INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

20 April 2018 (pm)

Subject SA5 – Finance
Specialist Applications

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 three 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 The government of a developed country makes frequent aid payments to poorer countries, particularly after a natural disaster such as severe flooding or an earthquake.

The payments after each disaster event are potentially large, and are unpredictable in terms of both timing and amount. The government has expressed a desire to make these aid contributions more evenly spread out and more predictable. The government is therefore considering whether it can transfer some of this risk to market participants.

It is considering issuing a new type of bond which pays a regular coupon but where the redemption proceeds are linked to the amount of aid paid out during the bond's term. Specifically, at maturity the bond will pay out the stated principal less the cumulative deductions for aid payments made by the government during the term of the bond.

(i) Outline the likely considerations that need to be taken into account in the design and issue of this proposed bond. [7]

(ii) Suggest other ways in which the government could manage the risk of having to make large and unpredictable aid payments. [4]

A prospective purchaser of the proposed bond is concerned about the sovereign risk associated with the bond.

(iii) Outline the potential ways in which the government's actions could operate against the interests of holders of the proposed bond. [6]

(iv) Outline factors that a prospective purchaser could consider in order to assess the creditworthiness of the country. [3]

(v) Suggest actions that a holder of the bond could take in order to mitigate the sovereign risk. [2]

(vi) Describe the other risks that an investor could face as a result of holding the bond. [5]

(vii) Suggest actions that the investor could take in order to manage or mitigate the risks identified in part (vi). [4]

It has been suggested that the government should be pro-active in reducing the impact of large scale accidents in developing countries by sending a task force to educate and train local people in risk control strategies. The task force would base its education on Haddon's theory for controlling the energy from an accident.

(viii) Describe the three main areas into which Haddon's strategies can be grouped. [3]

(ix) Outline, for each of these three areas, two approaches that could be taken to control the risks relating to an explosion at a fireworks factory. [3]

A newspaper has commented that large institutional investors have recently started to invest in insurance-linked securities (ILSs) such as catastrophe bonds. These securities are issued by reinsurers and form part of their capital.

The securities offer investors a premium for taking on reinsurance risk, such as catastrophe losses from a major hurricane. They are typically designed not to have any exposure to credit, currency or other traditional market risks.

(x) Suggest likely reasons why the yield offered on new issues of this type of bond may change over time. [3]

It has been commented that pension funds tend to reduce their holdings of ILSs after there has been a major natural catastrophe.

(xi) Discuss this comment. [3]

(xii) Explain whether an increase in interest rates (which may increase the yield on conventional bonds) would cause pension funds to sell their ILSs. [2]

A pension fund has outsourced the selection of its ILSs to a specialist ILS manager. The manager charges a low annual management fee plus a performance fee which is based on the absolute performance of the portfolio (and which cannot be less than zero).

(xiii) Explain why the ILS manager may prefer this charging structure instead of a single higher annual management fee. [2]

(xiv) Comment on the appropriateness of the ILS manager's charging structure from the investor's perspective. [2]

As a result of its investment in catastrophe bonds, a member of the pension fund asks about the sponsoring company's processes for managing its business, should a major hurricane hit its headquarters.

(xv) Outline the key issues that should be covered by the company's disaster plan in relation to events such as a major hurricane. [4]

[Total 53]

2 InfiniteRoE is a wealth management company that manages the assets of a diverse client base.

In order to determine how much market risk customers are willing to take in their investment portfolios, the company has created a client questionnaire. The results of this are used to divide clients into different risk profiles, ranging from low risk to high risk. These profiles are then associated with investment portfolios that have an increasing amount of market risk.

Senior management has proposed that historical volatility is used as the risk measure to determine the level of market risk that clients are willing to accept. An internal asset manager has suggested the use of Value at Risk (VaR) instead of historical volatility as he believes it would be a better risk measure.

(i) Outline the disadvantages of using historical volatility as the risk measure for this purpose. [3]

(ii) Describe the main disadvantages of using VaR when trying to illustrate how much a client could lose. [2]

(iii) Suggest an alternative risk measure that could be used, including a brief description of what it measures. [1]

The company's client advisers use simulation software to illustrate the potential investment outcomes of representative portfolios for the different risk profiles. The stochastic projections used to create these illustrations are produced by a third party company.

(iv) Explain why using an external third party to generate these projections could be an issue. [3]

InfiniteRoE's client advisers have recently been trained on inheritance tax to enable them to give effective recommendations to UK clients who are looking to pass on their wealth to their dependants.

(v) Describe the relevance of the terms "nil rate band" and "potentially exempt transfers" to UK inheritance tax assessment. [2]

A key client is worried about his dependants having to sell the family home to pay inheritance tax. One of the company's advisers has said "the client should purchase a life insurance policy to help reduce the tax bill". The client does not understand how this will reduce the inheritance tax bill that his dependants would have to pay and he thinks that it would actually increase the bill.

(vi) Comment on the recommendation to purchase life insurance and the client's concern. [2]

InfiniteRoE's senior management is worried that the product range offered to its client base is too limited. A suggestion has therefore been made to include Venture Capital Trusts (VCTs) in the range of investable assets. VCTs provide enhanced tax relief to individual investors for investing in small companies.

(vii) Suggest possible reasons why VCTs have greater tax incentives than other types of investment. [2]

The Chief Investment Officer has suggested that VCTs should be offered to investors with a low appetite for risk, as the volatility of their returns – based on an analysis performed on shares traded on the London Stock Exchange – is low.

(viii) Suggest possible reasons why the observed volatility of returns for these VCT shares is low. [3]

(ix) Suggest reasons why VCT shares are unlikely to be suitable for investors with a low appetite for risk. [2]

[Total 20]

PLEASE TURN OVER

3 A UK life insurance company has written a portfolio of immediate annuities that is now closed to new business. The annuities are matched with a portfolio of corporate bonds.

The company's finance director has decided to explore ways of reducing the amount of risk-based capital required by this portfolio of business. It has been suggested that a method of reducing the risks would be to use a longevity swap. This would operate in a similar way to an interest rate swap except that it would exchange cash flows based on mortality experience rather than interest rates.

(i) Explain how a longevity swap could work in practice. [3]

(ii) List four risk types under the Solvency II standard formula that would be affected by the swap. [2]

(iii) Explain what the impact of the swap would be on each of the four risk types in part (ii), in relation to the immediate annuity portfolio. [4]

(iv) Explain how a risk-adjusted performance measure could be used to decide whether the swap transaction was good value for money. [3]

The Prudential Regulation Authority has commented that it would wish to monitor the transaction closely.

(v) Justify the regulator's comment. [2]

The insurance company feels that the amount of Solvency Capital Requirement that its internal calculations show it should hold for the annuity business under Solvency II is too high. However, rather than entering into the longevity swap in order to address this, the company instead decides to sell the portfolio of business.

(vi) Explain why selling the business might NOT be the right economic decision for the company. [5]

(vii) Suggest issues that a potential buyer of the portfolio of business might experience or identify when performing its due diligence. [5]

(viii) Suggest three reasons why the purchaser may value the business more highly than the company that is selling it. [3]
[Total 27]

END OF PAPER