2014 PART III EXAMINATIONS

Subject Title: **C2A Life Insurance**
(longer answer component)

Date: **Tuesday, 14 October 2014**

Time: **1:00 pm – 1:15 pm** (Reading Time)
1:15 pm- 4:15 pm (Examination)

Time allowed: Three (3) hours and fifteen (15) minutes including reading time.

Instructions: Type your answers to the longer answer component into one Word document and ensure that there is no data linked to spreadsheets.

An Excel file must be submitted for each question.

Number of Questions: **Two** (2)

Question	Marks
1	30
2	30
Total	**60**

Candidates are required to answer **ALL** questions.
This paper has **four** (4) pages (excluding this page).

COURSE C2A LIFE INSURANCE **SEMESTER 2 2014 EXAMINATIONS**

Answer TWO questions.

QUESTION 1 **(30 Marks)**

You are the pricing actuary for CanDoIt Ltd, a medium sized Australian life insurer that sells a range of risk and savings products.

CanDoIt has an automated system to calculate the reinsurance premiums that are due on its YRT business, under its current obligatory treaty. Every month this system performs the calculation of reinsurance premiums for the month ahead, i.e. premiums are payable monthly in advance.

As part of a regular audit, you are required to independently calculate the reinsurance premium that is due for the month ahead, to check against the amount generated by the automated system. The reinsurance arrangements currently in place for the YRT business, under the obligatory treaty, are as follows:

- A proportional arrangement with 60% of cover ceded to the reinsurer, with reinsurance premium based on the reinsurer's risk rates;
- A selection discount of 100% is payable in the first year of the policy, but no reinsurance commissions are payable.
- Treaty underwriting limits for maximum sum insured of the original policy are:
    - If no underwriting loadings: $7,500,000
    - Underwriting loadings are 100% or less: $4,000,000
    - Underwriting loadings are greater than 100% but less than 600%: $3,000,000
    - Any policy that is outside these limits is 100% facultatively reinsured.

The reinsurer's risk rates and the profile of CanDoIt's in-force YRT policies can be found in the spreadsheet '2A Exam 2014 Sem 2 Q1'.

a) Assuming that the date is 1-10-2014, calculate the reinsurance premium due under the obligatory treaty for the month of October 2014.

(8 marks)

b) The Board of CanDoIt is particularly concerned with the mortality risk posed by an outbreak of pandemic influenza. It considers that current reinsurance arrangements on the YRT business provide insufficient protection against the extra claims that would arise, should a significant pandemic cause many deaths.

As an initial step to investigate their concerns, you have obtained the following information from a consultant, with regards to the mortality risks posed by a pandemic:

- There is a 3% chance that a pandemic can occur in any 12 month period;
- If a pandemic occurs, there is a 20% chance that standard mortality will increase by 500% for that 12 month period

- If a pandemic occurs, there is an 80% chance that standard mortality will increase by 200% for that 12 month period

Based on the consultant's view on pandemic risk and using the mortality tables provided, calculate the additional claims expected to arise as a result of a pandemic, net of current reinsurance arrangements.

Make your calculations based on the 12 month period starting from 1-10-2014, with expected standard mortality on the YRT business given in the sheet 'standard mortality', in the spreadsheet '2A Exam 2014 Sem 2 Q1'. Justify any assumptions that you make.

(6 marks)

c) The Board of CanDoIt has seen your additional claims risk calculation in (b) above and is now considering what additional reinsurance arrangements could be undertaken to mitigate the risk of extra mortality claims arising from a pandemic influenza.

It is considering three options, one of which the Board will ultimately select to proceed with:

(i) The current YRT reinsurer has offered to extend the current arrangements, to now reinsure 80% rather than 60% of the sum insured of each policy under the obligatory treaty. The rates for the additional sum reinsured would be 115% of the existing reinsurance risk rates.

(ii) Pursuing a non-proportional, stop-loss reinsurance cover.

(iii) Pursuing a non-proportional, catastrophe reinsurance cover.

CanDoIt's Board has requested that you provide a recommendation as to which of the three options above provides the most appropriate reinsurance arrangement for protection against pandemic risk. In justifying your recommendation you should explain why the alternatives are less appropriate than your recommended option.

(8 marks)

d) Other than the additional mortality claims risk, describe other risks that CanDoIt faces from a pandemic. Describe the various risk management strategies and practices it can adopt to mitigate these risks.

(8 marks)

Spreadsheet: 2A_Exam_2014_Sem_2_Q1

QUESTION 2 **(30 Marks)**

You are a recently qualified actuary who works for the Australian life insurer TakeMyMoney Ltd (TMM). TMM has large volumes of YRT, TPD, Disability Income and Trauma risk products in force, and has a small but growing number of single-premium, inflation-linked life annuities.

The annuities pay annual payments at the end of each year as long as the policyholder is alive at that time. The applicable inflation rate is the previous year's Consumer Price Inflation figure or 3%, whichever is the greater.

TMM's Appointed Actuary has asked you to contribute to the re-pricing of the annuity product, to allow for updated mortality assumptions.

The most recent pricing basis is:

- Expenses:
    - Initial: $500
    - At the time of each payment: $85 plus 0.15% of the payment amount
    - Policy termination (i.e. upon death): $300 at end of year of death
- A simplified reserving basis for establishing reserves at the end of each policy year for a policyholder alive at that time, is given by:
    - 0.5 x [amount of annuity payment just made] x [120 – entry age – policy duration in years]

  (You may assume that this reserving basis aligns with relevant regulatory requirements and cannot be modified).
- Interest = 4% per annum
- The relevant risk discount rate is 5% per annum
- Tax may be ignored
- Inflation: 3.1% per annum
- The profit requirement for TMM is that EPV(profits) / EPV(premium) = 3%.

The relevant mortality data is in the sheet 'Tables', within the spreadsheet '2A Exam 2014 Sem 2 Q2'. This includes the current mortality assumptions and the historical population-level female mortality rates for certain ages, dating back over 100 years.

a) Provide a price for the annuity product, assuming that a 60 year old female takes out a policy that will pay her $40,000 in exactly one year's time, with payments increasing in line with inflation thereafter. You should justify any assumptions that you adopt concerning mortality experience, but for the purposes of pricing this particular policy you may adopt other assumptions as per the most recent pricing basis.

(12 marks)

b) The Appointed Actuary has now asked you for a report on the overall risks posed to TMM by selling this annuity product.

She would like you to describe:

- The types of risk you consider to be material;
- Any potential risk mitigation strategies that TMM may already have in place, or could introduce, to manage those risks;
- The effectiveness or otherwise of each of those mitigation strategies;
- Any issues you would like to draw to the AA's attention arising from Section 6 of PS 200, based on the information you have available.

Give your advice in the form of a report to TMM's Appointed Actuary.

(18 marks)

Spreadsheet: 2A_Exam_2014_Sem_2_Q2

END OF PAPER