of using the new proposed retirement scale versus the current scale on the current valuation results
- Managements expectation if any regarding future employee retirement patters being different from that in the past

1. **Continued**

- Should compare the proposed assumptions with the plan's actual experience
- States that the Salaried plan provides for early retirement subsidy, 3% per year prior to age 62
- Should also consider if NOC provides any post-retirement benefit programs
- Should consider current and emerging trends in connection with recent plan experience
- NOCs historical retirement gains and losses over the past 4

Termination Considerations:

- Should consider employer-specific or job related factors
- Should review plan provisions: vesting schedule, early retirement benefits, payout options
- The Salaried plan provides for disability benefits. Should review how the disability benefits affect termination rates and assumptions
- Should test the assumptions for reasonableness to see if the 10% increase in termination rate assumption below age 55 aligns with experience
- Should review if service is an important driver of turnover
- Should compare the proposed assumptions with the plan's actual experience
- The current table is based on an old experience study done using NOC's experience from 1996 to 2006. It may not be reasonably representative of future.

2. Learning Objectives:

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

Learning Outcomes:

(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:

Canadian Pensions and Retirement Income Planning, Chapter 13

Pension Benefits Act

Case Study

Commentary on Question:

In this question, candidates are asked to demonstrate their ability to calculate a commuted value for an involuntarily terminated member of the NOC Hourly Plan. A well prepared candidate will be able to demonstrate a good understanding of the impact of grow-in, and the bridge benefits provided under the terms of the Plan. Full marks were awarded for candidates who were able to demonstrate a reasoned approach for calculating the maximum benefit allowable for each member.

Solution:

Calculate the commuted value of each member's termination benefit.

Show all work.

Member A: Candidates should have recognized that Member A is grow-in eligible

1. *Determine Grow-In Eligibility*
   = age + svc >= 55
   = 54 + 27 = 81 > 55 and thus Grow-In Eligible

2. *Determine Annual Unreduced Retirement Benefit*
   Annual Unreduced Retirement Benefit
   = B_r = svc * 12 * $80
   = 27 * 12 * 80
   = $25,920

3. *Calculate Bridge Benefit at Best Age*
   = $Bridge_x$
   = svc * 12 * $20
   = $6,480

2. Continued

4. *Determine Best Age = 56*
   - Must be able to demonstrate reasoned approach for concluding best age
     - Calculation of CVs at different ages (eg. commencement of bridge benefits, unreduced age, normal retirement age)
     - Reasoning that bridge benefit begins at 85 points (when member is 56 years of age) and not at unreduced benefit
   - Member may do simple calculations to determine ages that may result in maximum value: immediate age, beginning of bridge benefits, and unreduced retirement age
   - Member is 2 years away from attaining 85 points -> therefore grows-in to bridge payments starting at age 56
   - Member is eligible to grow into active early retirement ERFs; member is 3 years away from attaining 30 years of credited service; will grow in to 30 year service requirement by age 62; therefore eligible for unreduced base pension at age 62

5. *Calculate Total Plan CV*
= B_r * v^(x-54) * [Annuity factor] * [Early Retirement Reduction] + $Bridge_x$ * [Bridge Factor]
= $25,920 * 1.025^-(56-54) * [(0.8 * (22.3) + 0.2 * (20.5))] * [1-(0.25% * 12 * (65 – 56))] + 6,480 * 7.9 * 1.025^-(56-54)
= $443,861

Member B**:** Candidates should have recognized that Member A is not grow-in eligible

1. *Determine Annual Retirement Benefit*
=Annual Retirement Benefit = B_r = svc * 12 * $80
= 5 * 12 * 80
= $4,800

2. Determine Grow-In Eligibility
= age + svc >= 55
= 45 + 5 = 50 < 55 and thus Not Grow-In Eligible

2. Continued

3. Calculate Total Plan CV
= B_r * v^(65-45) * [Annuity factor] * [Early Retirement Reduction] + $Bridge_x$ * [Bridge Factor]
= $4,800 * v^(65-45) * [(0.8 * (18.2) + 0.2 * (16.4))] + [0] + [0]
= $52,259

3. 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:

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

(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, Third Edition, 2006, Chapter 2.

A practical approach to gains analysis by Josiah Lynch, TSA, Vol 27, pp.423-439

A practical approach to gains analysis revisited by Andrew Smith, Pension Section News, Sep 93

Commentary on Question:

A well prepared candidate will be able to calculate unfunded accrued liability and normal cost using the Projected Unit Credit, prorated on service, cost method. They will also be calculate and reconcile the gain/loss resulting from various experience items and be able to identify the sources of change in the unfunded accrued liability from one valuation to the next. As well, a well prepared candidate will be able to identify the impact of using a termination scale on the gain/loss.

Solution:

(a) Calculate the normal cost and the unfunded actuarial liability as at December 31, 2015.

Show all work.

Commentary on Question:

Overall, candidates performed very well on this part of the question. Some candidates had minor arithmetic errors (mostly with respect to determining final year's earnings).

3. Continued

PUC AL_x $= \sum B_y \times \ddot{a}_y^{(12)} \times v^{(y-x)} \times [(x-w) \div (y-w)]$; x-current age; y-rtmt age; w-hire age

PUC NC_x $= \sum B_y \times \ddot{a}_y^{(12)} \times v^{(y-x)} \times [1 \div (y-w)]$

Member A

AL $= 40{,}000 \times 1.03^{30} \times 2\% \times 5 \times 13 \times v^{30}$
$= 29{,}204$

NC $= 29{,}204 \div 5$
$= 5{,}841$

Member B

AL $= 80{,}000 \times 1.03^{25} \times 2\% \times 10 \times 13 \times v^{25}$
$= 128{,}606$

NC $= 128{,}606 \div 10$
$= 12{,}861$

$AL_{2015} = 157{,}810$
$NC_{2015} = 18{,}702$

UAL_{2015} $= AL - F$
$= 157{,}810 - 160{,}000 = (2{,}190)$

(b) Calculate the unfunded actuarial liability as at December 31, 2016.

Show all work.

Commentary on Question:
Overall, candidates performed quite well on this part of the question.

Member B

AL $= 80{,}000 \text{ x } 1.03^{24} \times 2\% \times 11 \times 13 \times v^{24}$
$= 144{,}214$

AL_{2016} $= 144{,}214$

F_{2016} $= (160{,}000 + 12{,}861 - 25{,}000) \times 1.0$
$= 147{,}861$

UAL_{2016} $= AL - F$
$= 144{,}214 - 147{,}861 = (3{,}647)$

3. Continued

(c) Calculate the gains and losses by source for 2016.

Show all work.

Commentary on Question:
A large number of candidates were able to identify and calculate most of the sources of gain and loss. However, some candidates missed or incorrectly calculated some sources of gain/loss (especially the termination gain for Member A) and/or failed to check that these reconciled with the change in the unfunded accrued liability.

Exp'd UAL = (2,190) x 1.05 = (2,300)
Gains/(Losses)= (2,300) – (3,647) = 1,347

Loss on fund return:
Exp'd F_{2016} = (160,000 + 12,861 – 25,000) x 1.05
= 155,254
Gain/(Loss) = 147,861 – 155,254 = (7,393)

Gain on termination – Member A:
Exp'd AL_{2016} = 29,204 x 1.05
= 30,664
Payout (w/ int) = 25,000 x 1.05
= 26,250
Gain/(Loss) = 30,664 – 26,250
= 4,414

Gain on salary increase for B:
Exp'd AL_{2016} = (128,606 + 12,861) x 1.05
= 148,540
Gain/(Loss) = 148,540 – 144,214
= 4,326

Check:
Gains/(Losses)= 4,326 + 4,414 – 7,393
= 1,347

(d) Describe factors that would impact whether there would be a termination gain or loss, if a termination scale had been used in the prior valuation.

3. Continued

Commentary on Question:
Overall, candidates did not perform very well on this part of the question. There were candidates who were able to identify a number of the factors that could impact whether or not there would be a termination gain or loss. However, many candidates only identified one or two relevant points, or otherwise failed to answer the question.

- A termination gain/(loss) occurs when the lump sum payout for a terminating member is lower/(greater) than their expected funding liability.
- A termination gain also occurs when a member who was expected to terminate (i.e. was impacted by the termination scale in the previous valuation), does not terminate (since no future salary increases would occur after a member is assumed to terminate).

Particular factors:

- Termination scale used (i.e. who was assumed to terminate in the previous valuation) will impact size of gain/(loss), but not direction
- Age of terminating member
- Going concern valuation assumptions
  - Discount rate
  - Salary scale
  - Mortality basis
- Lump sum transfer assumptions
  - Discount rate
  - Mortality basis
- Interaction between all these factors will determine direction and amount of gain/(loss) (e.g. low discount rate for lump sum transfer may result in payout that exceeds going concern liability, in spite of impact of future salary increases)

4. Learning Objectives:

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

Learning Outcomes:

(5d) The candidate will be able to describe and apply regulation pertaining to plan termination/wind-up.

(5g) The candidate will be able to describe and apply regulation pertaining to reporting requirements.

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

Sources:

FR-112-13: Filing Requirements and Procedure on Full or Partial Wind up of a Pension Plan

FR-117-15: FSCO Overview of Letters of Credit

FR-118-15: FSCO Overview of Letters of Credit – FAQs

FR-114-15 Ontario Pension Benefits Act R.R.O. 1990, Reg 909

FR-115-15 Ontario Pension Benefits Act, R.S.O. 1990, Ch. P.8

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Describe the circumstances under which the face value of the LoC may be reduced while the plan is ongoing.

Commentary on Question

Most candidates were able to provide at least one circumstance in which the LoC may be reduced while the plan is ongoing.

A letter of credit may be reduced in any one of the following circumstances:

- If the employer has paid into the pension fund the amount by which the letter of credit is to be reduced; or
- If the most recently filed actuarial valuation report indicates that the solvency liabilities minus the solvency assets (both after smoothing) is less than or equal to the present value of the total amounts of all letters of credit, then the letter of credit may be reduced to the level by which the solvency liabilities exceed the solvency assets (both after smoothing).

4. Continued

The administrator must notify the trustee that the letter of credit is reduced and the trustee must have received notice that one of the above has been satisfied.

(b) ABC has declared bankruptcy. As a result, the pension plan is being wound up. The face value of the LoC at the date of the wind up is greater than the wind up deficit.

Outline the process for winding up ABC's pension plan.

Commentary on Question:
Overall, candidates were able to demonstrate their knowledge of the wind-up process in general. However, the question clearly calls for the candidates to address the process of the call on the letter of credit in the wind-up process, and few candidates did so.

- Declare wind-up of the pension plan and reason for declaration (bankruptcy)
- Provide notice to members and FSCO of pension plan wind-up
- See items below regarding letter of credit (notice to issuer and payment to fund)
- Following the payment of the letter of credit the Plan will become in a surplus position as of the wind-up date
- Prepare and file the following with FSCO
  - wind-up report
    - Administrator should indicate how the surplus assets will be dealt with
    - If surplus not addressed in wind-up report, then a supplement to the wind-up report dealing with the surplus assets will be required
  - amendments, resolutions and Form 1.1,
  - Superintendent's checklist for Compliance on Plan Wind-up for DB Plans
  - Annual Information Return
  - Financial Statements for the pension plan or fund
- Prepare and issue wind-up benefit statements & election forms to members
- No payments of benefit entitlements should be made to members (except current retirees) until the wind-up report is approved by the Superintendent
- Following Superintendent approval, distribute benefits in accordance with the wind-up report and the options elected
- De-registration of the pension plan within 30 days of final distribution of the assets

4. Continued

Items related to the letter of credit in the context of wind-up:

- Review LoC arrangement to confirm windup is a circumstance/trigger (an employer being subject to bankruptcy proceedings is a major circumstance)
- Trustee must submit demand for payment to the issuer of the LoC if the pension plan administrator or the employer notifies the trustee of the wind-up the pension plan and the circumstance for wind-up (in this case bankruptcy)
- Trustee must notify Administrator, employer and Superintendent when it demands payment to the issuer of the LoC
- The issuer of the LoC is contractually liable to promptly transfer the face value of the LoC to the pension fund when the trustee of the pension fund demands payment where there is a valid circumstance/trigger.
- If the issuer does not pay the LoC upon receiving the trustee's demand, the employer must immediately pay that amount into the pension fund.
    - The employer must provide written notice to the Superintendent that the issuer has not paid the LoC, and that the amount has been paid into the pension fund.

5. 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.

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

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

Learning Outcomes:

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

(3d) Perform valuations for special purposes, including:
- (i) Plan termination/wind-up/conversion valuations
- (ii) Hypothetical wind-up and solvency valuations
- (iii) Open group valuations
- (iv) Multi-employer pension plan valuations

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

(6b) Evaluate funding restrictions imposed by regulations.

(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) Explain and apply the Professional Conduct Guidelines.

(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:

FR-107-03, FR-119-14, CIA Rules of Professional Conduct, SOA Code of professional conduct, CSOP 1000-1800, CSOP 3100-3500

Canadian Pensions and Retirement Income Planning Chapter 15, Morneau Chapter 5

5. Continued

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a) Describe how a funding policy could address the following for a non-contributory defined benefit multi-employer pension plan (MEPP):

(i) actuarial gains and losses over the long-term and the short-term;

(ii) use of funding excess; and

(iii) deficit funding.

Commentary on Question:
Successful candidates demonstrated their knowledge on how actuarial gains and losses could be applied during the short-term and long-term. Candidates appeared to struggle with describing how a funding policy could address deficit funding.

Funding policy for a non-contributory defined benefit MEPP could address:

Short-term treatment of actuarial gains and losses as follows:
- Protection against short-term losses may be provided by maintaining a margin between the rate of contributions to the plan and best estimate (i.e., no margin) funding requirements
- Policy should acknowledge that margin will systematically generate gains if best estimate assumptions are realized, which may be used to:
  - offset short-term experience losses; or
  - used to improve benefits
- Retain a portion of the experience gains as a contingency reserve for possible future experience losses

Long-term treatment of actuarial gains and losses as follows:
- If there is an unfunded liability, retain subsequent experience gains until the unfunded liability is eliminated
- Accumulate gains for period of time with objective to implement a series of improvements

Use of funding excess as follows:
- whether participating employers have an entitlement to funding excess
- retain a portion of surplus as a contingency reserve (i.e., increase level of margin)
- benefit improvements that can prudently be provided

5. Continued

Deficit funding as follows:

- a policy of not granting any benefit improvements that will result in an unfunded liability
- if unfunded liabilities occur (due to combination of net experience losses or granting benefit improvements) then the contribution rate must be sufficient to amortize any such unfunded liability over an appropriate period
- margin may need to be relaxed to temper total contribution requirements
- reduce of future benefits

(b) You have presented the results of the January 1, 2016 actuarial funding valuation under Scenario 1 to the Board of Trustees. The Board has asked you to file your actuarial valuation report using Scenario 2.

Assess the Board's request, taking into consideration professional standards.

Commentary on Question:
The question leads candidates to discuss professional standards given the context. The context is a possible reality where the actuary's best estimate assumptions result in increased funding requirements (almost double the current 9% and before deficit funding is considered), but by using an assumption that is greater than the actuary's best estimate (in this case, the discount rate) the resulting contributions result in no change to the existing funding structure. However, while the use of a discount rate greater than the actuary's best estimate may assist the Board and participating employers it also creates a professional issue for the actuary.

Successful candidates explicitly mentioned:

- *the CIA Standards of Practice for going concern funding assumptions that requires best estimate assumption which could be modified to reflect a margin for adverse deviation; and*
- *that the code of conduct (Rules 1, 3, and 6) is to be considered*

Further, successful candidates explained how the above would be violated given the Board's request to have the actuary file Scenario 2.

- Professional standards require the use of best estimate assumptions which could be modified to incorporate margins for adverse for a going concern valuation
- We are given that all non-discount rate assumptions are best estimate under both scenarios.
- The best estimate discount rate assumption is 5.5%.
- The discount rate under Scenario 2, 8.5%, is a rate that is 300bps greater than best estimate.

5. Continued

- Filing Scenario 2 results in no change in the participating employers' contribution rate of 9%.
- whereas under Scenario 1 the Board is faced with a 17% service cost PLUS deficit funding, which will result in an increase to participating employers' contribution rate from its current level of 9%.
- In assessing whether to comply with the Board's request the code of conduct is to be considered:
- Rule 3 – Standards of Practice. The actuary is required to observe applicable standards of practice that have been promulgated by the CIA when rendering professional services. Given the information provided and comments above on best estimate assumptions, if the actuary proceeds with the Board's request to file Scenario 2 which uses a discount rate that is 300bps greater than best estimate and all other assumptions are best estimate, the actuary will not be complying with CIA standards of practice.
- Rule 6 – Control of work product. The actuary is to take reasonable steps to ensure that services are not used to mislead other parties or to violate or evade the law. Given the information provided, if the actuary proceeds with the Board's request, the results would be:
  - misleading (by filing Scenario 2, the going-concern liabilities and service cost would be understated and the funding requirements would effectively insufficient when compared to those required by using best estimate assumptions); and
  - in violation of the law (law requires compliance with Standards of Practice, which were not complied with).
- Rule 1 – Professional integrity. The actuary is to act in a manner to fulfil the actuary's professional responsibility to the public and uphold the reputation of the profession, which would be violated if the actuary, given the information provided, proceeds with the Board's request.

6. Learning Objectives:

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

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

Learning Outcomes:

(3e) Calculate actuarially equivalent benefits.

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

Sources:

Canadian Pensions and Retirement Income Planning, 5th edition, Chapter 17

FR-105-13_Actuarially Equivalent Benefits.

Morneau Shepell Handbook of Canadian Pension & Benefit Plans, 15th Edition, Chapter 7

Commentary on Question:

In this question candidates were asked to determine the maximum pension benefits payable under the terms of the Canadian Income Tax Act (ITA) for a high earner.

In part (a), a well prepared candidate should know that the lifetime and bridge benefits payable are tested against the three limits under the ITA (maximum lifetime, maximum bridge and combined maximum). In part (b), a well prepared candidate should be able to successfully calculate the lifetime plan benefits payable in the Joint Survivor 60% option form, and then demonstrate understanding with how the ITA maximums are tested for the lifetime and bridge benefits.

Most candidates did well on this question. In part (a), almost all candidates were able to first calculate the benefits (prior to application of ITA limits) that would be payable under the plan. A few candidates forgot to apply the early retirement reduction under the plan. Some candidates missed components of the maximum bridge and combined maximum tests (i.e. service pro-rate or ERF). In part (b), most candidates correctly calculated the lifetime plan benefits payable in the Joint Survivor 60% option form, and compared with the ITA maximum lifetime benefits. Some candidates did not test the bridge benefits payable with the combined maximum again, not recognizing that change in lifetime pension payable would result in a change to the maximum bridge benefits payable.

6. Continued

Due to the typographical error in the question showing the CFO participant data as at January 1, 2015 (instead of January 1, 2016), a portion of the candidates added a year to the age and service of the CFO (i.e. Age 58 and 21 years of service at January 1, 2016). Full marks were awarded to candidates who used either Age 57 and 20 years of service at date of retirement, or Age 58 and 21 years of service at date of retirement. For candidates who used Age 58 and 21 years of service at date of retirement, full marks were given for using the given annuity factor at age 57 or an estimated annuity factor at age 58.

Both sets of solutions are illustrated below.

Solution:

(a) The CFO retires on January 1, 2016. Calculate the immediate lifetime and bridge pensions payable under the normal form.

Solution (Using Age 57 and 20 years of service)

Pension Payable Under the Plan

FAE 3 =	(230,000+190,000+180,000) / 3
=	$200,000
Lifetime pension =	1.75% * FAE3 * Credited Service * (1- ERF)
=	1.75% * 200,000 * 20 yrs of SVC * (1 - 4% * (62 - 57))
=	**$56,000**
Bridge =	0.30% * FAE3 * Credited Service
=	0.30% * 200,000 * 20 yrs of SVC
=	**$12,000**

Lifetime Max

# of Years to Age 60 =	3
# of Years to 30 yrs svc =	10
# of Years to 80 pts =	(80 - (57 + 20))/2 = 1.5
ITA ERF for Lifetime Max =	0.25% per month from earlier of (Age 60, 30 yrs of svc, 80 points)
=	0.25% * 12 * Min (3, 10, 1.5)
=	4.50%

6. Continued

Lifetime Max Pension = 2016 ITA Dollar Limit * Credited SVC * (1 - ITA ERF)
= 2,890 * 20 * (1- 4.5%)
= **$55,199**

Plan lifetime pension is capped by ITA Lifetime Max
Lifetime Pension Payable = min (Plan Pension, ITA max) = min (56,000, 55,199)
= **$55,199**

Bridge Max

ERF for Bridge Max = 0.25% per month from Age 60 *Max (1, SVC/10)
= 0.25% * 12 * (60 - 57) * max (1, 20/10)
= 9.00%

Max Bridge = (Max annual CPP + Max annual OAS) * ERF
= (1,093 + 571) * 12 * (1 - 9%)
= **$18,171**

Bridge is not capped by Bridge Max

Combined Lifetime and Bridge Max

YMPE 3 = average (2016, 2015,2014) YMPE = (54,900+53,600+52,500)/3
= $53,667

Combined Max = 2016 ITA Dollar Limit * SVC + 0.25% * YMPE3 * SVC / 35
= 2,890 * 20 + 25% * 53,667 * 20/35
= **$65,467**

Max Bridge Payable = Combined Max - Lifetime Pension Payable
= 65,457 – 55,199
= **$10,268**

Bridge is capped by Combined Max, therefore annual bridge is $10,268

Total Immediate Pension Payable in Normal Form is follows:

Annual lifetime pension	**$55,199**
Annual bridge payable till 65	**$10,268**

6. Continued

Alternative Solution (Using Age 58 and 21 years of service)

Pension Payable Under the Plan

FAE 3 = (230,000+190,000+180,000) / 3
= $200,000

Lifetime pension = 1.75% * FAE3 * Credited Service * (1- ERF)
= 1.75% * 200,000 * 21 yrs of SVC * (1 - 4% * (62 - 58))
= **$61,740**

Bridge = 0.30% * FAE3 * Credited Service
= 0.30% * 200,000 * 21 yrs of SVC
= **$12,600**

Lifetime Max

# of Years to Age 60 = 2
# of Years to 30 yrs svc = 9
# of Years to 80 pts = (80 - (58 + 21))/2 = 0.5
ITA ERF for LifeTime Max = 0.25% per month from earlier of (Age 60, 30 yrs of svc, 80 points)
= 0.25% * 12 * Min (2, 9, 0.5)
= 1.50%

Lifetime Max Pension = 2016 ITA Dollar Limit * Credited SVC * (1 - ITA ERF)
= 2,890 * 20 * (1- 1.5%)
= **$59,780**

Plan lifetime pension is capped by ITA Lifetime Max

Lifetime Pension Payable = min (Plan Pension, ITA max) = min (61,740, 59,780)
= **$59,780**

Bridge Max

ERF for Bridge Max = 0.25% per month from Age 60 *Max (1, SVC/10)
= 0.25% * 12 * (60 - 58) * max (1, 20/10)
= 6.00%

Max Bridge = (Max annual CPP + Max annual OAS) * ERF
= (1,093 + 571) * 12 * (1 - 6%)
= **$18,770**

Bridge is not capped by Bridge Max

6. Continued

Combined Lifetime and Bridge Max

YMPE 3 = average (2016, 2015,2014) YMPE = (54,900+53,600+52,500)/3
= $53,667

Combined Max = 2016 ITA Dollar Limit * SVC + 0.25% * YMPE3 * SVC / 35
= 2,890 * 21 + 25% * 53,667 * 21/35
= **$68,740**

Max Bridge Payable = Combined Max - Lifetime Pension Payable
= 68,740 – 59,780
= **$8,960**

Bridge is capped by Combined Max, therefore annual bridge is $**8,960**

Total Immediate Pension Payable in Normal Form is follows:

Annual lifetime pension	**$59,780**
Annual bridge payable till 65	**$8,960**

(b) The CFO has elected the Joint and 60% Survivor optional form of payment. Calculate the immediate lifetime and bridge pensions payable.

Show all work.

Solution (Using Age 57 and 20 years of service)

JS 60% Pension Payable Under the Plan Provision

JS 60% Annuity Factor = $\ddot{a}_{57}^{(12)} + 60\% * (\ddot{a}_{40}^{(12)} - \ddot{a}_{40:57}^{(12)})$
13 + 60% * (15.7 – 12.8)
14.74

Pension Payable under life only = $56,000

Pension Payable under JS 66.67% 5-Yr = pension payable for life only * Life only Annuity Factor / JS 60% Annuity Factor
= 56,000 * 13.0 / 14.74
= **$49,389**

JS 60% Pension Payable Under ITA Max

ITA Dollar Limit is applied regardless of pension form, maximum form payable is JS 66.67% with 5 year guarantee

ITA Max = $55,199 from part (a)

Plan Pension Payable Under JS60% is min (Plan Pension, ITA max) = min (49,389, 55,199) = $49,389

6. Continued

Combined Lifetime and Bridge Max

Combined Max = $65,467 as from Part (a)

Max Bridge Payable = Combined Max - Lifetime Pension Payable
= 65,467 – 49,389
= $16,078

Bridge Payable from Plan = Min (Max Bridge Payable, Bridge from Plan)
= Min (16,078, 12,000 from part (a))

Bridge Payable is not capped by ITA and therefore is $12,000

Alternative Solution (Using Age 58 and 21 years of service)

JS 60% Pension Payable Under the Plan Provision

JS 60% Annuity Factor = $\ddot{a}_{57}^{(12)} + 60\% * (\ddot{a}_{40}^{(12)} - \ddot{a}_{40:57}^{(12)})$
13 + 60% * (15.7 – 12.8)
14.74

Pension Payable under life only = $61,740

Pension Payable under JS 66.67% 5-Yr = pension payable for life only * Life only Annuity Factor / JS 60% Annuity Factor
= 61,740 * 13.0 / 14.74
= **$54,452**

JS 60% Pension Payable Under ITA Max

ITA Dollar Limit is applied regardless of pension form, maximum form payable is JS 66.67% with 5 year guarantee

ITA Max = $59,780 from part (a)

Plan Pension Payable Under JS60% is min (Plan Pension, ITA max) = min (54,452, 59,780) **= $54,452**

6. Continued

Combined Lifetime and Bridge Max

Combined Max = $68,740 as from Part (a)

Max Bridge Payable = Combined Max - Lifetime Pension Payable
= 68,740 – 54,452
= $14,288

Bridge Payable from Plan = Min (Max Bridge Payable, Bridge from Plan)
= Min (14,288, 12,600 from part (a)) = $12,600

Bridge Payable is not capped by ITA and therefore is $12,600

7. 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:

Rebuilding New Brunswick: The Case for Pension Reform

Commentary on Question:

A well prepared candidate will be able to describe the principles underlying SRPP and how they compare to traditional DB and DC plans.

4a –Many candidates listed the specific plan design details of the SRPP and some described the selection process of the task force instead of the underlying principle. Candidates received full credit if they covered most points described in Appendix C of the reading material: Shared Risk Model Development Principles.

4b – Candidates generally did better in part (b) of the question. No credit was awarded for discussion on the differences between traditional DB to DC. Candidates received full credit if they covered at least 6 points in part (i) and 4 points in part (ii). Correct points include and are not limited to the ones listed below.

Solution:

(a) Describe the underlying principles of New Brunswick's Shared Risk Pension Plan (SRPP).

1. Subject to **robust risk management** and be checked annually, including stress tests, to ensure that plans comply with that task.

2. Provide **benefit security**. Use risk management target to provide the forewarning that enables plan administrators to take corrective measures so that target benefits are achieved with a high degree of confidence. Plan governed by trustee who can force ER and EE to increase/decrease contributions

3. Demonstrate that the pension plan is **sustainable** over long term.

4. Contributions to pension plans must be **stable and affordable** for both ER and EE.

7. Continued

5. **Equitably designed**. No single age cohort should unduly subsidize another, and no one should be able to 'game the system'. If pension plans amalgamate, no one plan may subsidize another.

6. **Transparent.** Pension plan goals and risks clearly stated up-front, who shares in the risks and rewards and by how much is pre-established in the pension plan documents.

7. **Benefit changes only apply to the future.** Member/retiree will keep benefit already accrued, as measured under the pension plan's pre-conversion rules.

8. **No sudden shock** to members' and retirees' retirement plans. Individuals should e given time to adjust to the new system.

9. Groups of EEs treated **consistently**. Part-time or casual employees should be in the same pension plan offered to full-time employees.

10. Actuarial assumptions closely related to market benchmarks such as IAS 19.

(b) Compare and contrast New Brunswick's SRPP to:

(i) a traditional defined benefit pension plan; and

(ii) a traditional defined contribution pension plan

from both a funding and regulatory perspective.

Traditional DB	SRPP
Benefits are fixed	No absolute benefit guarantees
Employers carry investment risk	Employers and employees share the risk
Risk management is not emphasized. No annual stress test	Focus on risk management. Annual stress test.
Contributions may not be shared	Contributions are shared and known in advance
No clear guidelines for managing surpluses and deficits	Clear guidelines for managing surpluses and deficits
Usually no surplus distribution	Prudent distribution of surpluses to members
Managed by employer	Managed by independent trustee.

7. Continued

Traditional DC	SRPP
No benefit security	Although no absolute benefit guarantees, minimize risk to employees
Contributions are fixed	Independent trustee may force contributions to increase
Employees carry investment risk	Employers and employees share the risk
Risks borne individually by employees	Borne collectively as the risks are pooled among the employees
Managed by employee	Managed by independent trustee

8. Learning Objectives:

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

Learning Outcomes:

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

Sources:

Pension Mathematics for Actuaries, Anderson, Third Edition, 2006, Chapter 2.

Commentary on Question:

This question was designed to test candidates' knowledge with respect to funding methods, specifically the Individual Level Premium (ILP) method. Candidates were expected to know the formulas for Normal Cost and Accrued Liability under the ILP method and calculate the impact of a benefit rate change. Most candidates got full points on part (a) however few got full points on part (b).

Solution:

(a) Calculate the normal cost as at January 1, 2016.

Commentary on Question:

Part (a) was done well by most candidates. The most common mistake was not using all years of service in the present value of future benefits calculation.

ILP NC = $(PVFB_x - AL_x)/ PVFY_x = (PVFB_x - AL_x)/ a_{(y-x)\rceil}$

At January 1, 2016, $AL_{2016} = 0$

Employee A:

$PVFB_{2016} = 100*12 \times 35 \times .8 \times \ddot{a}_{60}^{(12)} \times v^{30}$

$= 100*12 \times 35 \times .8 \times 14.5 \times .23138$

$= 112{,}727$

$\ddot{a}_{(y-x)\rceil} = \ddot{a}_{30\rceil} = (1-v^{30})/(1-v) = 16.141$

$NC_{2016} = (112{,}727 - 0) / 16.141$

$= 6{,}984$

Employee B:

$PVFB_{2016} = 100*12 \times 15 \times .8 \times \ddot{a}_{60}^{(12)} \times v^{10}$

$= 100*12 \times 15 \times .8 \times 14.5 \times .61391$

$= 128{,}185$

8. Continued

$\ddot{a}_{(y-x)\rceil}$ = $\ddot{a}_{10\rceil}$ = $(1-v^{10})/(1-v)$ = 8.108

NC_{2016} = (128,185 - 0) / 8.108
= 15,810

Total NC = 6,984 + 15,810 = $22,794

(b) Effective January 1, 2017, the normal retirement benefit is increased to $120 per month per year of service, for future service only.

Calculate the accrued liability and normal cost as at January 1, 2017.

Show all work.

Commentary on Question:
Candidates performed well in calculating the accrued liability. Most candidates used the change in normal cost method to determine the Normal Cost at January 1, 2017. Most candidates had the general ideas correct however they did not treat the benefit improvement properly: either applying the increase to all years of service or not getting the split between service at the $100 level and $120 level correct. For those few candidates that used the formula as shown in the model solution to determine the NC, the key concept that was missed was subtracting AL_{2017} *from the* $PVFB_{2017}$ *before dividing it by* $PVFY_{2017}$.

ILP AL_x = $(AL_{x-1} + NC_{x-1}) * (1+i)$

<u>Employee A:</u>
AL_{2017} = NC_{2016} x 1.05
= 6,984 x 1.05 = 7,333

PVFB = 12* [100 x 6 + 120 x 29] x .8 x 14.5 x .24295
= 137,978

$\ddot{a}_{29\rceil}$ = 15.898

NC_{2017} = (137,978 – 7,333) / 15.898
= 8,218

8. **Continued**

Employee B:

AL_{2017} = NC_{2016} x 1.05
= 15,810 x 1.05 = 16,601

PVFB = 12* [100 x 6 + 120 x 9] x .8 x 14.5 x .64461
= 150,746

$ä_{9\rceil}$ = 7.463

NC_{2017} = (150,746 – 16,601) / 7.463
= 17,974

Total AL = 7,333 + 16,601 = $23,934

Total NC = 8,218 + 17,974 = $26,192

9. 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:
- (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.

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

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

(6b) Evaluate funding restrictions imposed by regulations.

Sources:

Canadian Pensions and Retirement Income Planning, 5th edition

Morneau Sobeco Handbook of Canadian Pension and Benefit Plans, Chapter 8

Ontario Pension Benefits Act

Asset Valuation Methods under ERISA, Pension Forum 9/2002

Asset Smoothing for Solvency Valuations, FSCO Q1 & A1

Guidance on Asset Valuation Methods, CIA September 2014

Commentary on Question:

Commentary listed underneath question component.

9. Continued

Solution:

(a) Calculate the annual minimum required and maximum permissible employer contributions for 2016. Assume no deferral of amortization schedules.

Show all work.

Commentary on Question:
Candidates generally did well on this part of the question. However, many candidates incorrectly calculated the maximum allowable contributions: it should be the sum of normal cost and hypothetical windup deficit. Many candidates used solvency deficit instead. Some people also made mistakes in the present value of amortization payments, by using wrong period or wrong interest rates.

Going Concern Surplus/(Deficit) = 460,586 – 375,000 = 85,586

Since there is a GC surplus, the existing GC amortization schedule can be eliminated.

Hypothetical Wind Up Excess/(Deficit) = 450,000 – 1,000 – 525,000 = -76,000

Smoothed Solvency Excess/(Deficit) = 460,586 – 1,000 – 490,000 = -30,414

Present value of existing solvency schedules at 1.1.2015
= 2,000 x [$\ddot{a}_{\overline{3}|}^{(12)}$ using smoothed solvency discount rate of 3.0%] +3,000 x [$\ddot{a}_{\overline{4}|}^{(12)}$ using smoothed solvency discount rate of 3.0%]
= 2,000 x 2.87 + 3,000 x 3.78
= 5,740 + 11,340
= 17,080

Remaining smoothed solvency deficit not funded given existing solvency schedules
= 30,414 – 17,080
= 13,334

Therefore, a new solvency amortization schedule is required, in the annual amount of
= 13,334 / [$\ddot{a}_{\overline{5}|}^{(12)}$ using smoothed solvency discount rate of 3.0%]
= 13,334 / 4.65
= 2,868

9. Continued

Minimum annual 2015 contributions
= NC + GC amortization payments + solvency amortization payments
= 50,000 + 0 + 2,000 + 3,000 + 2,868
= 57,868

Maximum annual 2015 contributions are limited to the NC and the larger of the GC deficit and hypothetical wind-up deficit
= NC + max (GC deficit, hypothetical wind-up deficit)
= 50,000 + (0, 76,000)
= 126,000

(b) Calculate the annual minimum required and maximum permissible employer contributions for 2017.

Show all work.

Commentary on Question:
Candidates generally did well on this part of the question. There are a few ways to reduce the amortization schedules, two of which are presented below. Marks were awarded as long as the candidates reduced the number of payments instead of reducing the payment amounts.

Net cash flow = Contributions – Benefit Payments – Non-Investment Expenses
Net cash flow for 2015 = 65,000 – 5,000 – 5,000 = 55,000

Adjusted market value of assets at 1.1.2016 using 1.1.2013 market value of assets
= $468,033 \times 1.055 + 55,000 \times 1.055^{0.5}$
= 550,267.07

Adjusted market value of assets at 1.1.2016 using 1.1.2014 market value of assets
= $466,863 \times 1.055 + 55,000 \times 1.055^{0.5}$
= 549,032.72

Adjusted market value of assets at 1.1.2016 using 1.1.2015 market value of assets
= $450,000 \times 1.055 + 55,000 \times 1.055^{0.5}$
= 531,242.26

Smoothed value of assets at 1.1.2016
= (550,267.07 + 549,032.72 + 531,242.26 + 650,000) / 4
= 570,135.51

9. Continued

Lower corridor threshold = 80% x market value of assets = 80% x 650,000 = 520,000
Higher corridor threshold = 120% x market value of assets = 120% x 650,000 = 780,000
Since the resulting smoothed asset value falls inside the two corridor thresholds, the resulting smoothed asset value is 570,136.

Going Concern Surplus/(Deficit) = 570,136 – 440,000 = 130,136

Since there is a GC surplus, no new GC amortization schedules required.

Hypothetical Wind-Up Excess/(Deficit) = 650,000 – 1000 – 670,000 = -21,000

Smoothed Solvency Excess/(Deficit) = 570,136 – 1,000 – 585,000 = -15,864

Present value of existing solvency schedules at 1.1.2016
= 2,000 x [$\ddot{a}_{2\overline{|}}^{(12)}$ using smoothed solvency discount rate of 3.0%] + 3,000 x [$\ddot{a}_{3\overline{|}}^{(12)}$ using smoothed solvency discount rate of 3.0%] + 2,868 x [$\ddot{a}_{4\overline{|}}^{(12)}$ using smoothed solvency discount rate of 3.0%]
= 2,000 x 1.94 + 3,000 x 2.87 + 2,868 x 3.78
= 3,880 + 8,610 + 10,841
= 23,331

<u>Minimum contributions SOLUTION 1: Reducing oldest schedules first</u>

The total present value of existing solvency schedules is greater than the smoothed solvency deficit, and therefore we can reduce the solvency schedule terms.

The oldest schedule (with annual payment of $2,000 and a present value of 3,880) can be eliminated completely, and the second oldest schedule (with annual payment of $3,000 and a present value of 8,610) can be reduced.

9. Continued

Schedule	Present Value of Schedule at Jan 1, 2016	Annual 2016 Payment
Oldest ($2,000 per year)	0 (this schedule can be eliminated)	0
Second Oldest ($3,000 per year)	15,864 – 10,841 = 5,023 (balancing item)	3,000 (as the PV needed of 5,023 is greater than the annual payment, the full 2016 year's payment for this schedule is required)
Newest ($2,868 per year)	10,841 (solved for above)	2,868 (as this schedule has not been adjusted)
Total	15,864 (smoothed solvency deficit)	3,000 + 2,868 = 5,868

Note: even though the plan is in an excess surplus on a going concern basis, because there is a hypothetical wind-up deficiency, the NC contributions are still permitted.

Minimum annual 2016 contributions
= NC + GC amortization payments + solvency amortization payments
= 60,000 + 0 + 5,868
= 65,868

Minimum contributions SOLUTION 2: Reducing newest schedules first

The total present value of existing solvency schedules is greater than the smoothed solvency deficit, and therefore we can reduce the solvency schedule terms.

The newest schedule (with annual payment of $2,868 and a present value of 10,841) can be reduced.

9. Continued

Schedule	Present Value of Schedule at Jan 1, 2016	Annual 2016 Payment
Oldest ($2,000 per year)	3,880 (solved for above)	2,000 (as this schedule has not been adjusted)
Second Oldest ($3,000 per year)	8,610 (solved for above)	3,000 (as this schedule has not been adjusted)
Newest ($2,868 per year)	15,864 – 3,880 – 8,610 = 3,374 (balancing item)	2,868 (because the PV needed of $3,374 is greater than the annual payment, so the full 2016 year's payment for this schedule is required)
Total	15,864 (smoothed solvency deficit)	7,868

Minimum annual 2016 contributions
= NC + GC amortization payments + solvency amortization payments
= 60,000 + 0 + 7,868
= 67,868

Maximum Contributions
Maximum annual 2016 contributions
= NC + max (GC deficit, hypothetical wind-up deficit)
= 60,000 + (0, 21,000)
= 81,000

(c) Describe the impact on the annual minimum required and maximum permissible employer contributions for 2017, if the plan were in a hypothetical wind-up surplus position.

Commentary on Question:
Candidates did not perform very well on this part of the question. Many candidates did not accurately describe excess surpluses and what contributions can be remitted.

- Since there is a GC surplus and a hypothetical wind-up surplus, we will need to apply the excess surplus test.
- The excess surplus, i.e., amount of GC surplus in excess of 25% of the GC liability,
- can be applied to reduce the NC contribution requirement.
- Since there is a surplus both GC and hypothetical wind-up bases, there are no amortization payments.

9. Continued

- Therefore, minimum contributions = maximum contributions = NC less the amount of excess surplus, if any, that can be applied to reduce the NC contributions

10. Learning Objectives:

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

Learning Outcomes:

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

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

Sources:

Selecting and documenting mortality assumptions, selection of mortality assumptions for pension plan actuarial valuations

Commentary on Question:

Candidates received partial credit where they identified each of the base mortality considerations. They received full credit where they described how plan experience, credibility and collar adjustments affected the base mortality assumption.

Most candidates received full credit for describing the methods for projecting adjustments for future improvements in mortality; however, most did not discuss the 3 elements of improvement rates or discuss emerging mortality improvement trends.

Solution:

Describe the considerations for selecting a base mortality table and mortality improvement scale when developing a best estimate mortality assumption for XYZ Company's pension plan.

Base mortality table considerations:

1. Plan's actual mortality experience: we are told a study was recently performed which showed actual mortality rates were slightly higher than the CPM2014Priv table
2. Credibility of plan experience: the plan would be considered mid-size, so only partial credibility would be assigned.
3. Experience of similar plans
4. Published mortality rates
5. Adjustments due to collar and industry: we are told that the employees covered are blue collar and the industry is private sector.

Future mortality improvement considerations:

1. Consider 3 elements:
   a. Short-term rate based on recently observed improvement rates;
   b. Ultimate long-term improvement rate, which is highly uncertain; and
   c. Transition from short-term to the ultimate improvement rates over certain period.

10. Continued

2. Three methods for projecting adjustments for future improvements in mortality:
   a. 2-D generational mortality tables;
   b. 1-D generational mortality tables; and
   c. Static mortality tables with a fixed projection period.

3. The actuary would give consideration to emerging mortality improvement trends and studies on a regular basis.

11. 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) Perform valuations for special purposes, including:
- (i) Plan termination/wind-up/conversion valuations
- (ii) Hypothetical wind-up and solvency valuations
- (iii) Open group valuations
- (iv) Multi-employer pension plan valuations

(7c) Explain and apply relevant qualification standards.

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

Sources:

Calculation of incremental cost on a hypothetical windup or solvency basis and CIA Consolidated Standards of Practice - 1000-1800, Effective October, 2014

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Calculate the transfer ratio as at September 30, 2016.

Show all work.

Commentary on Question:

The candidates were asked to project assets and liabilities to September 30, 2015 using the information provided, and then calculate the transfer ratio. Candidates did well for part a) of the question in general.

HWU1 @ September 30, 2015
= (HWU0 + SIC*0.75)* (1 + i(hwu))^(3/4) – BP*0.75 (1 + i(hwu)) ^ (3/8)
= (500 + 500 + 24*.75)*(1 + 0.025)^(3/4) – 12*0.75*(1 +0.025) ^ (3/8)
= 1,028

MVA1 @ September 30, 2015
= MVA0 (1 + i(ror)) + (CSC + SP – BP)*0.75 * (1 + i(ror)) ^(1/2)
= 750 * (1-0.1) + (15 + 45 – 12) * 0.75 * (1-0.1) ^ (1/2)
= 709

11. Continued

Transfer ratio
= (MVA1– WU Expense) / HWU1
= (709-5)/1028
= 69%

(b) Propose a course of action with respect to updating the September 30, 2016 transfer ratio. Justify your answer with reference to professional standards.

Commentary on Question:
Candidates were asked to come up with a course of action to deal with the situation described. Most candidates jumped too quickly to the conclusion rather than providing a solution that provides a walk through the thinking process described in the professional standards, missing key elements of the analysis.

Should determine how to reflect the event based on when the actuary became aware of the event

- Notify the client and all users
- Identify that the event was known after the transfer ratio report was filed with regulators
  - Determine if the information is classified as a subsequent event
  - Determine if the event would affect the report (i.e., if it would have been taken into account in the data, methods and assumptions.
  - Determine if need to amend or withdraw the report
    - If invalidate the report, should withdraw or amend the report
    - Should correct any data defect or calculation error that is revealed

12. 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.

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

(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) Explain and apply the Professional Conduct Guidelines.

(7c) Explain and apply relevant qualification standards.

(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 27, Determination of best estimate discount rates for going concern funding valuations, Provisions for adverse deviations in GC actuarial valuations of DB pension plans

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Recommend a best estimate going concern discount rate assumption using the building block approach. Justify your recommendation.

Commentary on Question:

In order for candidates to have received full credit, candidates would have needed to accurately outline the calculation of the discount rate, including the impact of diversification/rebalancing.

12. Continued

Weighted real return = [0.6 * 1.0%] + [0.25 * 4.5%] + [0.15 * 5.0%] = 2.5%
Plus inflation of 2.0%
Less investment management fees assumption of 0.1%
Plus impact of diversification/rebalancing. Typically this would be in a range of 0.3% to 0.5% per annum for a balanced portfolio. It is assumed that the effect for this plan is 0.4%.
Final rate = 2.5% + 2.0% - 0.1% + .4% = 4.8%

(b) Describe the alternative approach for determining the best estimate going concern discount rate as outlined in the CIA Consolidated Standards of Practice.

Aside from the building block approach, a going concern discount rate may be determined based on the yields on high quality fixed income investments, considering the expected future benefit payments of the pension plan. The resulting discount rate would be independent of the plan's assets.

(c) Describe in words how the proposed changes will impact the best estimate going concern discount rate, using the building block approach.

The higher allocation to bonds would decrease the expected return, and therefore lower the going concern discount rate (everything else being equal).
The actuary would assume there will be no additional returns achieved, net of investment expenses, from active management strategy compared to the passive strategy, unless there is relevant supporting data that such additional returns will be consistently and reliably earned over the long term.

13. Learning Objectives:

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

Learning Outcomes:

(5k) The candidate will be able to describe and apply regulation pertaining to coordination of individual and employer sponsored retirement plans.

Sources:

Reference – Morneau Chpt. 7, 8, 12, PBA, Canadian Pensions and Retirement Income Planning chpt 13, 14, 16, 19

Commentary on Question:

The question tested the candidates understanding of other different retirement or savings arrangements that can be provided to employees that were included in the readings.

Solution:

(a) Describe the advantages and disadvantages of the above arrangements from an employer costing perspective.

Commentary on Question:*In general, well prepared candidates were able to provide advantages and disadvantages. However, many candidates did not answer from the employer's perspective. To attain full marks, a candidate would have shown an understanding of costs advantages and disadvantages from the employer's perspective.*

<u>DCRPP</u>

Advantages

- Stable contributions for employers
- Employer contributions are not subject to payroll taxes
- Employer may make contributions on deemed earnings upon eligible leave of absence

Disadvantages

- Subject to minimum standards pension requirements
- Requires plan governance and monitoring by employer

13. Continued

Group RRSP
Advantages
- Not subject to provincial legislation
- Flexibility on employer contributions

Disadvantages
- Employer contribution are subject to payroll taxes
- Employer may not be able to determine RRSP contribution room

Defined Profit Sharing Plan (DPSP)
Advantages
- No minimum contribution requirement - employer contributions align with company performance/based on profits
- Employer contributions are not subject to payroll taxes

Disadvantages
- Contributions are made with respect to profits.

(b) Compare and contrast the following characteristics of the above arrangements from a regulatory perspective:

(i) Employer contributions

(ii) Employee contributions

(iii) Contribution limits

(iv) Periods of absence

(v) Forfeitures

(vi) In-service withdrawals

Commentary on Question:
In general, candidates were able to a provide points for DC RPP; however Group RRSP and DPSP arrangements were not as well understood. To attain full marks, a candidate would have shown a good understanding of the characteristics of the different benefits plans.

13. Continued

(i) Employer Contributions

DCRPP
- in accordance with the plan as registered
- minimum employer contribution required is 1% of total pensionable earnings
- does not attract payroll tax
- contributions must be made within 30 days from the end of the month in which they were deducted

GRRSP
- as defined by the employer
- payroll taxes apply to employer contributions
- contribution frequency is not governed by pension legislation

DPSP
- only employer contributions allowed
- does not attract payroll tax
- No minimum contribution requirement
- contribution frequency is not governed by pension legislation

(ii) Employee Contributions

DCRPP
- in accordance with the plan as registered
- contributions must be made within 30 days from the end of the month in which they were deducted

GRRSP
- in accordance with the plan as registered
- contributions must be made within 30 days from the end of the month in which they were deducted
- no minimum contribution required
- contributions are tax deductible

DPSP
- members are not eligible to contribute

13. Continued

(iii) Contribution Limits

DCRPP
- Employer contribution along with employee contributions cannot exceed the PA limit in year

GRRSP
- maximum contribution is based on both previous year's earned income and PA

DPSP
- contribution limited to half of RPP money purchase limit

(iv) Periods of Absence

DCRPP
- employer continues to make contributions if no member contributions are required
- employer continues to make contributions unless the member gives the employer written notice that he/she does not intend to contribute

Maximum 1 point

GRRSP
- RRSP room is based on earned income, therefore for prolonged leave of absence and have no earned income, member will have limited contribution room

DPSP
- contributions are not allowed during leave of absence

(v) Forfeitures

DCRPP
- may be paid out to employer
- relocated to remaining members
- used to pay admin or investment expenses incurred by plan
- used to satisfy the employer's contribution obligations
- must be included in the PA of the employee

13. Continued

GRRSP
- not applicable

DPSP
- must be paid to the employer, or
- reallocated to the beneficiaries

(vi) In-service withdrawal

DCRPP
- not allowed

GRRSP
- can be withdrawn at any time, unless the plan prohibits withdrawals

DPSP
- If plan permits, may allow member to withdraw all or a portion of their vested account at any time while employed