
SOCIETY OF ACTUARIES
Retirement Benefits United States – Design & Pricing

Exam DP-RU

Date: Thursday, April 26, 2012
Time: 8:30 a.m. – 12:15 p.m.

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 and 7 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.** (5 points) Your client sponsors a defined benefit plan. However, given recent activity amongst its primary competitors, your client is considering establishing a Cash or Deferred Arrangement (CODA) under Section 401(k).
- (a) (2 points) Describe the types of employee and employer contributions that may be made to a 401(k) plan.
 - (b) (3 points) Compare and contrast 401(k) plans, 403(b) plans, and 457(b) plans.
- 2.** (11 points) Your client sponsors a traditional final average pay defined benefit plan. The company is concerned with the level and volatility of contribution requirements and with benefit adequacy for the employees.

You recently met with your client and the VP HR mentioned the company was considering the following two plan design alternatives for future service:

- (i) cash-balance plan
 - (ii) profit sharing plan
- (a) (5 points) Compare and contrast the key plan design features of cash balance plans and profit sharing plans, in light of management's concerns.
 - (b) (4 points) Describe the various transition approaches that could be used by your client with respect to the current DB plan participants.
 - (c) (2 points) Describe "wear-away" and its implications on your client's plan design decisions.

Question 3 pertains to the Case Study.

- 3.** (12 points) National Oil Company (NOC) would like to make changes to the Full-Time Salaried and Union Retiree Health Benefit Program for future retirees to reduce NOC's program costs.
- (a) (6 points) Describe the plan design changes that NOC could make to meet this objective.
 - (b) (6 points) Describe the impact the plan design changes in (a) could have on each of the valuation assumptions.
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- 4.** (8 points)
- (a) (2 points) Describe the process to select a new investment manager for a pension fund.
 - (b) (3 points) Compare and contrast passive and active investment management.
 - (c) (3 points) The following potential new asset classes are being considered for a pension plan's investment portfolio:
 - (i) Government Bonds
 - (ii) Derivatives
 - (iii) Real Estate

Discuss the appropriateness of each asset class for investment in a pension fund.

- 5.** (7 points) Large Company is in the process of acquiring Small Company. Large Company and Small Company each sponsor defined benefit pension plans, Large Plan and Small Plan, respectively. The plan provisions of both plans are identical.

As part of the due diligence, Large Company has reviewed the last actuarial valuation report for the Small Plan. The lawyers at Large Company have noted differences in the assumptions used for the actuarial valuations of Small Plan and Large Plan as follows:

Assumption	Small Plan	Large Plan
Investment Return	7.0% per year	7.75% per year
Mortality	RP 2000 White Collar	90% of UP 1994
Future Pay Increases	4% per year	Table based on age and service
Retirement Age	Age 62	Age-based rates

Both actuarial valuations were performed as of December 31, 2010.

- (a) (3 points) List the factors that should be considered in setting each of these assumptions.
- (b) (4 points) Identify potential reasons for the variance between the two plans for each of the assumptions.
- 6.** (7 points) Explain the differences between US public and private sector defined benefit plans with respect to the following:
- (i) Benefit Structure
 - (ii) Protection of Benefits
 - (iii) Funding Approaches
 - (iv) Investment Policies

Question 7 pertains to the Case Study.

7. (8 points)

- (a) (3 points) Describe the issues that both the NOC Full-Time Salaried Pension Plan participants and Part-Time DC Pension Plan participants face in accumulating and preserving pension benefits.
- (b) (3 points) Describe the alternative approaches private pension systems in other countries have used to address the issues raised in (a). References to specific countries are not required.
- (c) (2 points) Discuss the feasibility of using the alternatives described in (b) to address the issues in the NOC pension plans described in (a).

8. (6 points) Your client's CFO asks you to evaluate the fund investment performance of the company's pension plan in 2011. You have been given the following information:

	Asset Class Return for Pension Fund Portfolio	Average Pension Plan Fund Mix	Benchmark Return	Target Pension Fund Allocation
Domestic Equities	11%	55%	10%	50%
International Equities	13%	15%	15%	15%
Domestic Bonds	8%	28%	5%	35%
Cash	2%	2%	2%	0%

In addition, the portfolio beta was 1.2 and the variance was 25% in 2011.

- (a) (2 points) Describe the steps in a pension fund performance evaluation.
- (b) (2 points) Calculate the following performance ratios:
 - (i) Ex post alpha (Jensen's alpha)
 - (ii) Treynor measure
 - (iii) Sharpe ratio

Show all work.

- (c) (2 points) Compare and contrast the different ratios.

9. (6 points)

- (a) (2 points) Discuss the considerations for an actuary in expressing an opinion as to whether a Domestic Relations Order is a Qualified Domestic Relations Order.
- (b) (2 points) Describe the key elements in the selection of an allocation method to determine the marital property portion of defined benefit plan retirement benefits under a domestic relations action.
- (c) (2 points) You have been provided the following with respect to a pension plan member.
- The plan member joined the plan at age 35,
 - The plan member was married at age 38,
 - The plan member and spouse divorced at age 41,
 - The plan member terminated his employment at age 45,
 - Each event occurred on January 1 of the given year,
 - Benefits are immediately vested under the plan, and
 - The member is currently age 45.

You are given:

Age, January 1	Benefit Accrual Service, January 1	Annual Compensation	Accrued Benefit, January 1
35	10	60,000	\$0
36	11	61,000	\$900
37	12	64,000	\$1,815
38	13	64,000	\$2,775
39	14	65,200	\$3,735
40	15	66,500	\$4,713
41	16	68,000	\$5,710
42	17	70,000	\$6,730
43	18	71,300	\$7,780
44	19	72,000	\$8,850
45	20	74,000	\$9,930

Calculate the portion of the accrued benefit that is marital property under two allocation methods.

Show all work.

****END OF EXAMINATION****

USE THIS PAGE FOR YOUR SCRATCH WORK

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