Actuarial Society of India

EXAMINATION

1st November 2006

Subject ST2 — Life Insurance

Time allowed: Three hours (14.15* pm – 17.30 pm)

INSTRUCTIONS TO THE CANDIDATE

1. Enter all the candidate and examination details as requested on the front of your answer sheet.
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. The answers are not expected to be any country or jurisdiction specific. However, if examples/illustrations are required for any answer, the country or jurisdiction from which they are drawn should be mentioned.
4. You must not start writing your answers in the answer sheet until instructed to do so by the supervisor.
5. Mark allocations are shown in brackets.
6. Attempt all questions, beginning your answer to each question on a separate sheet.
7. Candidates should show calculations where this is appropriate.
8. Fasten your answer sheets together in numerical order of questions. This, you may complete immediately after expiry of the examination time.

Professional Conduct:

It is brought to your notice that in accordance with provisions contained in the Professional Conduct Standards, If any candidate is found copying or involved in any other form of malpractice, during or in connection with the examination, disciplinary action will be taken against the candidate which may include expulsion or suspension from the membership of ASI.

Candidates are advised that a reasonable standard of handwriting legibility is expected by the examiners and that candidates may be penalized if undue effort is required by the examiners to interpret scripts.

AT THE END OF THE EXAMINATION

Hand in BOTH your answer sheets firmly attached, and this question paper to the supervisor.

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

Q1) You are the Appointed Actuary to an established life insurer

a) A newly appointed director has noted that the concept of solvency doesn't seem to be the same as in a manufacturing company of which she is also a director. How would you express the concept of solvency in a life insurer and what key differences would you emphasise? (2)

b) You have reassured the Board that the insurer is solvent but you have also told the Board that you need to project future solvency. The same director has stated that this is of no immediate concern. What points would you make in reply? (2)

c) What alternative general approaches would you consider when planning to conduct dynamic solvency testing? (2)

d) Another director states that he has come across the expression 'probability of ruin' in an insurance company concept. He has asked what this means and how would it be determined. How would you respond? (2)

[8]

Q2) You are employed in a proprietary life insurer and your Appointed Actuary has said that he would like you to start developing an asset share model for a new line of participating business.

a) What is an asset share?

The Appointed Actuary has emphasized that the asset share calculations need to make sure that all relevant deductions from the asset share are fully considered. (2)

b) Identify the deductions that would normally be made when determining an asset share and the particular issues associated with each.

You have constructed a prototype model and have noted that some asset shares are negative. (6)

c) How can an asset share be negative and what would be the consequences to the company? (2)

[10]

Q3)

a) Why do insurers often use their own sales forces or other intermediaries to sell life insurance on a face to face basis if this increases costs of distribution? (2)

b) What risks are mitigated by the use of face to face sales approach? (2)

c) Explain the effects of using different distribution channels on product pricing. (6)

[10]

Q4) You are the product development actuary for a life insurer. The marketing director is travelling and has sent you a text message saying that 'we need to discuss investment guarantees urgently'.

a) What is meant by the expression 'investment guarantee' (1)

b) Illustrate your answer by providing two examples of an investment guarantee that might be provided under an investment linked contract.

You know that the marketing director will think introducing investment guarantees is a simple matter but you know your Appointed Actuary will expect the cost of any guarantee that depended upon the future price of assets to be assessed carefully using stochastic simulation and for you to have started to plan your work.

(2)

c) List the steps you will need to take in conducting your investigation. (6)

[9]

Q5) You are a consulting actuary providing initial advice to the shareholders' representatives for a newly formed joint venture planning to enter the life insurance market. You have referred in conversation to the need to create an actuarial model and take special care in selecting model points. The representatives are not familiar with these concepts and ask you to explain further.

a) List the principal uses of such a model. (5)

b) Identify the key requirements of an actuarial model to be used in developing appropriate advice to an insurance company. (2)

c) Explain what a model point is and how model points are used in practice.

The conversation turns to the initial product range and the need to price appropriately. You explain that this is profit testing and is normally done using cash flow projections. You then add that allowance needs to be made for prudent reserving as required by the Regulator and also Solvency Margins. The representatives assert that this can't be so as these are not cash flow items. (1)

d) Explain why reserves and solvency margins are taken to be cash flows when pricing products.

One of the shareholders representatives turns out to be a private equity investor and asks whether the results of the profit testing are likely to be based on sound financial economic principles. (2)

e) In modeling life insurance business, what would financial economic principles expect one to do? (2)

f) In responding to the representative, what key limitation(s) to the financial economic approach would you emphasize? (1)

[13]

Q6)

a) What is the reason normally stated why Governments impose restrictions on the way that life insurers operate? (1)

b) What adverse impacts could imposing such restrictions have? (1)

c) Identify the regulatory restrictions likely to be encountered in practice and illustrate with examples as appropriate.

Your employer is a multi-national insurer specializing in participating business and prides itself on its reputation as a good corporate citizen. It is considering entry into a developing market where opportunities for overseas insurers have just been created. You observe that the Insurance Company Regulations were drafted 50 years ago and an extract from the regulations for determining policy reserves reads as follows:

? A net premium method will be used to determine reserves

? The interest rate used will not exceed the current yield on 10 year term Government Securities

? Mortality will be based on the most recent population mortality study issued by the Government

? Such other factors as the Actuary considers reasonable. (5)

d) What additional principles would you apply in developing an approach to determining supervisory reserves? (6)

[13]

Q7) You have joined the actuarial department of a recently established life insurer and the Chief Actuary has asked you to update the expense analysis. The insurer has only two products – a regular premium participating whole of life product and a regular premium unit linked product incorporating a minimum level of death benefit of 10 times the annual premium as a regulatory requirement.

You believe there are opportunities for improving the expense analysis and approach the financial controller for assistance with this project. The financial controller has also recently joined the insurer and tells you that he can easily provide total company expenses incurred over whatever period you nominate.

You decide to enlist the financial controller's assistance in your project and start out by explaining the other purposes for which the actuarial department is likely to want to analyze expenses.

a) Identify the purposes you would mention and provide a brief explanation of the relevance of expenses for each.

You have completed your expense analysis and are surprised that the unit costs are as high as they are. The financial controller tells you that the company has incurred substantial expenses in developing a new computer system to support large business volumes expected in the years ahead. (6)

b) How would you deal with this situation in your expense analysis?

The Chief Actuary tells you that a new term insurance product is being developed and has asked you to propose a set of expense assumptions. (2)

c) State with reasons the form you would propose?

The pricing actuary has used the results of your expense analysis to produce a first set or premium rates but says these are quite uncompetitive and believes there is a problem with either the (8) expense analysis or how the assumptions have been developed.

d) Suggest reasons why this might be so and how your expense assumptions might be varied to address the problem. (4)

e) What other measures might you suggest to the pricing actuary in the circumstances? (2)

[22]

Q8)

a) What are the Principles of Investment in the context of a life insurer?

You are the Appointed Actuary of a company planning to start writing immediate annuity business in a market where there are no supervisory restrictions on how assets can be invested. You have completed an initial analysis and are discussing the results with the Marketing Director. You tell him that on average the annuities will run for 15 years and you also tell him that your advice will be that the company invests in Government Securities with a range of terms of up to 25 years. The Marketing Director insists that over a 20 year term there is absolutely no doubt that the share market will outperform Government Securities, your investment policy is too cautious and the annuity rates will not be competitive. (3)

b) Explain the rationale for your initial approach.

The Marketing Director persists and you agree to review your proposals. (3)

c) Describe the investigations you would undertake in reviewing your proposals before your next meeting with the Marketing Director. (9)

[15]

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