INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

31st October 2014
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 you are required 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 life insurance company that was formed ten years ago intends to launch a new unit linked product. The product has a minimum term of ten years and a guarantee that the return to the policyholder will be at least 2% per annum provided the policyholder pays the first five annual premium payments, and does not take partial withdrawals at any time. This guarantee will only apply on maturity.

i) Discuss the reasons why the company may choose to perform the pricing of this product deterministically instead of pricing stochastically. (2)

The product has now been priced and launched, and a decision is being taken on the model to be used for valuing the product for regulatory purposes.

ii) Discuss why it may not be appropriate to use the pricing model and assumptions for regulatory valuations. (3)

[5]

Q. 2) A life insurance company has recently recruited a new Chief Marketing Officer (CMO) from the banking industry. The CMO has some innovative ideas on designing life insurance products. Before building on them he is keen to understand the regulatory restrictions present in the life insurance industry that influence product design.

i) Describe the kind of restriction which may be imposed by regulators which affect the design of life insurance products. Your answer should be generic and not specific to any country. (6)

The CMO has also observed that there is new business strain in all the products that the company issues. He comments that "it looks like all our products are loss making as we are spending more money than we are collecting from the policyholders at the point of sale".

ii) Clarify whether the Chief Marketing Officer's understanding is correct (3)

[9]

Q. 3) Company Insurance Protect writes term assurance business. For the last two years, it has been reinsuring this business on a risk premium basis with the reinsurer covering the risk on each policy in excess of retention of 100,000 units of sum insured. The average sum insured written for this product for the last two years has been 200,000 units.

Discuss the reasons why Insurance Protect might wish to reduce their retention to 50,000 units of sum insured. **[5]**

Q. 4) A life insurance company has until now only sold conventional products. The company now intends to start writing unit-linked products. The management team has been advised that before the company starts writing unit-linked business, it needs to decide on key aspects related to unit-pricing.

i) Outline the key considerations which the company needs to take into account regarding the calculation of unit price.

No formulae are required (5)

ii) Describe the principal risks associated with unit pricing. (5)

[10]

Q. 5) i) State the reasons why a life insurance company might carry out an analysis of change in its embedded value.

A company has observed the following while analysing the change in its embedded value:

	Impact (in units)		
Description	**PVFP***	**Net Worth**	**Total EV**
Actual Lapse experience	-100,000	+20,000	-80,000
Actual Mortality experience	-20,000	-50,000	-90,000

*PVFP means Present value of future profits. (3)

ii) Discuss why the impact on the company's net worth might be in the opposite direction compared to the impact on the PVFP for lapse experience, but in the same direction (and larger in magnitude) for the mortality experience. (4)

Before making any changes to the assumptions, the company decides to consider the results of recent experience analyses that have been carried out. The results from the experience analyses are as follows:

Mortality Experience

Calendar Year	**Actual/ Expected Ratio**
201X	110%
201X-1	80%
201X-2	77%
201X-3	82%
201X-4	79%

Lapse Experience

Policy Year	**Expected**	**Actual (Analysed at Year-end 201X)**	**Actual (Analysed at Year-end 201X-1)**
1	5%	12%	10%
2	5%	10%	8%
3	5%	9%	7%
4	5%	25%	20%
5+	5%	6%	5%

iii) Discuss for each of the following risks, how the above information may be used to recommend a change (if any) in the embedded value assumptions:

a) Mortality (3)

b) Lapse (5)

iv) The Finance director has suggested that to avoid reporting a drop in embedded value, the level of prudence in the statutory reserves could be reduced. Discuss this suggestion (6)

[21]

Q. 6) A large life insurance company has been writing all types of protection and endowment products through its agents and brokers over many years. Its critical illness product is a pure protection product under which the company pays the sum assured on diagnosis of one of the specified critical illnesses. The new business volumes under this product have reduced significantly over the last year.

i) Discuss the possible reasons for the reduction in new business volumes. (10)

In order to increase the new business volumes, the Marketing Director has suggested two propositions.

ii) Discuss the effectiveness of each of the propositions separately including the risks to the company of making the change.

Proposition 1: The Company currently guarantees that premiums will remain unchanged throughout the policy term. It is proposed that in future premiums can be reviewed at the company's discretion in line with actual critical illness experience. (8)

Proposition 2: It is proposed that an option be introduced that allows the policyholder to increase the sum assured at any policy anniversary in line with price inflation since the previous increase with premiums increasing by the same proportion. No further evidence of health would be asked for. Increases are not permitted more frequently than every three years. (7)

[25]

Q. 7) **i)** Describe the principal features of the following methods of distributing surplus under with-profit products:

a) Additions to benefit

b) Revalorisation

c) Contribution method (9)

A life insurance company writes all types of conventional with profits (WP) business and uses "additions to benefit" method for distributing surplus. During the last three years, the market value of its WP assets has increased significantly due to sustained fall in fixed interest yields.

The last three years' supervisory valuations have hence shown much larger surpluses than expected. The company has not yet distributed any of these exceptional surpluses, other than by means of terminal bonus.

ii) Discuss the advantages and disadvantages for the shareholders and policyholders of each of the following possibilities for distributing these exceptional surpluses:

a) Continue to use terminal bonus (4)

b) Declare higher reversionary bonus in future years (4)

c) Declare special reversionary bonus (3)

A colleague has remarked “if we do not declare any bonuses from this surplus now, we can use the additional capital to write higher new business volumes.”

iii) Discuss the validity of this statement. (5)

[25]

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