INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

15th November 2013
Subject ST2 — Life Insurance

Time allowed: Three hours (14.45* – 18.00 Hrs)
Total Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. ***Please read the instructions on the front page of answer booklet and instructions to examinees sent along with hall ticket carefully and follow without exception.***
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 answer sheet until instructed to do so by the supervisor.***
4. ***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.***
5. ***Attempt all questions, beginning your answer to each question on a separate sheet.***
6. ***Mark allocations are shown in brackets.***
7. ***Please check if you have received complete Question Paper and no page is missing. If so, kindly get new set of Question Paper from the Invigilator.***

AT THE END OF THE EXAMINATION

Please return your answer book and this question paper to the supervisor separately.

Q. 1) A large life insurance company writes unit-linked and conventional without-profit endowment products. It recently completed the financial year-end valuation to determine the regulatory surplus arising during the financial year. The assets backing the non-linked statutory reserves are primarily invested in government and corporate bonds.

Explain how each of the following would impact the change in regulatory surplus over the year (each needs to be considered in isolation)

i) The company experiences higher than expected surrenders in its without-profit endowment products. (3)

ii) There is an increase in bond yields. (3)

[6]

Q. 2) A life insurance company is pricing a new conventional without-profit endowment product. In the past the company has used a formula approach to calculate the premium rates under its conventional products, but it is considering using a projected cash flow approach for the new product.

i) Explain why it may be preferable to use a projected cash flow approach instead of a formula approach. (5)

ii) Discuss why withdrawals should normally be included in the projected cash flows. (3)

[8]

Q. 3) For a life insurance company:

i) Describe embedded value and its calculation (4)

ii) Explain four reasons for analyzing the change in embedded value and how it could be a useful management information tool. (6)

iii) How does a best estimate valuation differs from an embedded value calculation (3)

iv) A proprietary life insurance company sells three-year single premium conventional non-participating endowment products. As at year end 2012, the following were the key financial features of the company (in INR million)

Total Assets of the company	1500
Reserves (liabilities to policyholders plus current liabilities)	900
Required Solvency capital	130

The following are the expected projection of reserves, expenses and other policy outgoes for next three years (in INR million).

Year	Required reserves (at end of year)	Expenses outgo (at end of year)	Other Policy outgoes (at end of year)
2012	900		
2013	820	30	100
2014	640	35	200
2015	0	40	630

The required solvency capital is expected to release in the same pattern as the reserves.

Calculate the embedded value of the company as at year end 2012 assuming the following

- Investment income on reserve is 9% per annum and investment income on required solvency capital is 8% per annum
- Risk discount rate is 13% per annum effective
- Tax is assumed to be nil throughout (7)

[20]

Q. 4) A life insurance company, that has been in business for the past seven years, has never performed any expense investigations. The pricing of its products was based on industry expense figures. The chief actuary proposes to carry out expense investigations to help her set the assumptions for product pricing.

i) Describe the process to be carried out for expense investigations. (9)

ii) Explain how the results of the investigation would be used to set the expense assumptions for product pricing (5)

The expense investigation suggest that while the initial expense assumptions are roughly at the industry average, the per policy maintenance expense are higher than the average. The chief actuary proposes to revise the assumptions used to calculate statutory reserves so that they are based on the expense investigation but intends to use unchanged expense assumptions for the best estimate basis used in product pricing.

iii) Discuss the impact of the proposed changes on pricing and reserving. (3)

[17]

Q. 5) A life insurance company has been selling regular premium term assurance products successfully for the past few years. The only premium frequency allowed is annual. The company regularly profit tests its products based on a mortality assumption of 80% of a standard mortality table across all ages and across all policy durations. The company uses the same mortality assumption for both genders as well as for smokers and non-smokers

The company has recently performed its mortality investigation for this product based on claims over the last calendar year. The investigation was based on number of annual premiums paid by the policy at the date of death. The results of the investigation were as follows:

Number of premiums paid	1	2	3+	Overall
Death rate (as percentage of standard table)	120%	105%	70%	85%

Discuss the next steps that the company should take based on this investigation, including further investigations that might be required and possible changes to the profit testing mortality rate assumption.

(You are not required to discuss ways in which the actual mortality experience could be managed) **[14]**

Q. 6) A life insurance company currently distributes its products through two channels – Own Sales Force and Tied Corporate Agency. Own Sales Force are individual agents who are licensed and trained by the insurance company, and Tied Corporate Agents are entities that use their employees to sell policies of the insurance company. Both these channels are exclusive to the company. The company's new business comprises unit-linked and term assurance products.

The company's Chief Executive Officer (CEO) is new and comes from a non-insurance background. He has obtained the following statistics for the two sales channels and the products over the last year:

	Tied Corporate Agency	**Own Sales Force**
Assumed during Pricing		
Commission (% of Premium)	35%	25%
Other channel expenses (% of Premium)	10%	20%
Actual (in INR million)		
Commission	950	325
Other channel expenses	450	400
New Business premium	2,500	1,000
Percentage mix of unit-linked business sold	40%	60%
Percentage mix of term assurance business sold	60%	40%

Looking at the above statistics, the CEO mentions that since Corporate Agency seems to be an expensive channel, the channel should be closed and the money saved can be used to increase the volumes from Own Sales Force channel.

i) Discuss the merit in the CEO's statement. (8)

A large bank has been working as a Tied Corporate Agent for a competitor life insurance company for the past 3 years. Its contract just expired and the bank is now looking to change the company it works with as a Tied Corporate Agent for the next 3 years. The CEO is interested in partnering with the bank.

ii) State with reasons and examples the main types of information which the company should seek from the bank that might assist the CEO to make an initial offer to the bank. (8)

[16]

Q. 7) A life insurance company has been writing all types of with-profits endowment and unit-linked products for many years. All the with-profits policies are written in a single fund, the With-Profits Fund (WP Fund). The surplus of the WP Fund is distributed in the ratio of 90:10 (90% to policyholders and 10% to shareholders)

Of the total statutory reserves of the company, the reserves for with-profits endowment products and unit-linked products are almost equal. However, 75% of the new business written last year was from unit-linked and the rest from with-profits.

As part of its annual exercise, the company calculates the asset share of the with-profits policies in the WP Fund.

i) List possible uses of the asset share calculation for the company. (4)

ii) Explain why the benefit payout might not be equal to the asset share for a with-profits policy (5)

The surplus in the WP Fund reduced significantly over the last year due to high compensation payments being made to the customers for mis-selling a particular with-profits product. The Finance Director suggested that in order to rebuild the surplus, the terminal bonuses on the existing with-profits policies should be reduced.

iii) Discuss this suggestion. (4)

iv) Describe how the company would determine the terminal bonus rates for the with-profits policies maturing in the next few years. (6)

[19]

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