SOCIETY OF ACTUARIES
Advanced Portfolio Management

Exam APM

MORNING SESSION

Date: Friday, April 29, 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 11 questions numbered 1 through 11.

   b) The afternoon session consists of 8 questions numbered 12 through 19.

   The points for each question are indicated at the beginning of the question. Questions 1 through 6 pertain to the Case Study, which is enclosed inside the front cover of this exam booklet.

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 APM.

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

Tournez le cahier d'examen pour la version française.

475 N. Martingale Road
Schaumburg, IL 60173-2226

Printed in the U.S.A.
Exam APM-Front Cover

CASE STUDY INSTRUCTIONS

The case study will be used as a basis for some examination questions. Be sure to answer the question asked by referring to the case study. For example, when asked for advantages of a particular plan design to a company referenced in the case study, your response should be limited to that company. Other advantages should not be listed, as they are extraneous to the question and will result in no additional credit. Further, if they conflict with the applicable advantages, no credit will be given.

****BEGINNING OF EXAMINATION****
Morning Session

Questions 1- 6 pertain to the Case Study
Each question should be answered independently.

1. (*6 points*) Wonka Life is offering a universal life product that has an account value with a credited rate based on Wonka's portfolio rate, subject to a guaranteed minimum of 4% per year. The product has a decreasing surrender charge which is deducted from the account value if the policy is surrendered.

(a) (*2 points*) Evaluate the current investment strategy for the universal life product with respect to interest rate risk.

(b) (*2 points*) Describe the advantages and disadvantages of using callable corporate bonds to back this block of business.

(c) (*2 points*) Recommend an investment strategy to better manage Wonka's exposure to interest rate risk for the universal life product and justify your recommendation.

Questions 1- 6 pertain to the Case Study
Each question should be answered independently.

2. (*7 points*)

(a) (*1 point*) Describe considerations when calculating the effective duration for a portfolio of non-callable corporate bonds.

(b) (*1.5 points*) Describe how the effective duration of Wonka's Universal Life product will be affected by a decrease in interest rates.

(c) (*0.5 points*) Describe the risks of investing in agency mortgage pass-throughs to back Wonka Life's UL products.

(d) (*2 points*) Calculate the effect of issuing $2 billion in new insurance liabilities on Wonka Life's surplus duration. Assume any new business written and assets invested will have the same effective durations as the existing business and investments, respectively, and that new sales have no surplus strain.

(e) (*1 point*) Recommend a method for managing the surplus duration back to within guidelines.

(f) (*1 point*) Explain whether it is possible to manage the asset duration to achieve a zero surplus duration.

Questions 1- 6 pertain to the Case Study
Each question should be answered independently.

3. (*5 points*) Wonka is considering an investment in a private equity fund.

(a) (*1 point*) Describe vintage year considerations and why they might be important with respect to evaluating performance of this type of investment.

(b) (*2 points*) Describe the general characteristics of this type of investment with regard to each of the following criteria:

(i) Time horizon

(ii) Liquidity

(iii) Leverage

(c) (*2 points*) Evaluate the suitability of a private equity investment for Wonka's surplus account.

Questions 1- 6 pertain to the Case Study
Each question should be answered independently.

4. (*4 points*) You have been retained by Wonka Life to perform a review of how the Company's committees conducted business in 2009.

(a) (*1 point*) Identify behavioral biases and factors that may lead Wonka's committees to less than fully rational financial decisions.

(b) (*1 point*) Identify potential fiduciary liability issues.

(c) (*2 points*) Recommend appropriate changes for 2010.

Questions 1- 6 pertain to the Case Study
Each question should be answered independently.

5. (*7 points*)

(a) (*2 points*) The Byrd Ratings & Analysis report has defined the Liquidity Ratio to be liquid assets / projected demand liability.

(i) Define demand liabilities.

(ii) Describe how the demand liability will be measured for the following Wonka lines of business:

1. Term Certain Annuity

2. Universal Life

3. Group Life and Health

The head of Annuity Products, Sam Roach, argues Wonka's block of accumulation annuities does not pose significant liquidity risk.

(b) (*2 points*) Critique Roach's assertion based on the information in their Quarterly Product Report.

(c) (*3 points*) Critique the former CFO's proposed liquidity management framework.

Questions 1- 6 pertain to the Case Study
Each question should be answered independently.

6. (*5 points*) Recommend risk reduction strategies that would help Wonka Life in managing the following risks of their Employees' Pension Plan, and justify your recommendations.

(i) Longevity Risk

(ii) Inflation Risk

(iii) Liquidity Risk

(iv) Currency Risk

(v) Pension Funding Risk

7. (*4 points*) Your company has three investment portfolios. Your company's guideline on single company exposure mandates that credit risk exposure to a single issuer within a portfolio be limited. The managers of the three portfolios are reviewing alternative ways of managing issuer-specific risk.

Portfolio/Manager	A	B	C
Portfolio Size	Large	Small	Small
Credit Research Ability	Weak	Strong	Strong
Transaction Cost Efficiency	Efficient	Not Efficient	Not Efficient
Complies with Guideline on Single-Company Exposure	Yes	Yes	No

(a) (*1 point*) Explain how the manager of Portfolio C can use credit default swaps (CDS) to manage single issuer risk, while providing a similar cash flow pattern and achieving the original target total return.

(b) (*3 points*) Recommend approaches to manage issuer-specific risk other than using CDS to the managers of Portfolio A and B. Justify your recommendations.

8. (*5 points*) You are a commodity trader for a large financial institution. You observe the following:

- The spot price of Brent crude oil is $74.60 per barrel
- The spot price of copper is $3.50 per pound
- The price of futures on Brent crude oil and copper

Contract	Futures Price on Brent Crude Oil (per barrel)	Futures Price on Copper (per pound)
July, 2011	74.90	3.50
August, 2011	76.00	3.49
September, 2011	77.30	3.49
October, 2011	78.30	3.48
November, 2011	79.00	3.48
December, 2011	79.70	3.47
January, 2012	80.20	3.45
January, 2013	83.70	3.41
January, 2014	85.40	3.35

(a) (*2 points*) Describe the economic drivers of return for long-only commodity indexation.

(b) (*1 point*) Describe the market conditions in which futures for Brent crude oil and copper are currently trading.

(c) (*2 points*) You currently own a July 2011 contract. You believe strongly that the spot prices of copper will remain at $3.50 over the next four years.

Describe a strategy that would yield a profit for a long-only investor if this price were realized.

9. (*5 points*) Culebra Life has just acquired a large block of liabilities. This new acquisition has shifted the liability DV01 significantly and it is now 850,000.

Culebra's Asset Portfolio					
Asset Class	Duration (years)	Spread Duration (years)	Book Value ('000s)	Market Value ('000s)	Current yield
Cash	0	0	250,000	240,000	1.00%
Treasury Bonds	11.0	0	250,000	275,000	4.00%
Corporate Bonds	6.2	5.9	400,000	500,000	5.50%
Mortgages	2.2	1.3	500,000	475,000	5.00%
Total			1,400,000	1,490,000	

(a) (*2 points*)

(i) Define spread duration.

(ii) Describe the major types of spread duration.

(b) (*3 points)* The CFO has expressed concern that the current portfolio yield is too low, but Culebra's investment policy restricts spread duration to be no more than 3.0 years.

(i) Calculate the maximum allowable allocation to Corporate Bonds under the investment policy while keeping the allocations to Mortgages at the current level.

(ii) Recommend an asset allocation that rebalances the portfolio so that the asset dollar duration matches the liability while being sensitive to the CFO's concerns. Justify your recommendation.

10. (*7 points*)

(a) (*1 point*) Describe the differences between collateralized loan obligations and collateralized high-yield bond obligations in terms of their default risk.

You are given the following data for a Collateralized Debt Obligation (CDO):

	Amount (in millions)	Credit Rating	Coupon
Underlying Assets	100	B	LIBOR + 220 bps
Senior Tranche	82	Aa	LIBOR + 20 bps
Mezzanine Tranche	8	Baa	LIBOR + 120 bps
Equity Tranche	10	NA	Residual

(b) (*1 point*) Calculate the maximum return available on the equity tranche assuming no arbitrage and ignoring CDO manager fees.

(c) (*1.5 points*) Analyze the risk/reward trade-offs of the equity tranche.

(d) (*1.5 points*) Describe the challenges of rating CDO tranches.

(e) (*1 point*) Describe the deficiencies in solely using rating agency credit ratings to assess the default risk of a CDO.

(f) (*1 point*) Describe any limitations in the disclosure requirements for structured finance products.

11. (5 *points*) The Hatfield Corporation's defined benefit pension plan has a $500 Million portfolio, 20% of which is invested in equities. This equity "sub-portfolio" is managed separately. Instead of investing directly in equity, the fund manager proposes investing in equity index futures.

You are given:

(i) The current funding ratio for this plan is 90%.

(ii) The equity portfolio beta = 1.06 (relative to the S&P 500 index).

(iii) The current level of the S&P 500 Index is 800.

(iv) Each equity index futures contract is 500 times the value of the S&P 500 Index.

(a) (*1.5 points*) Calculate the hedge ratio and the number of S&P 500 Index futures contracts needed to replicate the equity exposure of this portfolio. Assume that the investment horizon coincides with the expiration date of the futures contract.

(b) (*1.5 points*) Analyze the pros and cons of using equity index futures in managing an equity portfolio.

(c) (*2 points*) Describe the reasons for and against investing in equities for a pension plan like Hatfield's.

****END OF EXAMINATION****
Morning Session

USE THIS PAGE FOR YOUR SCRATCH WORK

USE THIS PAGE FOR YOUR SCRATCH WORK

USE THIS PAGE FOR YOUR SCRATCH WORK