INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

22 April 2013 (am)

Subject SA3 – General Insurance Special 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 have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.*

3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*

4. *Mark allocations are shown in brackets.*

5. *Attempt both questions, beginning your answer to each question on a separate sheet.*

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.*

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1 Under Solvency II the SCR can be calculated in a number of ways.

(i) Outline each of the allowable methods. [3]

(ii) Outline the basic structure of the Solvency II standard formula as currently drafted. [7]

A large London Market general insurance company has just been through an extensive change in management and is in the process of deciding whether to apply for internal model approval under Solvency II. The company currently writes a range of classes covering international property, aviation, casualty (both domestic and international, including workers compensation) and motor lines. All business lines have been written since the operation started 15 years ago. Some business is written through delegated underwriting authorities and binders.

The company has calculated its individual risk charges as per QIS5 as follows:

Risk category	Capital charge (£m)
Premium & Reserves	199.4
Catastrophe	384.5
Market	124.2
Counterparty Default	31.4
Operational Risk	26.4

QIS5 correlation assumptions:

	Catastrophe	Lapse	Premium/Reserve
Catastrophe	1		
Lapse	0	1	
Premium/Reserve	0.25	0	1

	Market	Default	Life	Health	Non-life
Market	1				
Default	0.25	1			
Life	0.25	0.25	1		
Health	0.25	0.25	0.25	1	
Non-life	0.25	0.5	0	0	1

(iii) Calculate the diversified standard formula SCR for the company using the QIS5 correlation matrices. [5]

The company uses a limited amount of reinsurance, namely a quota share contract and some specific catastrophe cover. Its investments are all held in at least A-rated government and corporate bonds. The company has used Method 2 (the factor based method) to calculate its catastrophe risk charge rather than Method 1 (the standard scenario method).

(iv) Comment on the appropriateness of the standard formula SCR for this company. [10]

The company has an internal model in place, which is built using a non-standard software platform. It is an integrated, stochastic model that covers all risk categories, i.e. insurance, market, credit and operational risk.

It currently uses an external proprietary catastrophe model for perils/regions covered by the model, and then models all other catastrophe exposure internally using its own techniques where possible. The model is currently built on an ultimate basis and uses recognition factors and earning patterns to obtain the one-year SCR.

The following shows the high level output from the model:

Values shown in £m	OneYear	Ultimate
Reserve risk	74.5	80.8
Attritional risk	59.5	133.5
Modelled catastrophe risk	388.8	404.5
Non-modelled catastrophe risk	29.8	31.2
Catastrophe risk	389.9	405.7
Diversification within insurance risk	(158.7)	(249.7)
Insurance risk	365.1	370.3
Market risk	49.6	58.7
Credit risk	34.8	45.9
Operational risk	29.1	29.1
Diversification	(94.8)	(103.9)
Total SCR post diversification	383.8	400.1

(v)   Comment on the appropriateness of the model output and SCR figures, suggesting features of the business that may support the figures.   [20]

Under Solvency II an important part of building and using the model is validation of the model in terms of input, structure and outputs. The company has carried out a validation test to ensure that the number of simulations used within the internal model is sufficient. The following shows the variance from the base scenario above for the one- year high level outcomes:

	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Insurance Risk	99.5%	99.9%	100.6%	99.2%	100.1%	105.2%
Market Risk	108.1%	110.3%	105.0%	109.5%	105.6%	114.3%
Credit Risk	99.7%	98.6%	102.3%	117.2%	95.4%	92.8%
Operational Risk	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total SCR	100.4%	101.4%	102.5%	100.7%	103.2%	101.6%

(vi)   Comment on the levels of variance in the table above and the implied appropriateness of the model output.   [4]

(vii)   Describe how it would validate other areas of the model including the data required and articulating pass/fail criteria, for the following types of tests:

- sensitivity testing
- benchmarking
- back testing
- stress and scenario testing
- general model reasonableness

[20]
[Total 69]

2 The Swampshire region is located in a wealthy, developed country. However, the average income in Swampshire is less than a quarter of the national average.

There was flooding in Swampshire during 2012. Many residents had not purchased home building and contents insurance, so were left with significant uninsured losses after the flood.

The national government has said that insurers must do more to encourage people on low incomes to purchase home insurance.

(i)   Suggest why people in Swampshire may not have purchased home insurance.

[6]

(ii) Discuss ways in which insurers could encourage people on low incomes to purchase insurance. [8]

(iii) Discuss ways in which the government could encourage those on low incomes to purchase home insurance. [8]

Meals-On-Swamp is a charity that delivers meals to elderly residents of Swampshire. The charity wants to start a mutual insurer to underwrite home insurance, with products only being sold in Swampshire. The charity would not be able to meet regulatory capital requirements, so has asked the government to exempt it from these obligations.

(iv) Discuss whether the government should grant the charity an exemption from regulatory capital requirements, giving your opinion on whether the exemption should be provided. [9]

[Total 31]

END OF PAPER