

Exam RETDAU

Date: Thursday, April 29, 2021

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has 11 questions numbered 1 through 11 with a total of 100 points.

The points for each question are indicated at the beginning of the question. Questions 5 and 10 pertain to the Case Study.

2. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions provided in this document.

Written-Answer Instructions

1. Each question part or subpart should be answered either in the Word document or the Excel file as directed. Graders will only look at work in the indicated file.
 - a) In the Word document, answers should be entered in the box marked ANSWER. The box will expand as lines of text are added. There is no need to use special characters or subscripts (though they may be used). For example, β_1 can be typed as beta_1 (and ^ used to indicate a superscript).
 - b) In the Excel document formulas should be entered. Performing calculations on scratch paper or with a calculator and then entering the answer in the cell will not earn full credit. Formatting of cells or rounding is not required for credit.
 - c) Individual exams may provide additional directions that apply throughout the exam or to individual items.
2. The answer should be confined to the question as set.
3. Prior to uploading your Word and Excel files, each file should be saved and renamed with your five-digit candidate number in the filename.
4. The Word and Excel files that contain your answers must be uploaded before time expires.

Canadian version of this exam is recognized by the Canadian Institute of Actuaries.

Navigation Instructions

Open the Navigation Pane to jump to questions.

Press Ctrl+F, or click View > Navigation Pane:



GENERAL INSTRUCTIONS

- All questions indicate whether the response is to be answered in Word or Excel. Only the Word document will be graded for parts of a question with Word answer boxes; only the Excel spreadsheet will be graded for parts of a question with Excel instructions.
- When answering in Excel, “show your work” means
 - Calculation formulas must be used in the answer cells containing the work.
 - All work should be labeled.
- When answering in Excel:
 - Formatting and rounding is not required for credit.
 - Best practice is to write out the formulas in words, which demonstrates understanding and may result in earning partial credit.

CASE STUDY INSTRUCTIONS

The case study will be used as a basis for some examination questions. Be sure to answer the question asked by referring to the case study. For example, when asked for advantages of a particular plan design to a company referenced in the case study, your response should be limited to that company. Other advantages should not be listed, as they are extraneous to the question and will result in no additional credit. Further, if they conflict with the applicable advantages, no credit will be given.

1.

(7 points)

- (a) (1 point) Describe the risks an actuary should disclose in a valuation report based on Actuarial Standard of Practice No. 51, Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions (ASOP 51).

ANSWER:

- (b) (1 point) Identify the methods for assessing the risks described in part (a) based on ASOP 51.

ANSWER:

Company XYZ has experienced significant cost fluctuation in their defined benefit pension plan and wishes to mitigate this volatility.

- (c) (2 points) Recommend two pension risk transfer strategies available to Company XYZ.

Justify your response. No calculations required.

ANSWER:

- (d) (3 points) Compare and contrast the accounting treatment of each strategy identified in part (c) under:

- (i) U.S. Accounting Standard ASC 715
- (ii) International Accounting Standard IAS 19, Rev. 2011

No calculations required.

ANSWER:

2.

(8 points) Company ABC acquired Company XYZ through a share purchase. Company ABC sponsors an open defined contribution pension plan (Plan A). Company XYZ sponsors an open defined benefit pension plan (Plan X). Both plans target the same replacement ratio for a career employee working 30 years.

The combined company is considering the following options with respect to current employees within their retirement plans:

- Option 1: No change to either plan; employees continue to accrue benefits in their respective plans.
- Option 2: Company XYZ employees accrue benefits in Plan A prospectively. Plan X is frozen for benefit accruals.
- Option 3: Company XYZ employees are given the choice to either continue to accrue benefits in Plan X or enroll in Plan A going forward and convert past service to Plan A. For employees who convert past service to Plan A, the lump sum value of their accrued pension in Plan X on the date of conversion becomes the initial account balance in Plan A.

In each option future employees will join Plan A. Assume all options are legally allowed in their jurisdiction.

- (a) (6 points) Analyze the impact of the three options on the following:
- (i) Accounting cost to the merged company
 - (ii) Administrative cost to the merged company
 - (iii) Disruption to current employees

ANSWER:

2. Continued

Company ABC selected Option 3.

(b) (2 points) Recommend which plan the following employees should choose:

(i) 30-year old with one year of service in Plan X

(ii) 55-year old with 25 years of service in Plan X

No calculations required. Justify your response.

ANSWER:

3.

(9 points)

- (a) (3 points) Describe the features of the Variable Payout Life Annuity (VPLA) option in the University of British Columbia Faculty Pension Plan (UBC FPP).

ANSWER:

- (b) (3 points) Describe three risks of the VPLA option from the perspective of plan participants.

ANSWER:

- (c) (3 points) Recommend actions a plan sponsor could take to minimize the risks identified in part (b) above.

Justify your response.

ANSWER:

4.

(8 points)

- (a) *(4 points)* Compare and contrast a Multi-Employer Pension Plan's (MEPP) risk sharing structure to the risk sharing structure of the following:
- (i) Single employer defined contribution pension plan
 - (ii) Single employer defined benefit pension plan

ANSWER:

- (b) *(4 points)* Propose three investment strategies to mitigate risks in a MEPP.

Justify your response.

ANSWER:

Question 5 pertains to the Case Study.

5.

(15 points) NOC sponsors an unfunded Supplemental Retirement Plan (SRP) for its CEO. The SRP restores the annuity benefit not payable from the National Oil Pension Plan.

CEO Employee Data:

Date of Birth	1/1/1971	
Date of Hire	1/1/2011	
Earnings History	2016	\$800,000
	2017	\$850,000
	2018	\$900,000
	2019	\$950,000
	2020	\$1,000,000

SRP assumptions as of December 31, 2020 under U.S. Accounting Standard ASC 715 (ASC 715):

Retirement age	62.0
Pre-retirement decrements	None
Future Salary Scale	3.00%
Discount Rate	3.75%
Age 62 Annuity Factor at 3.75%	15.2

Excerpt of SRP results under ASC 715 as of December 31, 2020:

Unamortized Transition Obligation	\$0
Unamortized Prior Service Credit	\$60,000
Unamortized (Gain)/Loss	\$700,000
Annual Prior Service Credit Amortization	\$7,000

- (a) (7 points) Calculate the 2021 Net Periodic Pension Cost for the SRP under ASC 715.

Show all work.

The response to this part is to be provided in the Excel spreadsheet.

5. Continued

NOC has decided to freeze benefit accruals in both the National Oil Pension Plan and the SRP effective March 31, 2021.

SRP assumptions as of March 31, 2021 under ASC 715:

Discount Rate	3.25%
Age 62 Annuity Factor at 3.25%	16.1
Earnings through March 31, 2021	\$257,500

All other assumptions remain the same.

- (b) (8 points) Calculate the revised 2021 Net Periodic Pension Cost for the SRP under ASC 715 reflecting the plan freeze.

Show all work.

The response to this part is to be provided in the Excel spreadsheet.

6.

(10 points) Company ABC sponsors a defined benefit pension plan. The assets of the pension plan are invested according to the following investment strategy:

Asset Class	Portfolio Allocation	Arithmetic Return	Geometric Return	Standard Deviation
Bond	40%	3.2%	3.0%	5.5%
Equity	60%	7.7%	6.6%	18.0%

The correlation between bonds and equities is 25%.

(a) (2 points) Calculate the following for the pension plan portfolio:

(i) Arithmetic return

(ii) Geometric return

Show all work.

The response to this part is to be provided in the Excel spreadsheet

Company ABC used the following assumptions to determine financial disclosure information under U.S. Accounting Standard ASC 715.

Expected Return on Plan Assets	6.00%
Discount Rate	6.00%
Salary Scale	1.00%
Inflation	2.00%
Retirement Age	60
Termination Assumption	none
Mortality Table	90% of the Pri-2012 Private Retirement Plans Mortality Table
Mortality Improvement Scale	none

The pension plan provides an unreduced benefit at age 60.

(b) (4 points) Critique each of the assumptions used to calculate the financial disclosure information.

ANSWER:

6. Continued

- (c) (2 points) Describe the economic assumption disclosures that an actuary must communicate in an actuarial report under Actuarial Standard of Practice No. 27, Selection of Economic Assumptions for Measuring Pension Obligations.

ANSWER:

Company ABC has decided to adopt a new investment strategy and will phase it in over three years.

- (d) (2 points) Explain three approaches to determine the expected return on plan assets.

ANSWER:

7.

(8 points)

- (a) (2 points) Describe the roles of the following parties involved in the audit of a pension plan under Actuarial Standard of Practice No. 21, Responding to or Assisting Auditors or Examiners in Connection with Financial Audits, Financial Reviews and Financial Examinations (ASOP 21):

- (i) Responding Actuary
- (ii) Reviewing Actuary

ANSWER:

You are the actuary for Company ABC's defined benefit pension plan. Company ABC calls to tell you their auditor's Reviewing Actuary is requesting information for the annual plan audit. You wait a few months, then send the auditor the census data and a liability summary. The Reviewing Actuary then asks you to quantify the impact of certain demographic movements on the plan's liability and you neglect to respond as the impact is minimal.

- (b) (4 points) Critique the actions of the following parties with respect to ASOP 21 and the Code of Professional Conduct:

- (i) Responding Actuary
- (ii) Reviewing Actuary

ANSWER:

- (c) (2 points) Describe considerations when defining materiality thresholds for a pension plan audit.

ANSWER:

8.

(8 points) Company ABC sponsors a post-retirement benefit plan and is considering using a settlement strategy to fully or partially terminate the plan.

- (a) (2 points) Describe Company ABC's considerations when selecting a settlement strategy.

ANSWER:

Company ABC determines their goals with regards to the settlement strategy for their post-retirement benefit plan are:

- Provide a high level of benefit security to retirees
- Ensure retirees are not burdened with additional responsibilities
- Reduce costs
- Ease administration

- (b) (4 points) Propose a settlement strategy for Company ABC that meets all the above goals.

Justify your response.

ANSWER:

- (c) (2 points) Describe how Company ABC can ensure the implementation of the proposed settlement strategy in part (b) is effective.

ANSWER:

9.

(9 points)

- (a) (1 point) List the factors actuaries should take into account in the selection of mortality and mortality improvements, according to Actuarial Standard of Practice No. 35, Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations.

ANSWER:

You are provided the following information:

	Design	Covered Population	Gender mix of employees	Number of Employees	Number of Retirees
Plan A	Unit benefit defined benefit plan	Hourly union	85% male	20,000	27,500
Plan B	Final average pay defined benefit plan	Salaried non-union	50% male	18,000	25,000
Plan C	Career average pay plan with a lump sum option	Physicians	50% male	2,000	30

- (b) (6 points) Describe the considerations for setting the mortality assumption for the following:
- (i) Plan A
 - (ii) Plan B
 - (iii) Plan C

ANSWER:

9. Continued

You are provided the following data from Plan A's 2017-2020 annuitant experience study.

	Male	Female
Actual deaths during period	1,650	201
Expected deaths during period, based on standard mortality table	1,500	233
Number of deaths on a counts-weighted basis for full credibility	1,537	1,537

- (c) (2 points) Calculate the multipliers to be applied to the standard mortality table base rates based on the plan experience and credibility theory for the following:
- (i) Males
 - (ii) Females

Show all work.

The response to this part is to be provided in the Excel spreadsheet

Question 10 pertains to the Case Study.

10.

(8 points) NOC is considering amending the Pension Plan to a higher benefit multiplier and amending the Retiree Health Benefit Program to add a disability benefit.

- (a) (4 points) Evaluate the impact of the proposed plan changes on the demographic assumptions.

ANSWER:

On February 1, 2021 NOC announces they are changing the following, effective July 1, 2021:

- Increasing the Pension Plan multiplier to 2.25% for all prior and future service
- Providing benefits in the Retiree Health Benefit Program at age 65 for those participants who become disabled at any age

- (b) (4 points) Describe the implications of these changes on the 2021 Net Periodic Pension Cost under U.S. Accounting Standards ASC 715 for the following plans:

- (i) Pension Plan
- (ii) Retiree Health Benefit Program

No calculations required.

ANSWER:

11.

(10 points)

- (a) (4 points) Explain how the advantages of converting a defined benefit pension plan to a defined contribution plan may not translate to the public sector.

ANSWER:

- (b) (6 points) Describe how taxpayer risks are affected by the following in public sector pension plans:

- (i) Plan design features
- (ii) Contribution policy
- (iii) Governance structure

ANSWER:

****END OF EXAMINATION****