
SOCIETY OF ACTUARIES
Group and Health Core Exam - Canada

Exam GHCORC

MORNING SESSION

Date: Wednesday, April 25, 2018

Time: 8:30 a.m. – 11:45 a.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 100 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 40 points).
 - a) The morning session consists of 8 questions numbered 1 through 8.
 - b) The afternoon session consists of 6 questions numbered 9 through 14.

The points for each question are indicated at the beginning of the question. Questions 3, 4, and 11 pertain to the Case Study.
2. Failure to stop writing after time is called will result in the disqualification of your answers or further disciplinary action.
3. 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 on the exam booklet.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.
2. Write on only one side of a sheet. Start each question on a fresh sheet. On each sheet, write the number of the question that you are answering. Do not answer more than one question on a single sheet.
3. The answer should be confined to the question as set.
4. When you are asked to calculate, show all your work including any applicable formulas.
5. When you finish, insert all your written-answer sheets into the Essay Answer Envelope. Be sure to hand in all your answer sheets because they cannot be accepted later. Seal the envelope and write your candidate number in the space provided on the outside of the envelope. Check the appropriate box to indicate morning or afternoon session for Exam GHCORC.
6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

Tournez le cahier d'examen pour la version française.

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.

****BEGINNING OF EXAMINATION****
Morning Session

- 1.** (5 points) With respect to the Standards of Practice for actuaries practicing in Canada:
- (a) (2 points) List and provide examples of the benefit types that require an actuary's advice for funding or accounting of post-employment benefit plans.
 - (b) (1 point) List the types of actuarial advice an actuary may give for post-employment benefits plans.
 - (c) (2 points) You have been asked to provide actuarial advice on the funding of a post-employment benefits plan.
 - (i) Describe three actuarial cost methods that could be used for this purpose.
 - (ii) List two types of asset valuation methods that could be used for this purpose.
 - (iii) List information sources that can be used to determine plan provisions of the benefit types to be valued.

2. (9 points) Next Generation is a US-based company that recently acquired Norquay Inc., a Canadian company with 500 employees in Alberta and Ontario. Norquay offers a benefit package that includes medical, dental, basic life, optional life, STD, and LTD benefits. All Norquay benefits are currently underwritten on a fully insured basis.

Assume a tax rate of 30% for all employees.

- (a) (2 points) Next Generation self-insures its medical and dental benefits in the US. They would like to consider self-insuring the medical and dental benefits in Canada. You have been asked to project the plan cost for 2018 under a self-insured arrangement. The current insurer has provided the following for calendar year 2016:

Province	Medical Claims Per Employee Per Year	Dental Claims Per Employee Per Year	Number of Employees
Alberta	\$1,300	\$1,050	300
Ontario	\$1,200	\$900	200

The insurer's administrative expenses are 7% of paid claims for medical benefits and 6% of paid claims for dental benefits.

Calculate the expected total cost for calendar year 2018. State any assumptions and show your work.

- (b) (7 points) It is common among Norquay's competitors in Canada to offer a flex plan. Next Generation is considering offering an employer-paid core plan that includes medical, dental, basic life, and LTD benefits. Flex credits of \$1,000 will be provided to allow employees to upgrade medical or dental benefits, buy optional life insurance for themselves or their dependents, or fund a health spending account (HSA) or wellness spending account.

Proposed price tags are as follows:

	Medical Benefits	Dental Benefits
Core: 80% co-insurance	No employee cost	No employee cost
Option A: 90% co-insurance	Single: \$100 Couple: \$200 Family: \$300	Single: \$80 Couple: \$144 Family: \$200
Option B: 100% co-insurance	Single: \$150 Couple: \$300 Family: \$450	Single: \$120 Couple: \$216 Family: \$300

2. Continued

The monthly optional life premium rate is \$0.18 per \$1,000 of coverage. The employer-paid core basic life premium is \$10 per month and the employer-paid LTD premium is \$60 per month for all employees.

To ensure that these credits will be spent in the most tax-effective way possible, Next Generation is testing the insurer's credit allocation sequence. Human Resources has selected the following two sample employees:

- Employee A elects Option B family coverage for both medical and dental benefits, and \$500,000 in optional life coverage. The employee is also expecting additional orthodontics expenses for her children that are not covered by the dental plan.
 - Employee B is a single employee who is comfortable with the core medical and dental coverage. However, he expects an additional expense of \$200 for new glasses that would not be covered by the core plan and wants to buy \$300,000 in optional life coverage. He also buys an annual gym pass for \$500.
- (i) (2 points) Evaluate the proposed premium and price tag structure.
 - (ii) (2 points) Explain the most tax-efficient allocation of flex credits for each employee.
 - (iii) (2 points) Calculate the total employee cost based on your response from (ii) above. State any assumptions and show your work.
 - (iv) (1 point) Describe the methods permitted to handle unused credits and excess claims under an HSA.

*Questions 3 and 4 pertain to the case study.
Each question should be answered independently.*

- 3.** (10 points) Living Daylights Life and Health Insurance Company (“Living Daylights”) files Dynamic Capital Adequacy Testing (“DCAT”) reports.
- (a) (1 point) List the responsibilities of the Appointed Actuary with respect to DCAT.
 - (b) (1 point) Describe the goals of DCAT stress testing.
 - (c) (1 point) List the basic requirements of a sound DCAT model.
 - (d) (5 points) Construct the base scenario for Living Daylights’ 2015 DCAT analysis, given the following assumptions:
 - Premiums and other operating revenue are expected to grow 5% each year
 - Non-operating revenues are expected to remain level as of 2014
 - Benefit loss ratio (benefit expense/premiums) is expected to deteriorate by 1% each year for 3 years, then reach steady state
 - Other expenses are expected to grow proportionally to premiums
 - Income tax rate is expected to remain unchanged
 - Living Daylights’ business plan forecast period is 3 years

Show your work.

- (e) (2 points)
 - (i) (1 point) Describe two significant risks to capital adequacy for Living Daylights.
 - (ii) (1 point) Describe plausible adverse scenarios to test each of the risks from (i), including possible ripple effects.

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*Questions 3 and 4 pertain to the case study.
Each question should be answered independently.*

4. (6 points) You are an actuary working for Thunderball Corporation (“Thunderball”). PowerPlay Inc. (“PowerPlay”) is a large client of Thunderball with operations based mainly in the U.S. PowerPlay is setting up a new division in Manitoba, and requested a quote on the cost of providing Long Term Disability (“LTD”) coverage to this new division.

The new disability benefit will provide \$4,000 per month, payable up to the earliest of recovery, death or attaining age 65. The benefit has an elimination period of three months.

The age and gender distribution for the new division is as follows:

Age	# Employees	
	Male	Female
27	8	10
32	31	25

As there is no prior claims experience for the new division, the Chief Actuary has asked you to use the expected cost of new disabilities to estimate the required premium for next year.

Your team has already calculated the following disabled life reserve (“DLR”) factors:

Age	DLR factors	
	Male	Female
27	46	53
32	58	65

Assume the current discount rate is 0%, and an expense factor of 10%.

- (a) (2 points) Calculate the expected disability claims cost for the new division. Show your work.
- (b) (1 point) Calculate the monthly LTD premium rate (per \$100) Thunderball should charge for the new division. Show your work.

4. Continued

- (c) (3 points) In a subsequent discussion PowerPlay decides to self-insure disability claims for the first three years. Thunderball is asked to price an LTD policy that would cover disability claims starting with year four, up to the earliest of recovery, death or attaining age 65.

Assume male and female death & recovery probability is the same.

Assume death & recovery occurs mid-year.

Calculate the expected claims cost of this LTD policy. Show your work.

5. (8 points) You work at Only Life Insurance Company (“Only Life”), which is considering expanding its business. Only Life is looking to acquire a closed block of individual disability insurance (“IDI”) business from Entire Disability Company (“Entire”).

Entire’s closed block of IDI business has the following attributes:

- Unpadded reserves of \$2,885,000 as of December 31, 2017
- Expected reserve cash flows of \$1,000,000, \$1,100,000 and \$1,200,000 over the next three years
- Assets backing the business from Entire include:
 - A bond valued at \$2,600,000, with 3 years of coupon payments of \$1,000,000
 - \$400,000 cash
- Best estimate interest rate of 2%

- (a) (1 point) Describe the steps of a successful company's life cycle.
- (b) (1 point) Calculate the Balance Sheet position of Entire’s closed block of business based on best estimate assumptions. Show your work.
- (c) (4 points) The interest rate scenario to be used for Canadian Statutory filing is a one percentage point decrease from the best estimate interest rate.

Calculate the Interest Rate PfAD. Show your work.

- (d) (1 point) Additional testing on Entire’s closed block determined the following:
- Morbidity PfAD = \$100,000
 - Expense PfAD = \$20,000

Calculate the Balance Sheet position of Entire’s closed block of business based on padded assumptions. Show your work.

- (e) (1 point) Recommend to Only Life’s Senior Management if they should or should not purchase the IDI business from Entire. Justify your response.

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6. (9 points) Best Business and its employees are located in British Columbia. They are considering implementing a new employer paid Short Term Disability (“STD”) plan. With the new STD plan, Best Business would qualify for the Employment Insurance (“EI”) premium reduction. Best Business has five employees and their annual salaries are listed below:

Employee Name	Annual Salary
Brad	\$50,000
Beverley	\$60,000
Bianca	\$85,000
Boris	\$45,000
Brian	\$90,000

EI and the STD plan specifics are provided below:

EI Maximum Insurable Earnings	\$51,300
Employee EI Premium Rate	1.63% of insurable earnings
Employer EI Premium Rate Reduction	0.50% of insurable earnings
Weekly STD Benefit Amount	60% of salary
Maximum Weekly STD Benefit Amount	\$850
STD Monthly Premium Rate	\$2.25 per \$10 of weekly benefit

- (a) (2 points) List the minimum requirements an employer must satisfy to qualify for the EI Premium Reduction program.
- (b) (1 point) Describe acceptable ways the savings in EI Premium Reduction must be shared between the employer and employees.
- (c) (4 points) Calculate the change in cost to Best Business to implement the new STD Plan. Show your work.

6. Continued

- (d) (2 points) Best Business has implemented the STD plan as described above. It is now one year later and the government has made changes to the EI benefits. In order to continue to qualify for the EI Premium Reduction, the existing STD plan needs to be amended, which would increase the STD premium by 10%.

Assume the following:

- Best Business' employees and salary levels have not changed from last year
- There have been no changes to the EI premium rates from last year

Assess from an employer cost perspective whether it is in Best Business' interest to amend the STD Plan to maintain their EI Premium Reduction or to maintain their current STD plan. Show your work and justify your response.

7. (7 points) Your client, Kluane Corporation, is a large organization operating in Ontario, British Columbia (“BC”), and Alberta. Kluane has expanded its operations through acquisitions, so there are three separate group benefit policies in place (one for each province), including the following LTD benefits:

Province	BC	Alberta	Ontario
Benefit level	60%	66.67%	70%
Monthly maximum	\$4,500	\$6,000	\$6,000
Elimination period	120 days	90 days	120 days
Tax status	Taxable	Taxable	Non-taxable

Kluane has recently contacted you expressing interest in amalgamating the LTD plans under a single self-insured benefit.

- (a) (1 point) Describe common reasons that plan sponsors may prefer self-insured LTD plans over an insured arrangement.
- (b) (3 points) Draft an email to Kluane’s CFO that includes the following:
- (i) Explain the primary concern(s) that the insurance industry has with self-insured LTD plans.
 - (ii) Outline possible government policy solutions to address these concerns.
 - (iii) Describe any existing legislation that would impact Kluane’s decision.

7. Continued

- (c) (3 points) Based on your input, Kluane has decided to consolidate its LTD benefits under one insured policy effective January 1, 2018 with the following provisions:

	All
Benefit level	66%
Monthly maximum benefit	\$5,000
Elimination period	120 days
Tax status	Taxable

Assess the impact of the change in benefit for each of the following employees:

- John works in Alberta. His annual salary is \$130,000.
- Ed works in Ontario. His annual salary is \$45,000.
- Mel works in BC. His annual salary is \$90,000. He broke his leg and began collecting short term disability benefits on December 1, 2017; however, he expects to be back to work by February 1, 2018.

Show your work and justify your response.

8. (6 points) You are the valuation actuary for a Canadian insurance company. You receive the following income statement for renewal of a business protection disability insurance block, called BP (A+), for 2017.

Income Statement	
As of December 31, 2017	
	BP (A+)
	(\$)
Revenue	
• Premium	300,000
• Investment Income	<u>54,000</u>
	354,000
Expenses	
• Benefits Paid	350,000
• Change in Reserves	400,000
• Operating Expenses	8,000
• Commissions	30,000
• Premium Tax	<u>6,000</u>
	794,000
Net Income	(440,000)

At the end of 2016, the company had the following expectations for 2017:

Premium	\$300,000
Investment income	\$60,000
Benefit payments	\$250,000
Reserve increase	\$50,000
Operating expenses	2% of benefits paid
Commissions	10% of premium
Premium tax	2% of premium

- (a) (1 point) List and describe the types of business protection coverage.
- (b) (2 points) Outline the IFRS 4 disclosure requirements for:
- Assumptions
 - Effect of changes in assumptions

8. Continued

- (c) (3 points) In light of bad experience, management decided to increase the incidence assumption MfAD at the end of 2017, which resulted in a \$400,000 PfAD increase. Other reserve changes during the year were due to experience.

Construct the Source of Earnings Analysis for 2017, using the Income Statement lines, and the following categories:

- Experience Gain/Loss,
- Assumption Changes, and
- Investment Gain/Loss.

Show your work.

****END OF EXAMINATION****
Morning Session

USE THIS PAGE FOR YOUR SCRATCH WORK