TABLE OF CONTENTS
DESIGN AND PRICING

1b. Describe the process and apply the principles of conversion from one plan type to another	
R-D101-07 Converting Pension Plans from a DB to DC Design (Page 1-5)	55
1c. Apply methods of the integration of government provided benefits with retirement plan designs	
Retirement Plans (10th Edition) by Allen et al Chapter 17: Defined Benefit Plan, Page 310 – 311 "Integration with Social Security"	Obj1a
1d. Given a plan type, examine the relevance and range of plan features: ▪ **Plan eligibility requirements** ▪ **Benefit eligibility requirements, accruals, vesting and phased retirements** ▪ **Benefit / Contribution formula** ▪ **Payment options and associated adjustments to the amount of benefits** ▪ **Ancillary benefits** ▪ **Benefit subsidies and their value, vested or non-vested** ▪ **Participant investment options** ▪ **Required and optional employee contributions** ▪ **Phased retirement and DROP plans**	
Fundamentals of Private Pensions (9th Edition) by McGill et al Chapter 8: Changing the End of Work – Phased Retirement, Page 246 - 247	57
R-D801-07 Current Issues with Public Employee Retirement Systems, Page 17 -22, 26-35 (Exclude Q&A)	58
R-D807-11 State and Local Government Pension Plans, Current Structure and Funded Status	63
R-D139-11 The Use of Health Savings Accounts for Health Care in Retirement	64
For Objective 1d: Also refer to material under Objective 1a, 2a & 2b	

Instructional Objective 2	Page
2a&b. Explain and apply ▪ **Regulatory limits placed on types of plans that can be offered** ▪ **Restrictions on plan design features to a proposed plan design**	
Retirement Plans (10th Edition) by Allen et al	
Chapter 6: Profit Sharing Plan and Money Purchase Plans, Page 92-100 "Qualification Requirement"	1
Chapter 6: Profit Sharing Plan and Money Purchase Plans, Page 105-107 "Tax Provisions"	6
Chapter 7: Employee Stock Ownership Plans (ESOPs), Page 115-121 "ESOP Qualification Requirements"	9
Chapter 8: Cash or Deferred Arrangements (CODAs) under Section 401(k), Page 129-145	13
Chapter 9: Section 403(b) Plans, Page 150-165	21
Fundamentals of Private Pensions (9th Edition) by McGill et al	
Chapter 8: Changing the End of Work, Page 255-263	28
Chapter 12: Hybrid DB Plan Design	32
Chapter 13: Individual Tax-Favored Savings Plans	Obj1a
R-D100-11 Multi-Employer Plans	Obj1a
R-D807-11 State and Local Government Pension Plans, Current Stature and Funded Status	Obj1a
2c. Explain and test for limits on plan designs and features that protect participant rights	
Retirement Plans (10th Edition) by Allen et al Chapter 27: Other Legal Requirements, Page 509-514	35
2d. Test for plan design restrictions intended to control the use of tax incentives	
Retirement Plans (10th Edition) by Allen et al Chapter 31: Retirement Asset Distribution Planning, Page 579-592	39

2e. Calculate the limitations on payout options	
Retirement Plans (10th Edition) by Allen et al Chapter 26: Tax Qualification Requirements, Page 480-481	44
Private Pension Policies In Industrialized Countries – A Competitive Analysis, 1995, by Turner and Watanabe Chapter 5: Tax Policy: Influencing Coverage and the Structure of Pensions Page 93-94	45
2f. Explain and apply rules governing the conversion from one type of plan to another	
Fundamentals of Private Pensions, (9th Edition) by McGill et al Chapter 12: Hybrid DB Plans	Obj2a&b

Instructional Objective 3	Page
3a&b. Given a specific context, apply principles and features of: ▪ **Executive deferred compensation retirement plans** ▪ **Supplemental retirement plans**	
Retirement Plans (10th Edition) by Allen et al Chapter 10: Section 457 Deferred Compensation Plans Chapter 14: Executive Retirement Arrangements	 1 5
R-D103-07 Should Variable Pay Count Towards Benefit Calculations	9
R-D804-09 Non-qualified deferred compensation design after 409A	11
3c. Integrate a plan for executives with the basic benefit plan	
Retirement Plans (10th Edition) by Allen et al Chapter 14: Executive Retirement Arrangements, Page 252-253 "Co-ordination with Broad Based Plan"	Obj3a/b

Instructional Objective 5	Page
5a. Differentiate between the various purposes for valuing pension plans ▪ **Budgeting; Funding; Accounting; Solvency ; Termination / Wind-up** ▪ **Economic value**	
R-D109-07 Financial Economics and Canadian Pension Valuations, CIA Task Force	1
5b. Perform periodic valuations of ongoing plans, calculating normal cost and actuarial liability, using the variety of cost methods for budgeting, funding, accounting and measuring economic value	
Fundamentals of Retiree Group Benefits by Yamamoto Chapter 9: Actuarial Methods and Assumptions, Page 287 – 294	5
R-D127-09 ASOP6 Measuring Retiree Group Benefit Obligations	9
5c. Analyze and communicate the pattern of cost recognition that arises under a variety of funding and asset valuation method	
Fundamentals of Retiree Group Benefits by Yamamoto Chapter 9: Actuarial Methods and Assumptions, Page 287 – 294	Obj5b
R-D143-11 Funding of State and Local Pensions	15
R-D808-11 ASOP44 Selection and Use of Asset Valuation Methods for Pension Valuations	16
5d. Perform valuations for special purposes: ▪ **Plan termination / wind-up** ▪ **Solvency valuations** ▪ **Open group valuations**	
5e. Assess the impact of using various cost methods in a given context	
"A Look at Dynamic Pension Plan Valuation", August 2001 Pension Forum	18

6e. Evaluate the appropriateness of actuarial assumptions using both a traditional and a financial economics perspective	
Pension Forum, January 2005	Obj6c
R-D109-07 Financial Economics and Canadian Pension Valuation	Obj5a
R-D115-07 Reinventing Pension Actuarial Science with Discussion	Obj6d
R-D126-09 ASOP27 Selection of Economic Assumptions for Measuring Pension Obligations	Obj6c
6f. Describe and apply the building of economic assumptions	
Fundamentals of Retiree Group Benefits by Yamamoto Chapter 9: Actuarial Methods and Assumptions Page 256 – 278	Obj6c
Pension Forum, January 2005	Obj6c
R-D112-10 Selection of Actuarial Assumptions	Obj6c
R-D126-09 ASOP27 Selection of Economic Assumptions for Measuring Pension Obligations	Obj6c
R-D127-09 ASOP6 Measuring Retiree Group Benefit Obligations	Obj5b
6g. Assess and explain the effect that the assumptions selected had on valuation results	
Differences in Actuarial Assumptions, The Actuary 1988	Obj6b
6h. Recommend appropriate assumptions for a particular type of valuation and defend the selection	
Fundamentals of Retiree Group Benefits by Yamamoto Chapter 9: Actuarial Methods and Assumptions Page 256 – 278	Obj6c
R-D125-11 ASOP35 Selection of Demographic Assumptions for Measuring Pension Obligations	Obj6c
R-D126-09 ASOP27 Selection of Economic Assumptions for Measuring Pension Obligations	Obj6c
R-D127-09 ASOP6 Measuring Retiree Group Benefits	Obj5b

6i. Select demographic and economic assumptions appropriate for a sensitivity analysis **6j. Select demographic and economic assumptions appropriate for a projection valuation designed for a given goal**	
"A Look at Dynamic Pension Plan Valuation", August 2001 Pension Forum	Obj5d
R-D117-07 Pension Projections	60
R-D129-09 How the Liability Benchmark is developed and Used in Practice	84

Instructional Objective 7	**Page**
Given a context, able to ▪ Assess data quality ▪ Identify data needed ▪ Make appropriate assumptions where data cannot be provided	
R-D130-09 ASOP23 Data Quality	1

Instructional Objective 8	**Page**
8a. Assess the gain / loss from options offered: ▪ **Phased retirement** ▪ **Postponed retirement** ▪ **Early retirement** ▪ **Option factors** ▪ **DROPs** **8b. Assess the impact of applicable regulation**	
"Issues for Implementing Phased Retirement in Defined Benefit Pension Plans", NAAJ	1
R-D809-11ASOP34 Actuarial Practice Concerning Retirement Plan Benefits in Domestic Relations Actions	4
R-D801-07 Current Issues with Public Employee Retirement Systems (Exclude Q&A) 2005 EA meeting, Session 202, Page 17 – 35	Obj1d

Instructional Objective 9	Page
9a&b. Describe the principles and motivations behind ▪ **Tax policy** ▪ **Legislated restrictions**	
9c. Describe sources and framework of government regulation	
Pension Policy – The Search for Better Solutions by Turner Chapter 5: Pension Tax Policy	1

Instructional Objective 10	Page
10a. Evaluate the interaction of plan investment and: ▪ **Plan design and funding** ▪ **Valuation assumptions and methods**	
R-D120-07 Asset / Liability Modeling and Asset Allocation for Pension Plans	1
R-D129-09 How the Liability Benchmark is Developed and Used in Practice	Obj6j
R-D131-09 Plan Sponsor Guide to Liability-Driven Investment Strategies	12
R-D132-09 Top 10 Myths about Liability – Driven Investing	13
10b. Solve for a measure of investment performance relevant to a given benchmark	
Retirement Plans (10th Edition) by Allen et al Chapter 24: Defined Benefit Plan Investment Management	15
R-D-123-07 Managing Investment Portfolio, Maginn and Tuttle, 3rd Edition, Chapter 12	19
R-D129-09 How the Liability Benchmark is Developed and Used in Practice	Obj6j
10c. Given a context, describe and compare the structure of appropriate investment vehicles	
Retirement Plans (10th Edition) by Allen et al Chapter 24: Defined Benefit Plan Investment Management	Obj10b
R-D-124-07 Introduction and Overview of Retirement Plan Investment	31
R-D133-09 Maginn and Tuttle Chapter 8, Section 6: Hedge Funds	35

11d. Explain and apply all the applicable standards of practice related to valuing retirement obligations	
AAA Code of Professional Conduct	22
SOA Code of Professional Conduct	Obj5c
R-D125-09 ASOP35 Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations	Obj8

Fundamentals of Retiree Group Benefits (Yamamoto et al)

Page 287 - 294

I. ACTUARIAL METHODS FOR LIFE AND HEALTH PLANS

1. All pension actuarial cost methods applicable to retiree group benefit plans.
2. Only difference is benefit definition
   a) Benefit related to health plan costs at retirement + cost increases after retirement.
   b) No benefits EE terminating before eligible for retirement
   c) Benefit costs / retiree contributions vary on service, age, and marital status at retirement.
3. May split costs associated with total eligible health plan expenses and those reimbursed by Medicare
   a) Net present value cost of the plan = PV of total eligible expenses less PV of Medicare reimbursed expenses:

$$PVTH_x = \sum_j^{\infty} \frac{l_j \times {}^r q_j \times B_j \times {}^T\ddot{a}_j \times v^{j-x}}{l_x}$$

$$PVM_x = \sum_j^{64} \frac{l_{65} \times {}^r q_j \times M_{65} \times {}^M\ddot{a}_{65} \times v^{65-x}}{l_x} + \sum_{65}^{\infty} \frac{l_j \times {}^r q_j \times M_j \times {}^M\ddot{a}_j \times v^{j-x}}{l_x}$$

$$PVNH_x = PVTH_x - PVM_x$$

where:

$PVTH_x$	=	present value of total health plan benefit
l_j	=	number alive at age j
${}^r q_{jj}$	=	probability of retirement at age j
B_j	=	benefit at age j (increased at total health trend assumption from age x)
${}^T\ddot{a}_j$	=	increasing annuity at age j (increasing at total health trend assumption)
v^{j-x}	=	interest discount
PVM_x	=	present value of Medicare benefit
M_j	=	Medicare benefit at age j (increased at Medicare increase assumption from age x)
${}^M\ddot{a}_j$	=	increasing annuity at age j (increasing at Medicare increase assumption)
$PVNH_x$	=	present value of net health plan benefit
B_j , M_j	=	present benefits payable at the attained age j and therefore include any health/Medicare inflation from age x

Modified Projected Unit Credit

1. Required "attribution" method under FAS 106
2. Since retiree group benefits has no rate of benefit accrual, method must be modified
3. FAS 106 requires benefits be attributed to years prior to the date of full eligibility for benefits instead of expected retirement dates.
   a) E.g. EE hired at 35 with full benefit accrual by earliest retirement age 55.
   b) EE is assumed to have accrued one-fourth [5 ÷ (55 – 35)] of his benefit at age 40, three-fourths at 50 (15 ÷ 20) and the full benefit at age 55

Delayed Funding Eligibility

1. Applicable to any actuarial method
2. The difference is only participants who meet high age and service requirements will be included in the calculations. (E.g. Age 45 with 15 years of service or a rule of 60)
3. Rationale: only value EE most likely to receive retiree group benefit
4. Provide some degree of advance accrual for ER

Modified Entry Age

1. For welfare benefit fund calculations.
2. Entry age = Max (age at hire, date the welfare benefit fund was adopted)
   a) Benefits funded over the working lifetime of employees

II. SELECTION OF ACTUARIAL METHODS

1. FAS 106 requires projected unit credit method with cost allocation from hire age to full eligibility age (typically earliest retirement age)
   a) Cost allocation may also be over different time periods depending on how benefits are earned.
2. Most conservative (fastest) funding form entry age normal method
3. Most liberal (slowest) funding from traditional unit credit method
4. In between from aggregate, frozen initial liability, and projected unit credit methods
   a) Depend on amortization period of any unfunded liability in the funding amount.
5. GASB allow all 6 methods: entry age, attained age, frozen entry age, frozen attained age, projected unit credit, and aggregate.
   a) Actuary must communicate the longer term differences of the alternative methods.
6. Pension literature on actuarial cost methods selection generally also applicable for retiree group benefit valuations

III. EXPERIENCE GAINS AND LOSSES

1. Immediate gain methods (entry age and unit credit) produce annual GL
2. Generalized formula for calculating the gain/loss is:

$$Exp\,UAL_{t+1} = (UAL_t + NC_t) \times (1+i) - C_t^i$$

$$Gain/(loss) = Exp\,UAL_{t+1} - UAL_{t+1}$$

where:

$Exp\ UAL_{t+1}$ = Expected unfunded actuarial liability
UAL_{t+1} = Actual unfunded actuarial liability
NC_t = Normal cost
i = interest rate
C_t^i = Contribution (with interest)

3. GL may be identified by each source E.g. GL due to plan cost changes:

$$Gain/(loss) = AL_{t+1} - \frac{PC_t \times (1+m)}{PC_{t+1}} \times AL_{t+1}$$

where:

PC_t = plan cost at time t
m = expected health trend

4. Pension literature on GL also applicable for retiree group benefit valuations

IV. "ROLL-FORWARD" VALUATIONS

1. Allowed by ASOP 6 for interim valuations
2. Expected actuarial liability (no GL):

$$Exp\ AL_{t+1} = (AL_t + NC_t) \times (1+i) - B_t^i$$

3. May adjust expected AL if actual claim rates is different from prior year's claim rate increased by the valuation health care cost trend rate assumption.
   a) Linear adjustment is generally used (I.e. if the actual increase in cost rate was j% and the expected increase was i%, adjustment is:

$$Adj\ AL_{t+1} = Exp\ AL_{t+1} \times \frac{1+j}{1+i}$$

4. Similar adjustment may be made for demographics
   a) Either total number or a change in the make-up (i.e., age and gender)
   b) Consider differences by group (i.e., actives versus pre- and post-65 retirees), plan type, and location.
5. Normal cost estimation generally = Prior year's normal cost increased by the ultimate trend rate:

$$PVB_x^z = \sum_{t=0}^{\infty} {}_t p_x \times r_{x+t} \times B_0^z \times \prod_{j=0}^{t-1} (1+h_{z+j})$$

where:

PVB = present value of projected benefits
${}_t p_x$ = probability of survival to duration t
r_{x+t} = probability of being retired at $x+t$
B_0^z = initial benefit amount in year z

h_{z+j} = health care trend in year $z+j$

$$PVB_x^{z+1} = \sum_{t=0}^{\infty} {}_tp_x \times r_{x+t} \times B_0^{z+1} \times \prod_{j=0}^{t-1}(1+h_{z+1+j})$$

$$B_0^{z+1} = B_0^z \times (1+h_z)$$

$$PVB_x^{z+1} = \sum_{t=0}^{\infty} {}_tp_x \times r_{x+t} \times B_0^z \times (1+h_z) \times \prod_{j=0}^{t-1}(1+h_{z+1+j})$$

$$PVB_x^{z+1} = \sum_{t=0}^{\infty} {}_tp_x \times r_{x+t} \times B_0^z \times \prod_{j=0}^{t}(1+h_{z+j})$$

$$PVB_x^{z+1} = \sum_{t=0}^{\infty} {}_tp_x \times r_{x+t} \times B_0^z \times (1+h_{z+t}) \times \prod_{j=0}^{t-1}(1+h_{z+j})$$

6. If most persons aged x benefits do not commence until after the select period (i.e., time t is beyond the select period), the term h_{z+t} is a constant equal to the ultimate trend rate h_{ult}.

$$PVB_x^{z+1} = (1+h_{ult}) \times \sum_{t=0}^{\infty} {}_tp_x \times r_{x+t} \times B_0^z \times \prod_{j=0}^{t-1}(1+h_{z+j})$$

$$PVB_x^{z+1} = (1+h_{ult}) \times PVB_x^z$$

$$NC_x^z = PVB_x^z \times \frac{1}{FEA-e}$$

$$NC_x^{z+1} = PVB_x^{z+1} \times \frac{1}{FEA-e}$$

therefore:

$$NC_x^{z+1} = NC_x^z \times (1+h_{ult})$$

Above illustrates the formula for the projected unit credit method normal cost development. Similar proofs can be made for other actuarial cost methods

7. For select period > 5 years, such assumption (Most active EE start benefit payments until after the select period) does not hold
   a) Decide how much greater the service cost should be increased over the ultimate trend rate assumption.
8. Stable population implies total NC increases at the ultimate health care trend rate.