INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

19th September 2017

Subject SA2 - Life Insurance

Time allowed: Three hours (14.45* - 18.00 Hours)

Total Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. *Please read the instructions inside the cover 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 expected to be India Specific application for the syllabus and corresponding core reading. However, substantially the core reading material is still taken from material supplied by Actuarial Education Company which is meant for UK Fellowship examination. The core reading also contains some material which is India Specific, mostly the IRDA regulation. In view of this, it should be noted that focal point of answers is expected to be India Specific application. However, if application specific to any other country is quoted in the answer the candidate should answer the question with reference to Indian environment.*
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) You work for an Indian life insurer operating for over a decade. The Company operates through multiple channels including Agency, Bancassurance, Digital and Group Business and writes a variety of products including individual (par, non-par, unit-linked) and group (term and fund management).

The Company recently carried out a strategic review of its distribution channels.

i) The table below sets out the premium income and statutory profits for the yearly renewable group term assurance business over the last five years.

Rs. in Crores	FY 2012-13	FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17
Premium Income	114	111	113	112	119
Profit/(Loss)	(14)	(4)	2	(8)	(4)

The CEO noted that although the Company's target profit margin for this business is 10%, this business has not been profitable for the Company. You have been asked to carry out an investigation into the same.

Discuss the various aspects that you will cover in your investigation. (16)

ii) The Company also writes non-participating group fund-based products. The table below sets out the investment returns earned on the funds by the Company and the rates credited to the policyholders over the last five years.

	FY 2012-13	FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17
Earned Rate	9.5%	9.3%	9.0%	8.5%	8.3%
Credited Rate	9.8%	9.8%	9.5%	8.8%	8.7%

In this highly competitive product line, the Company has failed to extract positive investment spread.

Until now, the Company has invested the assets backing this business into government bonds and other high quality fixed income instruments. The Chief Distribution Officer suggested that in view of the Company's inability to achieve a positive investment spread, the Company should consider investing up to 15% of the backing assets into real estate.

Discuss various considerations you will take into account while evaluating this proposal. (16)

iii) For the year ended 31st March 2017, in the analysis of movement (AoM) of the Indian Embedded Value (IEV) of the Company, it was noted that the persistency variance was negative.

Upon further analysis, it was identified that the persistency experience for most product lines was similar to the best estimate assumptions. However, the negative persistency variance was mainly driven by the online term assurance products sold by the Digital channel.

The Company has been selling term assurance products through the Digital channel since 2011. The persistency for this product line has generally been better than expected. Thus, the CEO was surprised to know that this product line had a negative persistency variance.

Discuss why this product may have contributed a negative persistency variance in the AoM of IEV, in spite of experiencing a better than expected persistency. (11)

iv) Briefly discuss the requirements of the IRDAI (Assets, Liabilities and Solvency Margin of Life Insurance Business) Regulations, 2016 around reflecting policy maintenance expenses in the valuation of liabilities. (4)

v) IRDAI (Assets, Liabilities and Solvency Margin of Life Insurance Business) Regulations, 2016 allow the Appointed Actuary to make aggregate provisions in respect of certain items where it may not be possible to calculate mathematical reserves on a policy-by-policy basis. State various items for which such aggregate provisions can be made. (3)

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Q. 2) You work in the Actuarial Department of a life insurance Company in India. The product pricing department of your Company has recently completed pricing and profit testing for a new non-participating anticipated endowment ("money-back") product that is expected to be sold primarily through the corporate agency network of the Company. You have been provided with the following cash-flow output for a representative sample model point.

	projection year 0	1	2	3	4	5	6	7	8	9	10
Probabilities											
In-force	1	0.599208	0.418857	0.334584	0.283939	0.255102	0.241891	0.229325	0.217370	0.205991	0.195157
Independent probability of death		0.1320%	0.1403%	0.1498%	0.1608%	0.1735%	0.1881%	0.2050%	0.2245%	0.2472%	0.2734%
Number of deaths		0.001320	0.000840	0.000627	0.000538	0.000493	0.000480	0.000496	0.000515	0.000537	0.000563
Independent probability of surrender		40%	30%	20%	15%	10%	5%	5%	5%	5%	5%
Number of surrenders		0.399472	0.179510	0.083646	0.050107	0.028345	0.012731	0.012070	0.011441	0.010842	0.010271
Amounts											
Premium amount		20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000		
Death benefit		200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Survival benefit										25,000	200,000
Surrender benefit		10,000	24,000	42,000	64,000	90,000	120,000	140,000	160,000	175,000	200,000
Distributor commission payable		7,000	1,000	1,000	1,000	1,000					
Unit expense loading		3,000	500	525	551	579	608	638	670	704	739
Cash-flows											
CF_Premium		20,000	11,984	8,377	6,692	5,679	5,102	4,838	4,587	0	0
CF_Death benefit		264	168	125	108	99	96	99	103	107	113
CF_Survival benefit		0	0	0	0	0	0	0	0	5,150	39,031
CF_Surrender benefit		3,995	4,308	3,513	3,207	2,551	1,528	1,690	1,830	1,897	2,054
CF_Commission		7,000	599	419	335	284	0	0	0	0	0
CF_Expenses		3,000	300	220	184	164	155	154	154	153	152
Mathematical reserves		20,532	23,060	25,721	28,332	31,590	36,319	40,773	44,965	39,419	0
Increase in reserves		20,532	2,528	2,661	2,611	3,258	4,729	4,454	4,192	-5,546	-39,419
Investment returns		800	2,529	2,464	2,552	2,685	2,923	3,280	3,616	3,585	3,141
Profit before cost of capital (CoC)		**-13,991**	**6,611**	**3,903**	**2,799**	**2,008**	**1,517**	**1,721**	**1,924**	**1,823**	**1,210**
Present value of future profits	**1,454**										
Solvency Margin		821	922	1,029	1,133	1,264	1,453	1,631	1,799	1,577	0
Cost of capital		0	-41	-46	-51	-57	-63	-73	-82	-90	-79
Present value of cost of capital	**-271**										
Value of new business (VONB)	**1,183**										
Present value of premiums	**52,329**										
VONB / PV Premiums	**2.3%**										
VONB / Annual Premium	**5.9%**										

i) Describe in detail the checks and validations you would undertake to ensure that the output from the product pricing department is accurate and appropriate. The description of your checks should also include the outcomes that you would expect for the checks, for you to consider the output provided to be acceptable.

Note: you are not expected to undertake mathematical calculations on the cash-flows provided, but only describe the expected outcomes in qualitative terms (as opposed to a precise quantification based on the cash-flows provided). (18)

ii) You notice that the profit margins (i.e. VONB / PV Premiums and VONB / Annual Premium) for the model-point cash-flows are lower than what you had initially expected. Based on the cash-flows provided, this arises mainly due to the high new business strain in the initial policy year. List the items that you might ask the product pricing department to investigate further to reduce the new business strain. (4)

iii) The Appointed Actuary of your Company has observed that whilst the profit margins have been estimated based on a discounted cash-flow pricing approach consistent with a traditional embedded valuation (TEV) methodology, the Company externally publishes its profit margins on a quarterly basis consistent with a "market consistent" approach to estimating embedded value. Describe the adjustments you would need to make to the above cash-flows to estimate the profit margins assessed on a market consistent basis. (12)

iv) The Chief Strategy Officer of your Company has approached you to estimate the value to the Company of a potential corporate agency tie-up with a bank that could be used as the primary channel for distributing this new product. It is known that the bank already distributes life insurance products for another life insurance company and is currently in discussions with your Company to potentially enter into a new tie-up under the "open architecture" model, as permitted by the regulator. By making appropriate assumptions, set out the tasks you would need to carry out to estimate the value that can be created for the Company by entering into such a corporate agency tie-up. (16)

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