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

Exam DP-IU

MORNING SESSION

Date: Thursday, November 3, 2011
Time: 8:30 a.m. – 11:45 a.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 120 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 60 points).

   a) The morning session consists of 8 questions numbered 1 through 8.

   b) The afternoon session consists of 7 questions numbered 9 through 15.

   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 morning 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.

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****BEGINNING OF EXAMINATION****
MORNING SESSION

1. (*5 points*) You are given:

- XYZ Life has participating products including Term, Whole Life and Universal Life.
- The current expense study shows an increasing trend in actual expenses for all products.
- The assets backing the portfolio are actively traded bonds, mortgages, and tax preferred investments.
- The policy loan provision charges a variable rate.

The Actuary has proposed the following assumptions for determining the last calendar year's dividends for the Whole Life product:

- <u>Mortality</u>: Use overall table reflecting experience from the entire participating block of business that includes Term, Whole Life and Universal Life.
- <u>Lapses</u>: Not explicitly recognized in the dividend scale.
- <u>Expenses</u>: Same assumption used in the previous dividend review which reflects total company expenses and no assumed inflation.
- <u>Interest</u>: Excess component is determined using the portfolio method ignoring policy loans and capital gains (realized and unrealized) on assets.

Evaluate these assumptions and recommend any changes.

2. (*6 points*) XYZ is a stock company that sells a Single Premium Annuity product. You are given the following:

- XYZ Stockholders expect a rate of return of 15%.
- Investment return rate is 8%.
- The Single Premium Annuity has no initial strain.
- Risk free rate of return is 5%.

An analyst has calculated the following pricing measures for this product:

- Embedded value is positive using discount rate of 10%.
- ROI was not calculated.
- ROE is 10% using pre-tax solvency earnings as basis for profit.
- Profit as % of Premium is 7% using discount rate of 10%.

(a) (*3 points*) For the pricing measures above:

(i) Define each measure.

(ii) List the strengths and shortcomings of each.

(iii) Recommend an additional profit measure commonly used for Single Premium Annuities.

(b) (*3 points*) Evaluate the analyst's assumptions and method of calculation used, and appropriateness of each pricing measure for this product.

3. (*4 points*) An analyst was contracted to review a mutual company's Term product which has a New Business (NB) Strain budget of 30% of premium. The analyst calculates the NB Strain and concludes that the product is not achieving the company's profit goal with respect to New Business Strain.

You are given the following information for the first policy year:

Acquisition Expense	200
Discount Rate	8%
Benefit Reserve Increase	350
Cost of Equity	20%
DAC Amortization	-5,300
Deferred Tax Liability	-50
Death Benefits	200
Equity Base	2,000
Base First Year Commission (FYC)	50%
Sales Expenses Percentage	100% of base FYC
Investment Income	10
Investment Income on Required Capital	10
Premium	1,000
Required Capital Increase	30
Solvency Reserve Increase	200
Stock Asset	2,000
Surrender Benefits	100
Tax on Earnings	-50
Tax on Investment Income on Required Capital	3
Tax Reserve Increase	500

Distributable Earnings in year 2 are 700.

Verify the analyst's conclusion using distributable earnings as the basis for profit. Justify your answer.

4-5. *Use the following information for questions* 4 *and* 5.

RKA Life is the subsidiary of a large property-casualty company and sells its products through career property-casualty agents. RKA Life markets Group Life and Term insurance products and is considering the introduction of a fixed premium Universal Life product.

You are given:

	Group Life Insurance	**Term Insurance**	**Proposed Universal Life**
Annual Premium	60 million	40 million	25 million
Profit	0.75% of premium	1.50% of premium	2.50% of premium
Mortality Experience Study Basis	Aggregate	Aggregate	15 year select and ultimate
Underwriting Basis	Guaranteed Issue	Simplified Issue	Fully Underwritten with Preferred Classes

RKA's cost of capital is 15%.

4. (*8 points*)

(a) (*4 points*) Evaluate the proposed Universal Life product with respect to Critical Product Success Factors.

(b) (*4 points*) Identify and describe the hidden costs that might be associated with the proposed Universal Life product.

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4-5. *(Repeated for convenience) Use the following information for questions* 4 *and* 5.

RKA Life is the subsidiary of a large property-casualty company and sells its products through career property-casualty agents. RKA markets Group Life and Term insurance products and is considering the introduction of a fixed premium Universal Life product.

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Underwriting Basis	Guaranteed Issue	Simplified Issue	Fully Underwritten with Preferred Classes

RKA's cost of capital is 15%.

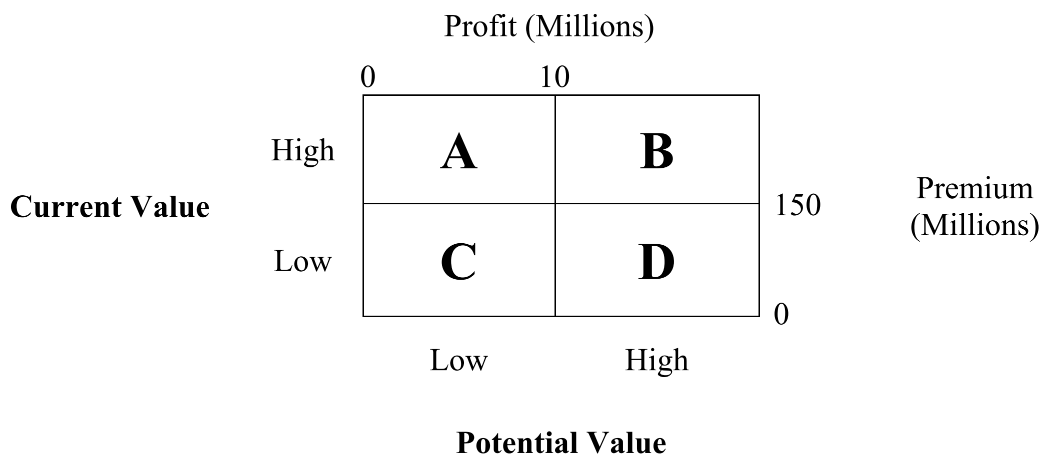
5. (*10 points*)

(a) (*3 points*) Explain why mortality experience data from the company's existing products may not be appropriate for setting the mortality assumption for the proposed Universal Life product.

(b) (*3 points*) Describe the design considerations that need to be balanced in pricing the proposed Universal Life product.

5. **Continued**

(c) (*4 points*) RKA Life considers its distribution channel to be a customer and uses the following value matrix:



(i) Define Current Value and Potential Value based on the Lifetime Customer Value.

(ii) Explain the goal and strategy for each quadrant in the Value Matrix.

(iii) Determine the quadrant that RKA Life's distribution channel is in currently, and its potential quadrant with the addition of the proposed Universal Life product. Show all work.

6. (*9 points*) You are given the following profile of two life insurance companies:

	ABC Life	XYZ Life
Distribution Strategy	Independent brokers distributing term life insurance with focus on upper-income customers.	Career and independent agents selling flexible premium variable universal life, and fixed and variable annuities, targeting middle income customers. Pays higher commissions to enhance recruitment and retention of agents.
Pricing Strategy	Set prices low enough to generate a high level of sales.	Set prices slightly higher than the competition.
Goals	Enhance recruitment and retention of agents, decrease unit costs by automation and economies of scale.	Provide product solutions for a wide variety of customer needs. Obtain agents' business through competitive, innovative products and outstanding support services.

(a) (*4 points*)

(i) Describe pricing strategies outlined in Atkinson and Dallas.

(ii) Identify which pricing strategies are being used by ABC Life and XYZ Life.

(b) (*3 points*) Analyze the expense impact of the distribution strategies and goals for both companies.

XYZ is considering a new distribution opportunity offering guaranteed issue term life insurance through employers to high-income executives.

(c) (*2 points*) Evaluate the potential success of XYZ's new strategy.

7. (*9 points*) Your company markets term insurance in the U.S., Canada and India. The pricing methodology for all countries is on a Market Consistent basis. Required capital is calculated based on Risk Based Capital (RBC) standards in the U.S., Minimum Continuing Capital and Surplus Requirements (MCCSR) for Canada and Economic Required Capital (ERC) for India.

(a) (*1 point*) State the objectives of Market Consistent Pricing Methodology.

(b) (*4 points*) Describe the three different required capital methods. Compare and contrast the three methods according to the risk factors:
(i) Asset default
(ii) Insurance risk
(iii) Interest rate risk

(c) (*4 points*) For a 3-year term product, you are given:

	Premiums (BOY)	Benefits (EOY)	Total Expenses (BOY)
Year 1	100	10	20% of premium
Year 2	100	10	20% of premium
Year 3	100	10	20% of premium

Interest Rate Earned on Company Investments	5%
Hurdle Rate	10%
Risk Free Rate	4%
Total Risk Premium Shareholders Expect to Earn	7%
Diversification Risk	0%
Transfer Tax on Liability	0%
Worst Case Shock for Mortality	20% increase in benefits, expenses, and commissions
Worst Case Shocks for Other Risks	0%

Calculate Economic Required Capital and Market Consistent Value of New Business.

8. (*9 points*) ABC Life Insurance Company is repricing an Equity Indexed Single Premium Deferred Annuity with the following product features:

- Single Premium: 1,000
- Index: S&P 500
- Index Period: 5 years
- Index Growth Method: High Water Mark
- Ratchet: Annual
- Participation Rate: 100%

You are also given:

- Net earned rate is now 5%, reduced from 7% in the original pricing
- The budget available to hedge the index growth guarantee is 9.5% of initial premium
- Minimum nonforfeiture value is 87.5% of premium accumulated at 3%.
- Equity index for each year:

Year	**0**	**1**	**2**	**3**	**4**	**5**
Equity Index	327	345	362	337	326	403

(a) (*1 point*) Identify major differences between a Variable Annuity (VA) and an Equity Indexed Annuity (EIA).

(b) (*2 points*) Calculate the present value of expenses and profit as a percentage of premium. Show all work.

(c) (*1 point*) Calculate the payout under the indexation method for this EIA. Show all work.

(d) (*2 points*)

(i) Determine the impact on the cost of Guaranteed Minimum Account Value resulting from the drop in the net earned rate. Show all work.

(ii) Explain the significance of the change in net earned rate to the pricing of an EIA.

(e) (*3 points*) Initial profit analysis shows a lower than desired profitability level. Recommend changes to the product design to improve profit results. Justify your answer.

****END OF EXAMINATION****
MORNING SESSION

USE THIS PAGE FOR YOUR SCRATCH WORK

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