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**SOCIETY OF ACTUARIES**  
**Retirement Benefits United States – Design & Pricing**

# Exam DP-RU

**Date:** Thursday, November 4, 2010

**Time:** 8:30 a.m. – 12:15 p.m.

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## INSTRUCTIONS TO CANDIDATES

### General Instructions

1. This examination has a total of 70 points.  
  
This exam consists of 9 questions, numbered 1 through 9.  
  
The points for each question are indicated at the beginning of the question. Questions 3-4, and 9 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 Exam DP-RU.
6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.



## **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\*\***

- 1.** (8 points) Employer sponsorship of post-retirement health care coverage has been declining for several years.
  - (a) (4 points) Explain the rationale employers have used to support elimination of these benefits.
  - (b) (4 points) In light of an employer's ability, in most situations, to reduce or eliminate benefits, describe three adjustments that could theoretically be made to the current actuarial model to refine the estimate of retiree medical obligations. Ignore the restrictions under current accounting standards.
  
- 2.** (5 points)
  - (a) (3 points) Describe the taxation of death benefits distributed from a qualified plan in the form of a lump-sum versus a periodic form of payment.
  - (b) (2 points) Describe the situations where penalty taxes are imposed in addition to federal income taxes on qualified plan distributions.

***Questions 3 and 4 pertain to the Case Study.  
Each question should be answered separately.***

**3-4.** *The following information applies to both questions 3 and 4.*

NOC is in the final stages of acquiring the salaried workforce of a smaller competitor, ABC Oil Co. (“ABC”). The acquisition has caused NOC to conduct a comprehensive review of its retirement income programs along with ABC’s retirement programs to determine the most appropriate retirement strategy for the new NOC population after the acquisition.

In order of importance, NOC has stated key objectives that should be addressed with regard to their retirement programs in light of the acquisition of ABC:

1. Single plan should cover all salaried employees.
2. Plan should minimize cost volatility.
3. Plan should be attractive to new employees.
4. Plan should encourage retention of current employees.
5. Employees should share responsibility for retirement income.
6. Plan should protect retirement income for existing NOC employees.

**3.** *(10 points)*

- (a) *(7 points)* In light of NOC’s key objectives, compare and contrast the characteristics of defined contribution plans and defined benefit plans.
- (b) *(3 points)* Discuss how the characteristics of defined contribution plans described in (a) affect projected retirement income for participants.

**Questions 3 and 4 pertain to the Case Study.  
Each question should be answered separately.**

- 4.** *In addition to the information in question 3, for question 4 only, you are given:*

*(10 points)* NOC has provided you with the following information about ABC's retirement programs and their demographics.

**Retirement Programs**

Qualified plan: Defined contribution plan with employer contribution of 6% of earnings.

SERP plan: Defined benefit plan with pension equal to 1.5% times highest 3 consecutive years of earnings less benefit payable under the qualified plan.

**Demographic Information**

Employee Count:	1,500
Average Age:	30
Average Service:	6 years
Average Earnings:	\$65,000
SERP Employee Count:	30
SERP Average Earnings:	\$400,000

NOC is considering two proposals for the ongoing retirement strategy.

**Proposal 1**

All ABC salaried employees would be covered under the current NOC Salaried Plan and ABC SERP participants would be covered under the current NOC SERP Plan.

**Proposal 2**

After the transaction, all NOC and ABC salaried employees would be covered under ABC's defined contribution plan. All SERP participants would also be covered under a new defined contribution SERP, with employer allocations equal to 4% of earnings.

- (a) *(7 points)* Discuss the advantages and disadvantages of each proposal.
- (b) *(3 points)* Recommend a proposal from (a) to NOC's Board of Directors. Provide support for your recommendation.

5. (8 points) You are reviewing a pension fund investment manager's performance over the past two years. You have been given the following information:

Year	Asset Class Return for Pension Fund Portfolio		Average Pension Plan Fund Mix		Benchmark Return		Target Pension Fund Allocation
	2008	2009	2008	2009	2008	2009	
Domestic Equities	(30%)	33%	41%	47%	(33%)	30%	50%
International Equities	(26%)	25%	19%	25%	(24%)	22%	15%
Domestic Bonds	8%	2%	32%	26%	6%	5%	35%
Cash	1%	2%	8%	2%	3%	1%	0%

- (a) (2 points) Calculate the fund performance in each of the last two years and in total (including average annual return over that period), relative to the benchmark returns.  
Show all work.
- (b) (4 points) Using macro analysis, analyze the manager's relative performance in 2008 and 2009.  
Show all work.
- (c) (2 points) List the characteristics that define market indices and describe how a liability benchmark meets these criteria.



**6.** (4 points)

- (a) (1 point) Explain the concept of multi-national pooling.
- (b) (3 points) Discuss the advantages and disadvantages of using multi-national pooling for insured benefits globally.

7. (10 points) Your client is considering establishing a hybrid plan that will offer a lump sum to all of the participants. In general, your client’s employees fall into one of the following two categories:

	<b>Profile 1 (Young, New Hire)</b>	<b>Profile 2 (Mid-Career Hire)</b>
Average Age	25	40
Average Service	1 year	12 years
Salary	\$50,000	\$85,000
Assumed Annual Salary Increase	3% per year	5% per year

Your client is considering the following two plan designs:

**Proposed Plan #1: Cash Balance Plan**

Contribution credit is 5% of salary per year.

Interest Crediting Rate: 200 basis points above 30-year treasury rate for November immediately before plan year.

**Proposed Plan #2: Pension Equity Plan (“PEP”)**

PEP Accrual Formula

<b>Age</b>	<b>Credit %</b>
Under 35	3.0
36 - 40	4.0
41 – 45	5.0
46 – 50	6.5
51 – 55	8.5
56 – 60	10.5
61+	13.5

- (a) (3 points) Describe the age discrimination issue that has arisen with hybrid plans, including new testing rules brought about by the Pension Protection Act (“PPA”).
- (b) (3 points) Describe the new hybrid plan rules brought about by PPA related to:
- (i) plan conversions;
  - (ii) vesting; and
  - (iii) interest-crediting rate.

## 7. Continued

- (c) (4 points) Critique the two proposed plan designs and their effect on Profile 1 and Profile 2 employees in terms of:
- (i) portability;
  - (ii) benefit accrual patterns;
  - (iii) inflation protection; and
  - (iv) relation to income replacement needs.

8. (8 points) Your client's final average earnings pension plan offers a lump sum benefit option and a level-income option at retirement. Currently the Internal Revenue Code 417(e)(3) assumptions and gender-specific mortality tables are used to value these options to determine minimum funding requirements.

The Internal Revenue Service proposed regulations indicate that a substitution rule may be used to value expected future lump sums and other 417(e)(3) optional form payments.

- (a) (2 points) Describe this proposed rule and its two optional elections.
- (b) (3 points) For each of the two benefit forms, describe the circumstances in which the proposed substitution rule should be adopted for valuing the benefits. Support your recommendation.
- (c) (3 points) Your client is considering freezing the final average earnings formula and replacing it with a cash balance formula going forward. The plan would allow participants to elect a lump sum or an annuity of the cash balance benefit on retirement or termination.

Explain how your client could use the reverse substitution rule to value the benefits of cash balance plan participants who are assumed to elect annuity payments rather than the lump sum option.

***Question 9 pertains to the Case Study.***

- 9.** (7 points) NOC is trying to recruit a mid-career employee (age 52) from a competitor with the intention of making him their new CEO.
- (a) (3 points) List the primary objectives of defined benefit executive retirement arrangements and indicate which ones are being met by the current NOC retirement plans.
  - (b) (2 points) Describe the changes that could be made to the features of NOC's current SERP that would make it more attractive to the potential CEO.
  - (c) (2 points) Describe how Internal Revenue Code regulation 409A affects the changes described in (b) above.

**\*\*END OF EXAMINATION\*\***

**USE THIS PAGE FOR YOUR SCRATCH WORK**

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