

# INSTITUTE AND FACULTY OF ACTUARIES



## EXAMINATION

29 September 2017 (am)

### **Subject SA3 – General Insurance 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**
- (i) Describe the application of contract boundaries in Solvency II Technical Provisions. [4]
  - (ii) Give an example of a contract boundary, explaining how it might impact Technical Provisions. [2]
  - (iii) Describe the legal obligations basis for unaccepted contracts in Solvency II Technical Provisions. [3]
  - (iv) State three circumstances where legally obliged unaccepted business may be material. [3]
  - (v) Explain, for each of the following business items, whether it would be included in a valuation of Solvency II Technical Provisions as at 31 December 2016:
    - (a) an insurance contract incepting on 1 January 2017
    - (b) an insurance contract due to renew on 1 February 2017
    - (c) a “Losses Occurring During” reinsurance contract incepting on 1 April 2017
    - (d) premium expected to be written during 2017 on binding authorities in force as at 31 December 2016
- [6]

An actuary is carrying out a valuation of the Solvency II Technical Provisions for an insurance company as at 31 December 2016.

Reinsurance cover has been purchased to protect inwards casualty business which is expected to be written in the future but none has been written yet. The reinsurance contract details are provided below:

Contract:	Casualty Excess of Loss
Period of Cover:	18 Months from 01 January 2017
Basis:	Risks attaching
Expected Inwards Written Premium:	\$100m
Expected Inwards Loss Ratio:	65%
Territory:	Worldwide
Maximum Line:	\$25m any one risk
Layer 1:	\$1m in excess of \$1m any one loss
Layer 2:	\$8m in excess of \$2m any one loss
Layer 3:	\$15m in excess of \$10m any one loss
Premium Rate:	10% adjustable of written
Deposit Premium:	80%
Deposit Payment Schedule:	10% 31 January 2017
	20% 31 May 2017
	30% 31 October 2017
	40% 4 April 2018
	All payments in US\$

- (vi) For the reinsurance contract, as at the valuation date:
- (a) Explain what cash in-flows and out-flows would be expected to be included in the Solvency II Technical Provisions
  - (b) Calculate the cashflows stating any assumptions you have made.
- [6]  
[Total 24]

**2** Motorists in Country X are currently required to purchase a single “comprehensive” motor insurance policy for each vehicle owned.

- (i) List the broad categories of cover that are likely to be offered under these motor insurance policies. [2]

Fully autonomous driverless (FAD) cars are cars which are able to navigate without human input, other than entering the destination. It is not necessary for anyone to be in the car while it is moving, meaning that there is no need to find parking near the destination (the car can be programmed to find parking elsewhere).

Country X has permitted driverless cars on its roads for several years, although only around 5% of vehicles currently have FAD technology. The government of Country X has set an objective that this technology will be fitted to all vehicles, and used for all journeys within the next five years.

- (ii) Outline the reasons why the government may not achieve its objective. [6]
- (iii) Assuming that FAD is used for all journeys, discuss the impact on:
  - (a) the number of motor vehicle claims occurring each year.
  - (b) the total cost of the damage arising from motor vehicle claims each year.

[12]

- (iv) Assuming motor insurance remains compulsory, discuss how the use of FAD will impact motor insurance premiums. [6]

A UK actuary has been engaged to advise a local insurance company in relation to motor insurance premium rates.

- (v) Explain what professional guidance may be relevant to the actuary’s work, assuming Country X is not the UK. [4]  
[Total 30]

- 3**
- (i) State the key benefits provided by the following products:
- (a) Employers' Liability
  - (b) Workers' Compensation
  - (c) Public Liability Insurance
- [4]
- (ii) State the key differences between each type of insurance in part (i). [3]
- (iii) Explain, for each of the types of insurance in part (i), whether it might respond to the following events:
- (a) A brick falls from a building site damaging a passing car that is being driven to work.
  - (b) A hotel guest on a business trip sustains an injury slipping on a puddle in the hotel lobby.
  - (c) An employee is injured in an earthquake striking his company's office.
  - (d) An employee is diagnosed with an illness linked to particular chemical exposures, 20 years after handling the chemicals in question at work.
- [8]

All employers in Country A must purchase Workers' Compensation insurance from a government owned insurer. The premium is currently 2% of wage costs, charged to all employers.

- (iv) Suggest reasons why the government may prefer to charge the same rate for all employers. [6]

The government is proposing to change how Workers' Compensation premiums are calculated. The method for calculating premiums will now be as follows:

- Calculate the claim ratio for each employer, where this is the ratio of claims paid to premiums received in respect of that employer during the year.
- Calculate the country average claim ratio, reflecting total claims paid and premiums received by the government insurer in respect of all employers.
- If an employer's claim ratio is less than 80% of the country average in a year, the premium for the next year is reduced by 0.2% of wages.
- If an employer's claim ratio is more than 120% of the country average in a year, the premium for the next year is increased by 0.2% of wages.
- The adjustments will be applied on a cumulative basis each year, however premiums may not be less than 1% of wages, or more than 3% of wages.

The following table shows the country average experience and the ratios for three companies:

**Table 1 – Country Average Claim Ratio, and Claim Ratio for Companies A, B and C**

<i>Year</i>	<i>Country Average</i>	<i>A</i>	<i>B</i>	<i>C</i>
1	50%	500%	90%	0%
2	50%	5%	80%	50%
3	50%	5%	75%	90%

The premium of 2.0% of wages applies in year 1. Adjustments to premium commence in year 2, based on year 1 claim ratios. For example, in year 2, companies A and B pay 2.2% where company C pays 1.8%.

- (v) Comment on the experience for the three companies and any indications it gives for the size and nature of each company. [4]
- (vi) Discuss whether the new method of calculating premiums is likely to bring premiums into line with expected claim costs. [8]
- (vii) Discuss whether the new method of calculating premiums is likely to reduce fatalities in the workplace over time. [5]

The government is also considering a scheme where large employers would be able to choose whether or not they purchase Workers Compensation insurance from the government insurer. Employers not covered by the government insurer would be responsible for the costs of compensating injured workers.

- (viii) Discuss whether this arrangement is likely to reduce work-related injuries, while providing reasonable compensation to workers. [8]
- [Total 46]

**END OF PAPER**