SOCIETY OF ACTUARIES
Individual Life & Annuities United States – Design & Pricing

Exam DP-IU

AFTERNOON SESSION

Date: Thursday, October 29, 2009
Time: 1:30 p.m. – 4:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 8 questions numbered 8 through 15 for a total of 60 points. The points for each question are indicated at the beginning of the question. There are no questions that pertain to the Case Study in the afternoon session.

2. Failure to stop writing after time is called will result in the disqualification of your answers or further disciplinary action.

3. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.

2. Write on only one side of a sheet. Start each question on a fresh sheet. On each sheet, write the number of the question that you are answering. Do not answer more than one question on a single sheet.

3. The answer should be confined to the question as set.

4. When you are asked to calculate, show all your work including any applicable formulas.

5. When you finish, insert all your written-answer sheets into the Essay Answer Envelope. Be sure to hand in all your answer sheets since they cannot be accepted later. Seal the envelope and write your candidate number in the space provided on the outside of the envelope. Check the appropriate box to indicate morning or afternoon session for Exam DP-IU.

6. Be sure your essay answer envelope is signed because if it is not, your examination will not be graded.

8. *(4 points)*

    (a)   Describe corporate growth strategies used to achieve a company's marketing objectives, according to LOMA, and provide an example of each.

    (b)   You are given the following Market Attractiveness/Business Strength Matrix:
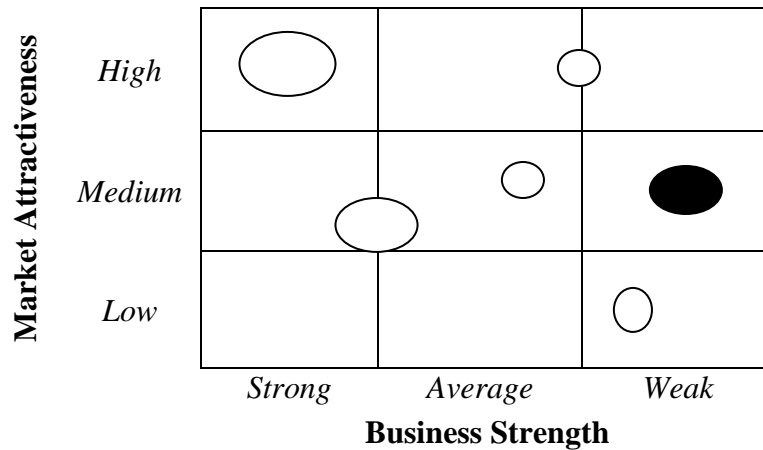
        (i)   Describe the marketing strategies commonly used with respect to a company's strategic business units.

        (ii)   Determine the marketing strategy which should be used for the strategic business unit indicated by the shaded circle. Justify your answer.

9. *(8 points)* ABC Life has recently reduced the dividend scale on its participating whole life insurance product.

(a) Describe the sources of earnings that typically drive a dividend scale.

(b) You are given the following dividend scales:

	Prior Year 2008	Current Year 2009	Future Years				
			2010	2011	2012	2013	2014
Old Dividend Scale	7	8	11	16	24	30	38
New Dividend Scale	7	2	4	7	12	18	25

(i) Describe the techniques that are commonly used to avoid a temporary decline in dividends for this type of product.

(ii) Calculate the cost of each technique in the current year and each of the next five years. Show all work.

(c) The following illustration was provided to the policyowner when his policy was issued:

ABC Life Insurance Company
Retirement Accumulation Product Illustration
Policyowner: John Smith
Issue Date: January 1, 2000
Issue Age: 40
Initial Premium Amount: 10,000

Year	Premium Paid	Total Account Value	Cash Value	Accumulated Dividends	Death Benefit
1	10,000	10,500	10,200	300	500,000
2	10,000	21,525	20,604	921	500,000
3	10,000	33,101	31,216	1,885	500,000
4	10,000	45,256	42,040	3,216	500,000
5	10,000	58,019	53,081	4,938	500,000
10	0	74,049	58,606	15,443	650,000
20	0	120,618	71,440	49,177	700,000

Note: Values may change at ABC Life's discretion.

Recommend changes to the illustration necessary to comply with the current requirements of the NAIC Life Insurance Model Regulation.

10. *(6 points)* ABC Life has engaged in risk transfer by securitizing its term life block of business.

(a) Explain the motivations for securitizing life insurance and the potential benefits to ABC Life of securitizing this block of business.

(b) Explain the hurdles to securitization and assess the factors that are critical to successfully securitizing this block of business.

11. *(6 points)* You are given the following information with respect to two policies issued on April 25, 1992, which both meet the definition of life insurance under Section 7702 of the Internal Revenue Code.

You are given:

Life Insurance Policy A:
- The policy qualifies as a Modified Endowment Contract ("MEC") under Section 7702A of the Internal Revenue Code.
- Insured's attained age is 60.
- Policyowner's attained age is 58.
- Planned transactions on April 25, 2009:
  - Partial withdrawal of 50,000 (free of any surrender charge).
  - New policy loan of 10,000.
- Policy values prior to the planned transactions:
  - Gross premiums paid to date equal 40,000.
  - Cash Value (excluding surrender charges) is 110,000.
  - Cash Surrender Value is 100,000.

Life Insurance Policy B:
- The policy is not a "MEC."
- All other information is the same as Policy A.

Tax rate is 30%.

(a) Calculate the investment in the contract and taxes due after the planned transactions, for each policy. Show all work.

(b) Propose possible alternative actions to reduce the taxes that would result from the planned transactions and demonstrate the reduction in taxes for each.

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12. *(12 points)* XYZ is developing a UL product with a secondary guarantee using a shadow account design. The guaranteed minimum interest rate credited to the policy's account value is 3%. You have been asked to review the pricing with respect to lapses, guarantees, and tax compliance.

(a)

(i)   List the business factors that affect lapse rates.

(ii)   You are given the following pricing lapse assumptions for the UL product:

Duration	Male	Female
1	6.0%	5.0%
2	5.0%	4.0%
3	4.0%	3.0%
4+	3.5%	2.5%

Criticize XYZ's pricing lapse assumptions and evaluate the potential impact on future profits.

(b)   Recommend strategies for managing the risks associated with this product's guarantees.

(c)   XYZ is using stochastic pricing for this product.

(i)   Explain the benefits of using stochastic pricing techniques.

(ii)   Interpret the following stochastic pricing results and recommend actions to improve profitability.

Profit results by Scenario
PVFP @ hurdle rate

Stochastic pricing
Deterministic Pricing = target profit measure
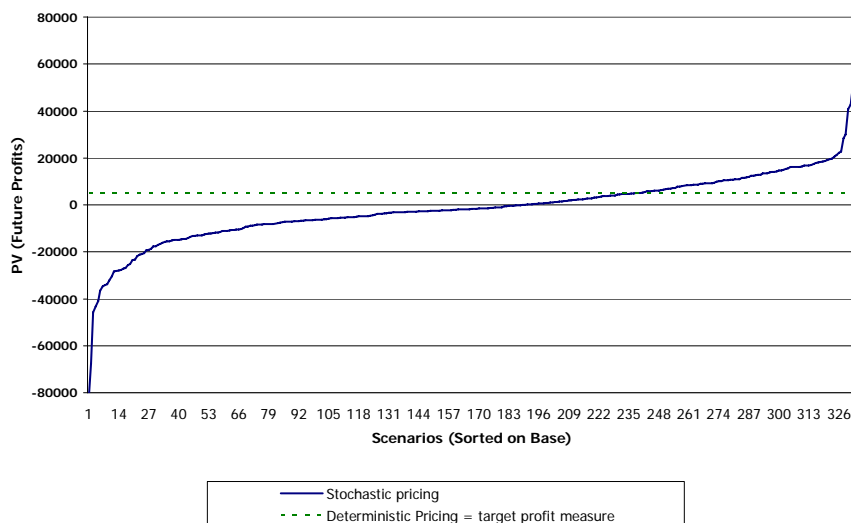
(iii)   Explain the process for establishing reserves using stochastic pricing.

12. (Continued)

(d) You are given the following policy information for a male, nonsmoker, issue age 55 with a face amount of 100,000:

Guaranteed Mortality:	2001 CSO smoker distinct Age Last Birthday
Guaranteed Expenses:	5% of premium
Death Benefit Option:	Level
Guaranteed interest rate:	3%
Account value at age 55:	0
Account value at age 60:	15,000

	$i = 4\%$	$i = 6\%$
A_{55}	0.35	0.30
A_{60}	0.40	0.35
$A_{55:\overline{45}}$	0.32	0.27
$A_{60:\overline{40}}$	0.38	0.33
a_{55}	16.0	15.0
a_{60}	15.5	14.5
$a_{55:\overline{45}}$	15.0	14.5
$a_{60:\overline{40}}$	14.5	14.0
$a_{55:\overline{7}}$	6.0	5.5
$a_{60:\overline{7}}$	5.5	5.0
Corridor factor at age 55	150%	150%
Corridor factor at age 60	130%	130%

Calculate the maximum cumulative premiums that can be paid in the first five years to:

(i) qualify as a life insurance contract using the Guideline Premium Test of Section 7702 of the Internal Revenue Code.

(ii) avoid Modified Endowment Contract status under Section 7702A.

Show all work.

13. *(8 points)* ABC Life currently offers a whole life insurance product issued up to age 80, using preferred underwriting. The product will be sold through a new distribution channel that focuses on the retiree market, which increases the potential mortality exposure at older ages.

The original mortality assumptions used to price the preferred class of this product are as follows:

- 35% of the Society of Actuaries 1975 – 1980 mortality table (15 year select & ultimate)
- Mortality improvement of 0.5% per year
- Preferred mortality differential from standard applies for the life of the policy

You have been asked to update the pricing mortality assumptions for the product.

(a)

    (i)   Explain the theories regarding the shape of the mortality table at the oldest ages including how to end the mortality table.

    (ii)   Recommend a method to end the pricing mortality table for this product. Justify your answer.

(b)   Assess the appropriateness of using ABC Life's existing mortality assumptions to update pricing mortality assumptions for the retiree market.

(c)   ABC has conducted a study of preferred and standard mortality to determine whether the differential wears off over time by comparing its mortality experience to the Society of Actuaries 1975 – 1980 mortality table.

    (i)   Identify potential flaws in this approach.

    (ii)   Propose a more suitable approach for this study.

14. *(8 points)* ABC, a stock life insurance company, sells individual and group life insurance to the middle and upscale markets through both career agent and broker distribution channels. ABC is looking to expand its markets through worksite marketing and is developing a new level-premium term life insurance product with unisex rates to sell to union groups.

(a) Explain the advantages of worksite marketing for:

  (i) ABC

  (ii) The agent

  (iii) The consumer (employee)

(b)

  (i) Identify reasons the actual mortality experience may deviate from expected for ABC's worksite marketing product.

  (ii) Recommend actions to manage this risk.

(c) For issue age 35 you are given:

		Mortality Rates by Policy Year		
Sex	Number of Lives	1	2	3
Male	130,000	0.01175	0.01250	0.01335
Female	120,000	0.00250	0.00230	0.00240

  (i) Determine the unisex mortality rates for the first three years. Show all work.

  (ii) Determine the 95% confidence interval of the first-year unisex mortality rate. Show all work.

(d) Propose ways to enhance the credibility of a mortality study.

15. *(8 points)* Your company priced a whole life last survivor insurance product based on equivalent single age mortality.

You are given the following:
- First insured life issue age is 55
- Second insured life issue age is 50
- Equivalent single issue age is 45
- Face amount equals 10,000,000
- Lapse rate equals 0%
- Interest rate equals 4%
- Mortality rates are select and ultimate
- Deaths occur at the end of the year

Duration (t)	$q_{45}(t)$	$q_{50}(t)$	$q_{55}(t)$
1	0.0010	0.0100	0.0200
2	0.0020	0.0150	0.0300
3	0.0040	0.0250	0.0450
4	0.0060	0.0400	0.0600
5	0.0100	0.0550	0.0750

(a)   Describe the following with respect to survivorship insurance:

(i)   Market applications.

(ii)   Product features and available riders.

(b)   Compare the present value at issue of death claims for the first five policy years using Frasierization to death claims assumed in pricing.

(c)   Propose improvements in setting the mortality assumptions for this product.

END OF EXAMINATION
Afternoon Session