INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

26 September 2016 (am)

Subject CA1 – Actuarial Risk Management

Paper One

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
3. *You have 15 minutes of planning and reading time before the start of this examination. You may make separate notes or write on the exam paper but not in your answer booklet. Calculators are not to be used during the reading time. You will then have three hours to complete the paper.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all seven questions, beginning your answer to each question on a new page.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator from the approved list.

1 During a recent economic recession total premium income received under all motor insurance policies in a particular country fell.

At the same time, premium rates for most motor insurance policies rose.

Discuss the factors that could have caused these apparently contradictory outcomes. [8]

2 A 55 year old individual lives alone in a large property which, they intend to sell.

The proceeds of the sale are to be used in a combination of three ways:

- to assist with the purchase of a smaller property for the individual to live in
- to provide capital for each of the individual's two adult children to use as deposits to purchase their own homes
- to act as free capital for the individual's own use

(i) Set out the individual's likely financial needs. [6]

(ii) Assess whether the chosen strategy will help meet these needs. [4]
[Total 10]

3 (i) Define the terms:

(a) systematic risk
(b) specific risk

[2]

(ii) A government is concerned that consumers of financial services are exposed to significant risks because the way financial markets operate could lead to the failure of financial service providers.

Discuss the range of measures the government could take to improve protection for consumers of financial services. [9]
[Total 11]

4 HHO Power is a company which owns and operates a number of hydro-electric and tidal power plants.

(i) Outline, using an example in each case, the main categories of risk this company is subject to. [6]

(ii) Describe how the risks mentioned in part (i) could be managed by each of the four main risk management tools. [9]
[Total 15]

5 A life insurance company sells annuity business. It has been investigating its mortality experience.

The investigation has shown a significantly higher number of deaths over the last three years relative to those expected under the existing mortality assumptions.

The investigation has also concluded that the higher number of deaths has been due to smoking related illnesses.

In light of this experience, the insurance company is considering adjusting the mortality assumptions it uses to price its annuity business.

(i) Discuss the data limitations that the insurance company will need to consider when deciding whether the results of the investigation are suitable for adjusting the mortality assumptions used to price its annuity business. [8]

Approximately 20% of the business written over the last three years has been for individuals taking out policies with very large annuities.

(ii) Discuss the data sources that could be used to set mortality assumptions for these individuals. [5]

(iii) Suggest, with reasons, whether the mortality assumptions for this “large annuity” subsection of the business should differ from those used for “standard” annuity business. [3]

[Total 16]

6 (i) Explain the impact that the following theories should have on the shape of a yield curve which, plots the gross redemption yields on conventional government bonds by term:

(a) expectations theory
(b) liquidity preference theory
(c) inflation risk premium theory
(d) market segmentation theory

[8]

The following gross redemption yields (GRY) are currently available on bonds in a particular market:

Bond Type	*Term to Maturity*	*GRY (% p.a.)*
Conventional Domestic Government	2 years	5.0
Conventional Domestic Government	8 years	3.0
Conventional Domestic Government	15 years	3.5
Index-linked Domestic Government	15 years	2.0
Conventional Domestic Corporate	8 years	3.5
Conventional Foreign Government	2 years	8.0

All the above yields are quoted in nominal terms except for that on the index-linked bond which, is quoted real terms. All the bonds are denominated in the domestic currency. None of the bonds are convertible or have attaching options.

(ii) Discuss the factors that could have given rise to the pattern of yields shown in the table. You do not need to consider the effects of taxation, accrued interest or different coupon rates. [10]

[Total 18]

7 A large employer operates a defined benefits pension scheme for its employees. The employer has recently decided to close the scheme to new members and cease the accrual of future service benefits for existing members.

From now on, the scheme will operate as a stand-alone entity independent of the resources of and any obligations from the employer and any new pension arrangements the employer may choose to introduce.

(i) Outline the regulatory pressures that may have influenced the decision to close the scheme. [5]

The Trustees of the scheme have set specific budgets for the various future expenses of operating the scheme.

(ii) Explain why keeping within such budgets will be especially important in this situation. [3]

(iii) Discuss the factors the Trustees should have considered when setting the expense budgets. [7]

Five years later on, the Trustees have reviewed the expenses that have been incurred during and since the closure of the scheme. This review has concluded that, over the period, expenses for investment management and professional services were significantly higher than assumed.

(iv) Suggest, with reasons, why this overspend may have arisen and suggest options for reducing these expenses in the future. [7]

[Total 22]

END OF PAPER