Solutions to EA-2(A) Examination
Fall, 2012

Question 1

In the case of a multiple employer plan, IRC section 413(c)(4)(A) states that for plans established after 1988, the minimum required contribution is determined separately for each employer. The minimum required contribution must be determined separately for each of Employers A, B, and C. The sum of these is the minimum required contribution for the entire plan.

<u>Employer A</u>

The minimum required contribution under IRC section 430(a)(1)(i) is equal to the sum of the target normal cost, the shortfall amortization charge, and the waiver amortization charge (if any waiver exists).

The funding shortfall is equal to the funding target less the actuarial value of the assets (reduced by the funding standard carryover balance and the prefunding balance).

Funding shortfall as of 1/1/2013 = 500,000 – 505,000 = -5,000

When the funding shortfall is less than or equal to zero, there is no shortfall amortization base (and any existing bases are considered to be fully amortized). In addition, any excess assets are used to reduce the target normal cost (but not less than zero).

Minimum required contribution for Employer A = 10,000 – 5,000 = 5,000

<u>Employer B</u>

Funding shortfall as of 1/1/2013 = 600,000 – 620,000 = -20,000

When the funding shortfall is less than or equal to zero, there is no shortfall amortization base (and any existing bases are considered to be fully amortized). In addition, any excess assets are used to reduce the target normal cost (but not less than zero).

Minimum required contribution for Employer B = 15,000 – 20,000 = 0

<u>Employer C</u>

Funding shortfall as of $1/1/2013 = 700{,}000 - 600{,}000 = 100{,}000$

The funding shortfall is amortized over 7 years:

$100{,}000/6.0000 = 16{,}667$

Minimum required contribution for Employer C $= 20{,}000 + 16{,}667 = 36{,}667$

Total minimum required contribution $= 5{,}000 + 0 + 36{,}667 = 41{,}667$

Answer is C.

Question 2

Plans that provide for accelerated distributions are required to reduce the funding balances if doing so would prevent the plan from having IRC section 436 restrictions placed on the plan with regard to those distributions.

The AFTAP, as defined in IRC section 436(j)(1) and determined on the plan valuation date, is equal to the ratio of the actuarial value of assets (reduced by the funding standard carryover balance and prefunding balance) to the funding target, with both the numerator and denominator increased by the total purchases of annuities for the NHCEs during the last 2 years. Note that it can be assumed in this question that there were no annuities purchased because that information is not provided.

$$\text{2012 AFTAP} = \frac{950{,}000 - 200{,}000}{1{,}000{,}000} = 75\%$$

A partial restriction on accelerated distributions would apply to this plan because the AFTAP is less than 80%. However, if the prefunding balance were reduced to $150,000, then the AFTAP would be equal to exactly 80%:

$$\text{Revised 2012 AFTAP} = \frac{950{,}000 - 150{,}000}{1{,}000{,}000} = 80\%$$

The prefunding balance is therefore reduced to $150,000. (Note that the 2011 AFTAP of 120% is given so that it is known that the presumed AFTAPs for 2013 are always greater than 80%.)

The actual contribution deposited for 2012 is $300,000 on 12/31/2012. This must be interest adjusted to the 1/1/2012 valuation date using the 2012 plan effective rate:

$300,000/1.06 = 283,019$

There is an excess contribution of $33,019 (283,019 − 250,000). The general conditions of the exam state that the employer elects to apply the excess contribution to the prefunding balance. Generally, this excess is added to the prefunding balance as of the first day of the following year, including an interest adjustment using the current year (2012) plan effective rate.

In this question, the employer has also elected to apply $50,000 of the prefunding balance towards the minimum required contribution. Due to the size of the actual contribution, this application was unnecessary, and can be ignored for purposes of adjusting the prefunding balance to 1/1/2013. The existing 1/1/2012 prefunding balance of $150,000 is increased with interest using the actual 2012 asset return (30%) to get the value as of 1/1/2013.

Prefunding balance as of $1/1/2013 = (\$150,000 \times 1.3) + (\$33,019 \times 1.06) = \$230,000$

Answer is B.

Question 3

The average value method under IRC section 430(g)(3)(B), Treasury regulation 1.430(g)-1(c)(2), and Revenue Notice 2009-22 allows for averaging of fair market and adjusted fair market values for up to 25 months ending on the valuation date. The asset method being used in this question averages the fair market value on the valuation date with the adjusted fair market value from the prior year valuation date.

The adjusted fair market value from a particular valuation date is the fair market value on that date, adjusted for all contributions, benefit payments and administrative expenses that occurred between that valuation date and the current valuation date, and further adjusted for expected earnings based upon the actuary's best estimate of the asset rate of return for the year. If this expected rate of return is larger than the segment 3 interest rate, then that segment 3 interest rate is used. In this question, the segment 3 interest rate for 2012 of 6% is used to determine the expected earnings for that year (the assumed rate of return of 7% is larger).

The expected earnings for 2012 are:

$$(4,000,000 + 300,000) \times .06 = 258,000$$

Note that all contributions, benefit payments, and administrative expenses occurred on 12/31, so there were no expected earnings associated with those transactions.

1/1/2012 adjusted fair market value (adjusted to 1/1/2013)
$$= 4,300,000 + 258,000 + 500,000 - 100,000 - (8,000 + 6,000) = 4,944,000$$

1/1/2013 fair market value
$$= 3,500,000 + 750,000 = 4,250,000$$

1/1/2013 actuarial value $= (4,944,000 + 4,250,000)/2 = 4,597,000$

Under IRC section 430(g)(3)(B)(iii), the actuarial value cannot be more than 110% of the market value of the assets. 110% of 4,250,000 is equal to 4,675,000.

The 1/1/2013 actuarial value of assets is equal to 4,597,000.

Answer is C.

Question 4

A waived funding deficiency is amortized over a period of 5 years under IRC section 430(e). The amortization is part of the minimum required contribution beginning in the year following the waiver. As a result, the $25,000 that was waived for 2012 is first amortized on 1/1/2013 (one year after the 1/1/2012 valuation date). The waived deficiency is amortized using the segment rates in effect for the valuation year in which the waiver was obtained. So, the $25,000 is amortized using the 2012 segment rates.

The first 4 amortization installments are determined using the segment 1 interest rate, and the final installment is determined using the segment 2 interest rate. This is due to the fact that the final installment is due exactly 5 years after the waiver occurred (and the payment is made on the first day of the 6th year following the waiver date).

$$2012 \text{ waived deficiency amortization installment} = \frac{\$25,000}{a_{\overline{4}|2\%} + v^5_{4\%}} = \$5,400$$

Note the use of the annuity immediate because the first installment is paid one year after the waived deficiency occurred.

The 2013 funding shortfall is equal to the funding target less the actuarial value of the assets.

Funding shortfall as of $1/1/2013 = 3,000,000 - 2,700,000 = 300,000$

The 2013 shortfall amortization base is equal to the 2013 funding shortfall reduced by the outstanding balance of any existing shortfall or waiver amortization bases. The only other base is the 2012 waiver base. The outstanding balance of the waiver base is equal to the present value of the remaining 5 payments, valued using the 2013 segment rates. Note that all 5 payments will be made during the next 5 years (beginning on 1/1/2013), so only the segment 1 rate is used to determine the outstanding balance. In addition, the first installment is to be made immediately on 1/1/2013, so an annuity-due is used.

Outstanding balance of 2012 waived deficiency $= 5,400 \times \ddot{a}_{\overline{5}|3\%} = 25,472$

2013 shortfall amortization base $= 300,000 - 25,472 = 274,528$

The maximum amount that can be waived in 2013 is the sum of the target normal cost and the amortization of the 2013 shortfall base (the amortization of a waived deficiency cannot be waived).

$X = 5,000 + (274,528/6.2468) = 48,947$

Answer is B.

Question 5

Smith's compensation must be limited to the IRC section 401(a)(17) maximum for each year. Treasury regulation 1.401(a)(17)-1(b)(3)(ii) indicates that for plans using compensation based on consecutive 12-month periods, compensation for each 12-month period is limited to the annual compensation limit using the limit in effect as of the first day of the 12-month period. The 12-month periods representing the plan year compensation are 7/1/2005 – 6/30/2006, 7/1/2006 - 6/30/2007, and so on for each plan year. Using the table provided with the exam, Smith's compensation history and limitation history is:

Period	Salary	401(a)(17) limitation
7/1/05 – 6/30/06	217,000	210,000
7/1/06 – 6/30/07	240,000	220,000
7/1/07 – 6/30/08	250,000	225,000
7/1/08 – 6/30/09	255,000	230,000
7/1/09 – 6/30/10	230,000	245,000
7/1/10 – 6/30/11	210,000	245,000
7/1/11 – 6/30/12	205,000	245,000

Smith's high consecutive 5-year average compensation (limiting each year's salary to the IRC section 401(a)(17) maximum) is from 7/1/06 through 6/30/11:

$$\frac{\$220,000 + \$225,000 + \$230,000 + \$230,000 + 210,000}{5} = \$223,000$$

Accrued benefit $= 1.2\% \times \$223,000 \times 7$ years of service $= \$18,732$

Answer is B.

Question 6

The normal cost under the Aggregate cost method is generally equal to:

$$\frac{\text{Present value of future benefits - Actuarial value of assets (reduced by the credit balance)}}{\text{Temporary annuity}}$$

When the plan benefits are based upon compensation, the temporary annuity is equal to the ratio of the present value of future compensation to current compensation. When there is a salary scale and no pre-retirement decrements, the temporary annuity factor (ratio of present value of future compensation to current compensation) is based on the ratio of the assumed interest rate to the salary scale. In this question, that rate is:

$(1.06/1.04) - 1 = 0.019231$, or 1.9231%

Although this plan has 1,000 participants, they are all the same age (58) with the same compensation. Therefore, the normal cost can be calculated using the same temporary annuity for all participants. Based upon the general conditions of the exam, it can be assumed that normal retirement age is 65, and there are no pre-retirement decrements.

The actuarial value of assets as of 1/1/2013 is equal to $10,600,000 (the contribution for the first plan year made one day earlier).

Final compensation for each participant $= \$31,200 \times 1.04^7 = \$41,057$

Projected retirement benefit for each participant $= \$41,057 \times 25\% = \$10,264.25$

Present value of future benefits $= 1,000 \times \$10,264.25 \times \ddot{a}_{65}^{(12)} \times v_{6\%}^7 = \$68,263,125$

$$\text{Normal cost}_{1/1/2013} = \frac{\$68,263,125 - \$10,600,000}{\ddot{a}_{\overline{7}|1.9231\%}} = \$8,715,712$$

Answer is C.

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Question 7

The unused prefunding balance is adjusted with interest using the actual asset rate of return for the year (IRC section 430(f)(8)). The actual asset rate of return for 2012 is not provided in this question. However, the data provided can be used to determine the rate of return.

Market value of assets as of 1/1/2012 = 460,000

Market value of assets as of 12/31/2012 (before 2012 contribution and benefit payments)
$$= 473,000 + 50,000 - 40,000 = 483,000$$

2012 asset rate of return = (483,000/460,000) − 1 = 0.05, or 5%

An excess contribution exists if the contribution for the year (interest-adjusted to the valuation date using the current year plan effective rate) exceeds the minimum required contribution.

2012 excess contribution = (40,000/1.07) − 35,000 = 2,383

The excess contribution is added to the prefunding balance in 2013 (this must be elected by the employer, and the exam general conditions state that the employer makes that election). The excess contribution is increased with interest to 1/1/2013 using the 2012 plan effective rate of 7%. (Note that once the excess contribution has been added to the prefunding balance, it is given interest using the actual plan rate of return. But for the year in which the excess contribution is made, the excess contribution is not yet part of the prefunding balance and is thus given interest at the current year plan effective rate.)

Prefunding balance as of 1/1/2013 = (50,000 × 1.05) + (2,383 × 1.07) = 55,050

Answer is B.

Question 8

Plan amendments that have been adopted no later than the valuation date and become effective no later than the last day of a plan year <u>must</u> be used in the valuation for the plan year (unless restricted under IRC section 436). See Treasury regulation 1.430(d)-1(d)(1)(i). The statement is true.

Answer is A.

Question 9

IRC section 4971 provides that the excise tax for multiemployer plans that fail to satisfy the minimum funding standard is 5%, not 10%. The statement is false.

Answer is B.

Question 10

Treasury regulation 1.430(d)-1(f)(2) states that plans with fewer than 100 participants (including beneficiaries who are not in pay status) are not required to have a pre-retirement mortality assumption (but only if that would be a reasonable assumption to make). The statement is false.

Answer is B.

Question 11

This statement is false because there are three conditions under IRC section 430(h)(5)(B) that must be satisfied in order for IRS approval of a change in actuarial assumptions to be required. Missing from this statement is the fact that the plan must be covered by the PBGC. In addition, IRS approval is only required if the change would result in a decrease of the funding shortfall by more than \$50,000,000, or if the decrease in the funding shortfall exceeds \$5,000,000 and that is at least 5% of the funding target before the assumption change.

Answer is B.

Question 12

The minimum required contribution under the Entry Age Normal method is equal to the normal cost, plus the amortization charges, less the amortization credits, brought forward with interest at the valuation rate to the last day of the plan year. The smallest amount needed to satisfy minimum funding is the minimum required contribution, reduced by the credit balance (brought forward with valuation interest to the end of the plan year).

$$\text{Minimum required contribution}_{12/31/11} = (1,500,000 + 200,000 - 150,000) \times 1.07$$
$$= 1,658,500$$

$$\text{Smallest amount needed for minimum funding}_{12/31/11} = 1,658,500 - (350,000 \times 1.07)$$
$$= 1,284,000$$

The 2011 contribution, deposited on 12/31/2011, was not sufficient to avoid a funding deficiency for 2011.

2011 funding deficiency = 1,284,000 - 1,250,000 = 34,000

The 2011 deficiency must be included as part of the minimum required contribution for 2012.

$\text{Minimum required contribution}_{12/31/12}$
$$= (1,600,000 + 225,000 - 150,000 + 34,000) \times 1.07$$
$$= 1,828,630$$

The 2012 contribution, deposited on 12/31/2012, exceeds the minimum required contribution for 2012. The difference is the credit balance as of 12/31/2012.

1/31/12 credit balance = 1,850,000 - 1,828,630 = 21,370

Answer is A.

Question 13

The funding target is equal to the present value of the accrued benefit in effect at the beginning of the year. Smith has 11 years of service as of 1/1/2013.

Smith's actual 2012 salary is $115,000, and Smith's expected 2012 salary is $103,000 ($100,000 × 1.03).

The normal retirement benefit is based upon the highest 3-year average salary. For purposes of the funding target, salary cannot be projected beyond 2012 (for the 1/1/2013 valuation).

Smith's high 3-year average salary is:

Using 2012 expected salary: $\dfrac{95{,}000 + 100{,}000 + 103{,}000}{3} = 99{,}333$

Using 2012 actual salary: $\dfrac{95{,}000 + 100{,}000 + 115{,}000}{3} = 103{,}333$

It is assumed based upon the general conditions of the exam that normal retirement age is 65. Smith is currently age 51 on 1/1/2013.

The funding target as of 1/1/2013 is equal to the present value of the accrued benefit. Using the segment interest rates, the segment 2 is used for the first 6 years of payments (age 65 through 70), and segment 3 is used for ages 71 and later. All payments must be discounted with interest and mortality because there is an assumption of pre-retirement mortality.

$$\$X = 2\% \times \$99{,}333 \times 11 \text{ years} \times \left[\frac{N^{(12)}_{65@\,seg2} - N^{(12)}_{71@\,seg2}}{D_{51@\,seg2}} + \frac{N^{(12)}_{71@\,seg3}}{D_{51@\,seg3}} \right]$$

$$= \$21{,}853 \times \left[\frac{23{,}241 - 12{,}896}{5{,}028} + \frac{6{,}202}{3{,}115} \right]$$

$$= \$88{,}472$$

$$\$Y = 2\% \times \$103{,}333 \times 11 \text{ years} \times \left[\frac{N^{(12)}_{65@\,seg2} - N^{(12)}_{71@\,seg2}}{D_{51@\,seg2}} + \frac{N^{(12)}_{71@\,seg3}}{D_{51@\,seg3}} \right]$$

$$= \$22{,}733 \times \left[\frac{23{,}241 - 12{,}896}{5{,}028} + \frac{6{,}202}{3{,}115} \right]$$

$$= \$92{,}035$$

|$X - $Y| = $92,035 - $88,472 = $3,563

Answer is C.

Question 14

Treasury regulation 1.430(d)-1(f)(5) requires that the pay credit in a cash balance plan be accumulated at the plan's interest crediting rate to retirement age. For purposes of the target normal cost, that accumulated value is then discounted using the plan's funding assumptions, assuming the accumulated pay credit is elected to be paid as a lump sum. Smith is age 50 as of the valuation date, so the assumed lump sum would be payable in 15 years. As a result, the segment 2 interest rate of 6% is used to discount the assumed lump sum (segment 2 is used for payments to be made more than 5 years and no more than 20 years from the valuation date). Note that the pay credit is as of the end of 2013, so it is accumulated for only 14 years.

Accumulated pay credit at age $65 = 5,000 \times 1.05^{14} = 9,900$

Target normal cost $= 9,900 \times v_{6\%}^{15} = 4,131$

Answer is B.

Question 15

A schedule SB must be completed and signed by the enrolled actuary regardless of which form in the 5500 series is to be filed by the plan sponsor. The statement is false.

Answer is B.

Question 16

The smallest amount that satisfies the minimum funding standard for 2012 is equal to:

$50,000 - $11,150 = $38,850

The 2012 quarterly contribution amount is equal to 25% of the smaller of:

(1) The 2011 minimum required contribution, or
(2) 90% of the 2012 minimum required contribution

The smaller of these is 90% of the 2012 minimum.

2012 quarterly contribution requirement $= 25\% \times 90\% \times \$50,000 = \$11,250$

The due dates of the quarterly contributions for 2012 are 4/15/2012, 7/15/2012, 10/15/2012, and 1/15/2013. The quarterly contribution requirement can be satisfied by using the funding balances, or by making a contribution for 2012. On 4/15/2012, the plan sponsor elected to apply the prefunding balance to the 2012 minimum required contribution, so this is also used to pay for the quarterly contributions, as needed. The prefunding balance is increased from 1/1/2012 to 4/15/2012 (the date of the election) with interest using the 2012 plan effective rate.

Prefunding balance as of 4/15/2012 $= \$11,150 \times 1.031^{3.5/12} = 11,250$

The 4/15/2012 quarterly contribution is paid for using the entire prefunding balance.

The only contribution for 2012 is made on 9/15/2013, in an amount equal to the smallest amount that satisfies minimum funding (in other words, enough to avoid a funding deficiency). The final 3 quarterly contributions are all late, deposited on 9/15/2013. As a result, when discounting that portion of the contribution to 1/1/2012, an additional 5 percentage points must be added to the 2012 plan effective rate for the period that the quarterly was late. For example, the 7/15/2012 quarterly was 14 months late, so there is a 14-month discount using 8.1%, and the remaining 6½ month discount is at 3.1%.

Present value of the late quarterly contributions as of 1/1/2012:

$$(\$11,250 \times 1.081^{14/12} \times 1.031^{6.5/12}) + (\$11,250 \times 1.081^{11/12} \times 1.031^{9.5/12})$$
$$+ (\$11,250 \times 1.081^{8/12} \times 1.031^{12.5/12})$$
$$= \$10,104 + \$10,225 + \$10,346 = \$30,675$$

The remaining contribution (not needed to pay for a quarterly contribution) is:

($38,850 - $30,675) $\times$ $1.031^{20.5/12}$ = $8,613

Total contribution $X = ($11,250 $\times$ 3) + $8,613 = $42,363

Answer is D.

Question 17

When the actuarial value of the assets is at least as large as the funding target, then the funding balances are ignored for purposes of the AFTAP determination. See IRC section 436(j)(3)(A). The AFTAP for this plan is equal to the ratio of the actuarial value of assets to the funding target. Note that it can be assumed that there have been no purchases of annuities, per the general conditions of the exam.

2013 AFTAP = 68,000,000/65,000,000 = 104.6%

There is no required reduction in the funding balances when the AFTAP exceeds 100%. Therefore, $X = $0.

Answer is A.

Question 18

The frozen initial liability cost method consists of a normal cost and various amortization charges and credits. The amortization bases generally consist only of an initial accrued liability (amortized over a period of 30 years for plans effective prior to 2008) determined under the entry age normal method. That unfunded liability is not provided in the data for this question. However, the unfunded liability can be determined by using the balance equation

$$\text{Unfunded liability} = \text{Outstanding balance} - \text{Credit balance}$$

$$= 50,000,000 \times \frac{\ddot{a}_{\overline{4|}}}{\ddot{a}_{\overline{30|}}} - 700,000$$

$$= 13,648,159 - 700,000 = 12,948,159$$

The amortization of the initial base is: $\dfrac{50,000,000}{\ddot{a}_{\overline{30|}}} = 3,765,720$

The normal cost under the frozen initial liability cost method is equal to:

$$\frac{\text{Present value of future benefits - Actuarial value of assets - Unfunded liability}}{\text{Temporary annuity}}$$

Note that the actuarial value of assets is not reduced by the credit balance for purposes of the normal cost calculation under the FIL cost method.

When the plan benefits are based upon compensation, the temporary annuity is equal to the ratio of the present value of future compensation to current compensation.

$$\text{FIL normal cost} = \frac{350,000,000 - 300,000,000 - 12,948,159}{750,000,000 / 75,000,000} = 3,705,184$$

The smallest amount that satisfies the minimum funding standard under the FIL method is equal to the normal cost plus the 30-year amortization of the initial base, less the credit balance, all brought forward with interest to the end of the plan year using the valuation interest rate.

$$X = (3,705,184 + 3,765,720 - 700,000) \times 1.07 = 7,244,867$$

The normal cost under the Aggregate cost method is generally equal to:

$$\frac{\text{Present value of future benefits - Actuarial value of assets (reduced by the credit balance)}}{\text{Temporary annuity}}$$

There are no amortization bases under the Aggregate cost method, so the initial base under the FIL method is considered to be fully amortized.

$$\text{Aggregate normal cost} = \frac{350{,}000{,}000 - (300{,}000{,}000 - 700{,}000)}{750{,}000{,}000 / 75{,}000{,}000} = 5{,}070{,}000$$

The smallest amount that satisfies the minimum funding standard under the Aggregate method is equal to the normal cost less the credit balance, all brought forward with interest to the end of the plan year using the valuation interest rate.

$$Y = (5{,}070{,}000 - 700{,}000) \times 1.07 = 4{,}675{,}900$$

$$|X - Y| = 7{,}244{,}867 - 4{,}675{,}900 = 2{,}568{,}967$$

Answer is B.

Question 19

When a plan participant retires, the gain or loss is equal to the difference between the actual liability and the expected liability (if they had not retired and the accrued liability was determined under the cost method).

Smith has retired at age 55 with 9 years of service. The annual accrued benefit, payable at age 65 is:

$4,000 \times 9 = 36,000$

The actual benefit that Smith is receiving has been adjusted to reflect the early retirement reduction of 3% per year prior to age 65.

Early retirement benefit $= 36,000 \times [1 - (.03 \times 10 \text{ years})] = 25,200$

Actual liability $= 25,200 \times \dfrac{N_{55}^{(12)}}{D_{55}} = 25,200 \times \dfrac{508,056}{38,635} = 331,384$

Under the unit credit cost method, the accrued liability is equal to the present value of the beginning of year accrued benefit. For funding purposes, retirement age is assumed to be 65, and there are no assumed pre-retirement decrements.

Expected liability $= 36,000 \times \dfrac{N_{65}^{(12)}}{D_{65}} \times v^{10} = 36,000 \times \dfrac{220,966}{20,301} \times 0.558395 = 218,802$

There is an experience loss, because the actual liability is greater than the expected liability.

$X = 331,384 - 218,802 = 112,582$

Answer is C.

Question 20

Under the unit credit cost method, the accrued liability is equal to the present value of the beginning of year accrued benefit. It is not clear in this question what the accrued benefit is, but without a means of making that determination, it must be assumed that $120,000 (the benefit payable at normal retirement age) is the accrued benefit.

The accrued liability must include both the present value of the retirement benefit, as well as the present value of the death benefit. The present value of the retirement benefit must include a discount for mortality, since it does not get paid unless the participant survives to age 65.

$$\text{Present value of retirement benefit} = 120,000 \times \frac{N_{65}^{(12)}}{D_{63}} = 120,000 \times \frac{220,966}{23,213} = 1,142,288$$

Present value of death benefit $= 120,000 \times (q_{63} + p_{63}q_{64}v) = 2,018$

Accrued liability $= 1,142,288 + 2,018 = 1,144,306$

Answer is A.

Note that if the accrued benefit is assumed to be anything less than the given normal retirement benefit, the answer would still be in range A.

Question 21

Plans that provide for accelerated distributions (such as a lump sum) are required to reduce the funding balances if doing so would prevent the plan from having IRC section 436 restrictions placed on the plan with regard to those distributions.

The AFTAP, as defined in IRC section 436(j)(1) and determined on the plan valuation date, is equal to the ratio of the actuarial value of assets (reduced by the funding standard carryover balance and prefunding balance) to the funding target, with both the numerator and denominator increased by the total purchases of annuities for the NHCEs during the last 2 years. Note that it can be assumed in this question that there were no annuities purchased because that information is not provided.

$$\text{2013 AFTAP (before asset method change)} = \frac{50{,}000{,}000 - 4{,}000{,}000}{60{,}000{,}000} = 76.67\%$$

A partial restriction on accelerated distributions would apply to this plan because the AFTAP is less than 80%. However, if the prefunding balance were reduced to $2,000,000, then the AFTAP would be equal to exactly 80%:

$$\text{Revised 2013 AFTAP (before method change)} = \frac{50{,}000{,}000 - 2{,}000{,}000}{60{,}000{,}000} = 80\%$$

The prefunding balance is therefore reduced to $2,000,000 when considering the valuation before the asset method change.

$$\text{2013 AFTAP (after asset method change)} = \frac{47{,}000{,}000 - 4{,}000{,}000}{60{,}000{,}000} = 71.67\%$$

A partial restriction on accelerated distributions would apply to this plan because the AFTAP is less than 80%. A full reduction in the prefunding balance (to zero) would not allow the AFTAP to reach 80%. Therefore, the prefunding balance is not reduced when considering the valuation after the asset method change.

The funding shortfall is the excess of the funding target over the actuarial value of assets (reduced by the funding standard carryover balance and the prefunding balance). In considering the valuation before the asset valuation method change:

Funding shortfall$_{1/1/2013}$ = \$60,000,000 – (\$50,000,000 - \$2,000,000) = \$12,000,000

X = Amortization of 2013 funding shortfall if asset method change is not changed
= \$12,000,000/5.9991 = \$2,000,300

In considering the valuation after the asset valuation method change:

Funding shortfall$_{1/1/2013}$ = \$60,000,000 − (\$47,000,000 - \$4,000,000) = \$17,000,000

Y = Amortization of 2013 funding shortfall after change in asset method
   = \$17,000,000/5.9991 = \$2,833,758

Y − X = \$2,833,758 - \$2,000,300 = \$833,458

Answer is C.

Question 22

The funding shortfall is the excess of the funding target over the actuarial value of assets (reduced by the funding standard carryover balance and the prefunding balance).

Funding shortfall$_{1/1/2012}$ = $2,100,000 – ($2,200,000 - $200,000) = $100,000

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the <u>total</u> pre-funding balance if the employer elects to use any part of it to reduce the minimum contribution requirement, but not reduced by the funding standard carryover balance) is at least as large as the funding target. It is given that the employer elects to use the prefunding balance in 2012 to satisfy the minimum required contribution, so the plan is not exempt from creating a new shortfall base because the assets reduced by the prefunding balance are less than the funding target. The 2012 shortfall base is equal to the funding shortfall, amortized over 7 years.

2012 shortfall amortization installment = $100,000/5.9982 = $16,672

The funding shortfall for 2013 is:

Funding shortfall$_{1/1/2013}$ = $2,200,000 – ($2,400,000 – 225,000) = $25,000

The new shortfall amortization base for 2013 is equal to the 2013 funding shortfall less the outstanding balance of the 2012 shortfall base (6 years remaining).

1/1/2013 outstanding balance of 2012 shortfall base = $16,672 × 5.2932 = $88,248

2013 shortfall amortization base = $25,000 - $88,248 = ($63,248)

2013 shortfall amortization installment = ($63,248)/5.9982 = ($10,544)

The minimum required contribution is equal to the sum of the target normal cost and the shortfall amortization installments.

2013 minimum required contribution = $95,000 + $16,672 - $10,544 = $101,128

Answer is D.

Question 23

The target normal cost is equal to the present value of the increase in the accrued benefit for the year. For this purpose, the beginning of year accrued benefit uses salary history through the end of the prior year, and the end of year accrued benefit uses salary history through the end of the prior year as well as current year expected salary (equal to the prior year salary increased by the assumed salary scale).

There is a retirement age assumption under which participants are assumed to retire at either age 62 or age 65. The accrued benefit calculated at both the beginning and end of 2013 must be reduced for early retirement age 62 in order to determine the target normal cost with regard to the assumed early retirement age.

Smith has 7 years of service as of 1/1/2013, and 8 years of service as of 12/31/2013.

$AB_{1/1/2013} = 2.5\% \times \$125,000 \times 7$ years of service $= \$21,875$
$AB_{12/31/2013} = 2.5\% \times (\$125,000 \times 1.03) \times 8$ years of service $= \$25,750$

The accrued benefits reduced for early retirement age 62 are:

$AB_{1/1/2013} = \$21,875 \times [1 - (.04 \times 3 \text{ years})] = \$19,250$
$AB_{12/31/2013} = \$25,750 \times [1 - (.04 \times 3 \text{ years})] = \$22,660$

The segment 3 interest rate of 8% is used to determine the present values because Smith is age 30 on 1/1/2013 – more than 20 years from both of the assumed normal and early retirement ages.

The target normal cost is equal to 40% of the present value of the increase in 2013 accrued benefit payable at age 62, plus 60% of the present value of the increase in 2013 accrued benefit payable at age 65.

Target normal cost $= [(\$25,750 - \$21,875) \times 9.53 \times v^{35}_{8\%} \times .6]$

$+ [(\$22,660 - \$19,250) \times 10.07 \times v^{32}_{8\%} \times .4]$

$= \$1,499 + \$1,170 = \$2,669$

Answer is A.

Question 24

Under the projected unit credit cost method, the normal cost is equal to the present value of the current year accrual (using projected compensation), and the accrued liability is equal to the present value of the prior year accruals (beginning of year accrued benefit using projected compensation). When there are various assumed retirement ages, each present value must include the value if the participant retired at each assumed age, multiplied by the probability of retiring at that age. In this question, the assumed retirement ages are 62, 63, and 65. The assumed probability of retiring at each age is:

Age 62: 50%
Age 63: 50% (probability of NOT retiring at age 62) × 25% = 12.5%
Age 65: 50% × 75% (probability of NOT retiring at age 63) = 37.5%

Smith is age 60 with 10 years of service as of 1/1/2013.

Projected final compensation at each retirement age is:

Age 62 = $101,000 × 1.03^2 = $107,151
Age 63 = $101,000 × 1.03^3 = $110,365
Age 65 = $101,000 × 1.03^5 = $117,087

The projected accrued benefit as of 1/1/2013 for each retirement age is:

Age 62 = 1.5% × $107,151 × 10 years of service × [1 − (.05 × 3 years)] = $13,662
Age 63 = 1.5% × $110,365 × 10 years of service × [1 − (.05 × 2 years)] = $14,899
Age 65 = 1.5% × $117,087 × 10 years of service = $17,563

$$AL_{1/1/2013} = (\$13,662 \times 10.9 \times v^2 \times .5) + (\$14,899 \times 10.7 \times v^3 \times .125)$$
$$+ (\$17,563 \times 10.3 \times v^5 \times .375)$$
$$= \$65,034 + \$16,267 + \$48,367$$
$$= \$129,668$$

Since the accrual is the same each year (1.5% of projected salary), the normal cost will be equal to one-tenth of the accrued liability (Smith has 10 years of past service, so one-tenth of that is the one year of service that Smith earns in 2013).

$$NC_{1/1/2013} = \$129,668 \times (1/10) = \$12,967$$

AL + NC = $129,668 + $12,967 = $142,635

Answer is B.

Question 25

IRC section 430(c)(5)(A) states that a plan is exempt from creating a new shortfall amortization base only if the plan's assets reduced only by the prefunding balance (in certain situations) is at least as large as the funding target. The funding standard carryover balance is never used for this purpose. The statement is false.

Answer is B.

Question 26

The normal cost under the Aggregate cost method is generally equal to:

$$\frac{\text{Present value of future benefits - Actuarial value of assets (reduced by the credit balance)}}{\text{Temporary annuity}}$$

When the plan benefits are based upon compensation, the temporary annuity is equal to the ratio of the present value of future compensation to current compensation. When the plan benefits are not based on compensation, the temporary annuity is equal to the average present value of the future working years of the active participants (terminated vested and retired participants are not taken into account in determining the temporary annuity).

$$\text{Normal cost}_{1/1/2013} = \frac{\$10,000,000 - (\$4,000,000 - 300,000)}{8,000/1,000} = \$787,500$$

The credit balance as of the end of the year (12/31/2013) is equal to the excess of the credits (in this question, that would be the contributions with interest from date of deposit to the end of 2013, plus the credit balance with interest to the end of 2013) over the normal cost (brought forward with interest to the end of 2013). Note that contributions made after 2013 receive no interest adjustment.

$$\text{Credit balance}_{12/31/2012} = [(\$300,000 \times 1.06) + (\$500,000 \times 1.03) + \$200,000]$$
$$- (\$787,500 \times 1.06)$$
$$= \$198,250$$

Answer is D.

Note that simple interest was used to increase the mid-year contribution. Compound interest can also be used, and the answer will be in the same range.

Question 27

The funding shortfall is the excess of the funding target over the actuarial value of assets (reduced by the funding standard carryover balance and the prefunding balance).

Funding shortfall$_{1/1/2013}$ = \$45,700,000 − (\$46,200,000 - \$3,700,000) = \$3,200,000

IRC section 430(c)(5)(A) states that a plan is exempt from creating a new shortfall amortization base only if the plan's assets reduced by the prefunding balance (in certain situations) is at least as large as the funding target. The funding standard carryover balance is never used in this situation. In this question, there is no prefunding balance, and the actuarial value of assets exceeds the funding target. There is no new shortfall amortization base created in 2013.

However, the funding shortfall is positive, so the prior shortfall amortization bases continue to be maintained.

The minimum required contribution is equal to the sum of the target normal cost and the shortfall amortization installments.

2013 minimum required contribution = \$6,900,000 + \$110,000 = \$7,010,000

The smallest amount that satisfies the minimum funding standard (\$X) is equal to the minimum required contribution less the funding balances.

\$X = \$7,010,000 - \$3,700,000 = \$3,310,000

Answer is D.

Question 28

The funding shortfall is the excess of the funding target over the actuarial value of assets (reduced by the funding standard carryover balance and the prefunding balance).

Funding shortfall$_{1/1/2013}$ = \$95,759,000 – (\$95,700,000 - \$500,000) = \$559,000

IRC section 430(c)(5)(A) states that a plan is exempt from creating a new shortfall amortization base only if the plan's assets reduced by the prefunding balance (in certain situations) is at least as large as the funding target. The funding standard carryover balance is never used in this situation. In this question, there is no prefunding balance, and the actuarial value of assets is less than the funding target. There is no exemption from creating a new shortfall amortization base in 2013. The new base is \$559,000 (there are no prior shortfall amortization bases). This is amortized over 7 years.

2013 shortfall installment = \$559,000/5.7800 = \$96,713

The minimum required contribution is equal to the sum of the target normal cost (reduced by the mandatory employee contributions to be made for the year) and the shortfall amortization installments. The target normal cost is equal to the present value of benefits expected to accrue during the year.

2013 minimum required contribution = (\$2,200,000 - \$750,000) + \$96,713 = \$1,546,713

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution less the funding balances:

\$1,546,713 - \$500,000 = \$1,046,713

A contribution of \$100,000 was made on 7/1/2013. This is interest adjusted for 6 months back to 1/1/2013, using the 2013 plan effective rate.

Interest adjusted contribution = $\$100,000 \div 1.06^{6/12} = \$97,129$

The additional contribution \$X, to be deposited on 12/31/2013, is equal to:

(\$1,046,713 - \$97,129) × 1.06 = \$1,006,559

Answer is B.

Question 29

The funding shortfall is the excess of the funding target over the actuarial value of assets (reduced by the funding standard carryover balance and the prefunding balance).

Funding shortfall$_{1/1/2013}$ = \$1,140,000 − (\$880,000 - \$12,000) = \$272,000

IRC section 430(c)(5)(A) states that a plan is exempt from creating a new shortfall amortization base only if the plan's assets reduced by the prefunding balance (if the employer elects to use any portion of the prefunding balance to reduce the minimum required contribution) is at least as large as the funding target. The funding standard carryover balance is never used in this situation. In this question, there is a prefunding balance, and the exam general conditions state that it is assumed that the employer elects to use it to reduce the minimum required contribution. The actuarial value of assets reduced by the prefunding balance (\$880,000 - \$12,000) is less than the funding target, so the plan is not exempt from creating a new shortfall amortization base in 2013. The new base is \$272,000 (there are no prior shortfall amortization bases). This is amortized over 7 years.

2013 shortfall installment = \$272,000/5.9782 = \$45,499

The minimum required contribution is equal to the sum of the target normal cost (increased by plan-related expenses paid for the year) and the shortfall amortization installments. The target normal cost is equal to zero because the plan is frozen for 2013, but the \$9,000 of plan-related expenses is still used.

2013 minimum required contribution = \$9,000 + \$45,499 = \$54,499

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution less the funding balances:

\$54,499 - \$12,000 = \$42,499

Answer is D.

Question 30

Smith has 13 years of service as of 1/1/2013, and has qualified for early retirement. The plan benefit that Smith has earned as of 1/1/2013, payable at his early retirement age of 55 (including the 3% reduction factor) is:

$5\% \times \$125,000 \times 13$ years of service $\times [1 - (.03 \times 10 \text{ years})] = \$56,875$

This must be limited under IRC section 415(b) to the smaller of the IRC section 415 dollar limit or the IRC section 415 compensation limit. The compensation limit is equal to 100% of the high 3-year average compensation (reduced pro-rata for years of service less than 10 – which does not apply in this question as Smith has 13 years of service). The compensation limit is $128,000.

The IRC section 415(b) dollar limit in effect for 2013 is given to be $200,000. This must be reduced pro-rata for years of plan participation less than 10. The plan was effective on 1/1/2008, so Smith has only 5 years of plan participation.

Pro-rated dollar limit $= \$200,000 \times (5/10) = \$100,000$

The dollar limit is further reduced for retirement prior to age 62. The reduced dollar limit is the smaller of the limit reduced using plan equivalence (in this case, using the 3% reduction factor) or the limit reduced using actuarial equivalence based upon 5% interest and the applicable mortality table.

The 3% reduction factor is a factor to be applied to an age 65 (not age 62) benefit. So, it must first be used to "normalize" the dollar limit from age 62 to 65, and then reduce that to age 55. The dollar limit reduced using the 3% factor is:

$\$100,000 \div [1 - (.03 \times 3 \text{ years})] \times [1 - (.03 \times 10 \text{ years})] = \$100,000 \div .91 \times .7 = \$76,923$

The reduction using actuarial equivalence includes an interest only discount from age 62 to age 55 if the plan has an employer-provided pre-retirement death benefit. This question does not state whether there is such a benefit, and the general conditions of the exam do not provide a default. A discount using interest and mortality will be used here as that results in a smaller reduced dollar limit. The actuarially reduced dollar limit (using the 5% commutation function factors) is:

$$\$100,000 \times \frac{N_{62}^{(12)}}{D_{62}} \times \frac{D_{62}}{D_{55}} \div \frac{N_{55}^{(12)}}{D_{55}} = \$60,439$$

Clearly, the IRC section 415 limit is larger than the plan benefit of $56,875. That is the annual benefit payable to Smith on 1/1/2013.

Answer is D.

Question 31

I. A plan is in critical status under IRC section 432(b)(2)(B)(i) if it has a funding deficiency for the current year. The statement is true.

II. A funding improvement plan must be adopted for a plan in endangered status under IRC section 432(c). There is no requirement for a plan in critical status to adopt a funding improvement plan. The statement is false.

III. An actuary must certify within the first 90 days of the plan year as to whether the plan is in either critical or endangered status. See IRC section 432(b)(3)(A)(i). The statement is true.

Answer is B.

Question 32

The normal cost under the Aggregate cost method is generally equal to:

$$\frac{\text{Present value of future benefits - Actuarial value of assets (reduced by the credit balance)}}{\text{Temporary annuity}}$$

When the plan benefits are based upon compensation, the temporary annuity is equal to the ratio of the present value of future compensation to current compensation. When there is a salary scale and no pre-retirement decrements, the temporary annuity factor (ratio of present value of future compensation to current compensation) is based on the ratio of the assumed interest rate to the salary scale. In this question, that rate is:

$(1.07/1.04) - 1 = 0.028846$, or 2.8846%

Although this plan has 100 participants, they are all the same age (50, as of 1/1/2012) with the same compensation. Therefore, the normal cost can be calculated using the same temporary annuity for all participants. Based upon the general conditions of the exam, it can be assumed that normal retirement age is 65, and there are no pre-retirement decrements.

Final compensation for each participant (for 1/1/2012 valuation) $= \$43,000 \times 1.04^{15}$
$$= \$77,441$$

Projected retirement benefit for each participant $= \$77,441 \times 50\% = \$38,720.50$

Present value of future benefits $= 100 \times \$38,720.50 \times \ddot{a}_{65}^{(12)} \times v_{7\%}^{15} = \$11,690,398$

Normal cost$_{1/1/2012} = \$11,690,398/\ddot{a}_{\overline{15}|2.8846\%} = \$943,882$

The normal cost for the first year of the plan is also the minimum required contribution for the first year under the Aggregate cost method. The 2012 contribution was made on 12/31/2012, so this must be increased with interest at the 7% valuation interest rate.

2012 contribution $= \$943,882 \times 1.07 = \$1,009,954$

The 2012 contribution is also equal to the actuarial value of the assets as of 1/1/2013, since there were no earnings during 2012.

The only other experience data provided was that salaries increased by 8% in 2012. It can be assumed that all 100 participants are still active as of 1/1/2013. The valuation results for 2013 can now be calculated.

Final compensation for each participant = $43,000 \times 1.08 \times 1.04^{14} = \$80,419$

Projected retirement benefit for each participant = $\$80,419 \times 50\% = \$40,209.50$

Present value of future benefits = $100 \times \$40,209.50 \times \ddot{a}_{65}^{(12)} \times v_{7\%}^{14} = \$12,989,750$

$$\text{Normal cost}_{1/1/2013} = \frac{\$12,989,750 - \$1,009,954}{\ddot{a}_{\overline{14}|2.8846\%}} = \$1,022,702$$

Answer is B.

Question 33

Revenue Notice 2009-22 provides rules regarding the application of the asset valuation method allowed under IRC section 430(g)(3)(B). In section II.C of that notice, regarding the determination of the assumed rate of return when the plan sponsor has elected to use the full yield curve for funding purposes, generally an average of the third segment rates for the 24-month period ending with the month preceding the valuation month is used as an upper limit on the assumed rate of return. The statement is therefore false.

Answer is B.

Question 34

The normal cost under the frozen initial liability cost method is equal to:

$$\frac{\text{Present value of future benefits - Actuarial value of assets - Unfunded liability}}{\text{Temporary annuity}}$$

When the plan benefits are based upon compensation, the temporary annuity is equal to the ratio of the present value of future compensation to current compensation. The benefit formula is not provided in the data for this question, so it is impossible to determine whether the plan benefits are based upon compensation. However, the data includes information with regard to compensation, and there is no other way to determine a temporary annuity, so it can be assumed that the plan benefits are compensation based.

The unfunded liability (UL) is not provided as of 1/1/2013. However, it can be developed from the 2012 data using the following formula:

$$UL_{1/1/2013} = [(UL_{1/1/2012} + NC_{1/1/2012}) \times (1 + i)] - [2012 \text{ Contribution} \times (1 + i)]$$

The interest credited with regard to the contribution must be pro-rated, depending upon the date that the contribution is deposited for the 2012 plan year. The $500,000 contribution was deposited on 4/1/2012, so it is given 9 months of interest.

$$UL_{1/1/2013} = [(1,600,000 + 300,000) \times (1.07)] - [500,000 \times (1.07)^{9/12}] = 1,506,973$$

$$\text{Normal cost} = \frac{11,500,000 - 8,000,000 - 1,506,973}{17,000,000 / 1,700,000} = 199,303$$

Answer is D.

Question 35

The gain or loss due to investment earnings is equal to the difference between the actual earnings and the expected earnings. The actual earnings can be determined based upon the beginning and ending market value of assets (MVA) for 2012, and the actual transactions that occurred. Specifically,

$$MVA_{1/1/13} = MVA_{1/1/12} + 2012 \text{ Contributions} - 2012 \text{ benefit payments} + 2012 \text{ Earnings}$$

Note that the benefit payments to Smith were $12,000 ($1,000 × 12) and to Jones were $6,000 ($500 × 12). The only contribution paid during 2012 was $90,000 on 8/1/2012. The other contribution was paid in 2013, and is irrelevant in solving this question.

Substituting the given data from the question,

$$1,014,000 = 870,000 + 90,000 - (12,000 + 6,000) + 2012 \text{ Earnings}$$

$$2012 \text{ Earnings} = 72,000$$

The expected earnings for 2012 are based upon the 7% assumed rate of return. The 2012 contribution receives earnings for 5 months, and the monthly benefit payments (payable at the beginning of each month) can be assumed to have all been made on June 15 (halfway between the first payment date of 1/1/2012 and the last payment date of 12/1/2012).

$$2012 \text{ expected earnings} = (870,000 \times .07) + (90,000 \times .07 \times 5/12)$$
$$- (18,000 \times .07 \times 6.5/12)$$
$$= 62,843$$

The asset <u>gain</u> is equal to the excess of the actual earnings over the expected earnings.

$$X = 72,000 - 62,843 = 9,157$$

Answer is B.

Question 36

IRC section 430(f)(3)(C) provides that funding balances can only be applied to the minimum required contribution for a plan year if the funded percentage in the prior plan year is at least 80%. The funded percentage is defined to equal the ratio of the actuarial value of assets (reduced by the prefunding balance only) to the funding target (determined on a not at-risk basis). In this question, the funded percentage as of 1/1/2013 is:

$$\frac{AVA_{1/1/2013} - PB_{1/1/2013}}{FT_{1/1/2013}} = \frac{AVA_{1/1/2013} - 300,000}{4,800,000} = 97.91\%$$

$$AVA_{1/1/2013} = 4,999,680$$

The AFTAP, as defined in IRC section 436(j)(1) and determined on the plan valuation date, is equal to the ratio of the actuarial value of assets (reduced by the funding standard carryover balance and prefunding balance) to the funding target, with both the numerator and denominator increased by the total purchases of annuities for the NHCEs during the last 2 years. However, there is no reduction in the assets by the funding balances when the actuarial value of assets (4,999,680) exceeds the funding target (4,800,000).

The annuity purchases for the NHCEs only are:

2011: 2,850,000 – 2,000,000 = 850,000
2012: 3,500,000 – 3,350,000 = 150,000
Total = 850,000 – 150,000 = 1,000,000

$$AFTAP_{1/1/2013} = \frac{AVA_{1/1/2013} + 1,000,000}{FT_{1/1/2013} + 1,000,000} = \frac{4,999,680 + 1,000,000}{4,800,000 + 1,000,000} = 103.44\%$$

Answer is D.

Question 37

The minimum required contribution is equal to the target normal cost plus the amortization of the 2013 shortfall amortization base.

The target normal cost is equal to the present value of the 2013 benefit accrual, and the funding target is equal to the present value of the 1/1/2013 accrued benefit (based upon past accruals). Smith is age 40 on 1/1/2013, and retirement age is assumed to be age 65 (general conditions of the exam). Only the segment 3 interest rate (6%) is used to determine the present value, because Smith has more than 20 years before reaching the assumed retirement age. Smith's accrued benefit on 1/1/2013 is $1,200 per month ($120 times 10 years of service).

$$\text{Target normal cost} = 120 \times 12 \times \ddot{a}^{(12)}_{65@\,6\%} \times v^{25}_{6\%} = 120 \times 12 \times 11.56 \times 0.232999 = 3,879$$

$$\text{Funding target} = 1,200 \times 12 \times \ddot{a}^{(12)}_{65@\,6\%} \times v^{25}_{6\%} = 1,200 \times 12 \times 11.56 \times 0.232999 = 38,786$$

The funding shortfall for 2013 is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the prefunding balance and the funding standard carryover balance).

The funding shortfall as of 1/1/2013 is: $8,786 - (41,000 - 8,000 - 1,000) = 6,786$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the <u>total</u> pre-funding balance if the employer elects to use any part of it to reduce the minimum contribution requirement, but not reduced by the funding standard carryover balance) is at least as large as the funding target. There is no provision in the data as to whether the employer elects to use the prefunding balance in 2013 to satisfy the minimum required contribution. The general conditions of the exam state that the employer has made such an election if it is not stated otherwise, and the employer would not be prevented from making that elected based upon the data provided in the question. With a target normal cost of less than $4,000, and a small funding shortfall of just under $7,000, the total minimum required contribution is certainly less than the $8,000 carryover balance. IRC section 430(f)(3)(B) states that the prefunding balance cannot be used to satisfy the minimum required contribution until the carryover balance has been reduced to zero. As a result, it is not possible for the employer to elect to use the prefunding balance in this question. The plan is exempt from creating a new shortfall base because the assets are greater than the funding target.

The minimum required contribution as of 1/1/2013 is equal to the target normal cost of $3,879.

Answer is B.

Question 38

IRC section 430(j)(3)(D) states that the quarterly required installment is generally equal to 25% of the smaller of:

(1) 90% of the minimum required contribution for the current plan year, or
(2) 100% of the minimum required contribution for the preceding plan year

However, in the case where the preceding plan year is a short year, the quarterly installment is determined solely as 25% of 90% of the minimum required contribution for the current plan year. See proposed Treasury regulation 1.430(j)-1(c)(5)(iii).

The statement is true.

Answer is A.

Question 39

The top heavy minimum benefit (payable as a life annuity) for a defined benefit plan as required under IRC section 416(c)(1) is equal to 2% of the high consecutive 5-year average compensation for each year of top heavy participation that the participant has, up to a maximum of 10 years. This is an alternative to the plan accrued benefit, so that the participant receives the greater of the top heavy minimum, or the accrued benefit under the plan benefit formula. Only non-key employees are required to receive the top heavy minimum benefit.

Smith has 6 years of service as of 1/1/2013. The accrued benefit under the plan's normal retirement benefit formula is:

$1.25\% \times \$75,000 \times 6$ years of service $= \$5,625$

Only years of plan participation while the plan is top heavy are counted for the top heavy minimum benefit. The plan didn't become top heavy until 2008, so Smith has only 5 years of top heavy participation in the plan. The top heavy minimum benefit is:

$2\% \times \$75,000 \times 5$ years of top heavy participation $= \$7,500$

The plan normal form of benefit is a 15-year certain and life annuity. The $7,500 top heavy minimum must be converted from a life annuity to the plan form in order to determine whether it exceeds the plan benefit.

$$\$7,500 \times \frac{\text{Life annuity factor}}{15\text{ - year certain and life annuity factor}} = \$7,500 \times (10.86/11.92) = \$6,833$$

$X equals the greater of the plan accrued benefit ($5,625) and the top heavy minimum benefit ($6,833). This is $6,833.

Answer is B.

Question 40

The minimum required contribution is equal to the target normal cost plus the amortization of the shortfall bases plus the amortization of any waived funding deficiencies. In 2012, the target normal cost is $50,000 and the amortization of the shortfall bases is $5,000.

2012 minimum required contribution = $50,000 + $5,000 = $55,000

The funding waiver for 2012 is equal to $55,000. This waived deficiency is amortized under IRC section 430(e) over a period of 5 years, beginning with 2013. The amortization is based upon the 2012 segment rates. The segment 1 rate applies to the first 4 payments (from 1/1/2013 through 1/1/2016) and the segment 2 rate applies to the final payment on 1/1/2017. Note the use of an annuity-immediate because the first payment is on 1/1/2013, one year after the waived deficiency is created.

$$\text{Amortization of 2012 waived deficiency} = \frac{\$55,000}{a_{\overline{4}|4\%} + v_{5\%}^5} = \$12,462$$

2013 minimum required contribution = $54,000 + $8,000 + $12,462 = $74,462

Answer is C.

Question 41

The experience gain or loss for participants in retirement status is equal to the difference between the actual and expected liability for the participants. Smith and Jones have both elected to receive 10-year certain and life benefits. The 10-year certain payments are guaranteed to be made regardless of whether Smith and Jones die, so those payments can be ignored (there can be no gain or loss with regard to the certain payments).

In order to value the benefits, D_x is needed at ages 65 and 66. Recall that:

$$D_x = N_x - N_{x+1}$$

$$D_{65} = N_{65} - N_{66} = 102{,}245 - 92{,}585 = 9{,}660$$
$$D_{66} = N_{66} - N_{67} = 92{,}585 - 83{,}649 = 8{,}936$$

The 1/1/2012 present value of the life only portion of the benefit for Smith and Jones is:

$$\text{Smith PV} = \$30{,}000 \times \frac{N_{75}}{D_{65}} = \$30{,}000 \times \frac{33{,}380}{9{,}660} = \$103{,}665$$

$$\text{Jones PV} = \$6{,}000 \times \frac{N_{75}}{D_{65}} = \$6{,}000 \times \frac{33{,}380}{9{,}660} = \$20{,}733$$

The expected liability on 1/1/2013 is equal to the present value from 1/1/2012, increased with interest at 7% for one year. Note that the mortality decrement between ages 65 and 66 is already built into the 1/1/2012 present value, so there is no need to make any further mortality adjustment.

Smith expected liability as of 1/1/2013 = $\$103{,}665 \times 1.07 = \$110{,}922$
Jones expected liability as of 1/1/2013 = $\$20{,}733 \times 1.07 = \$22{,}184$

The actual liability on 1/1/2013 is equal to the present value of the life portion of the benefit for Smith, who is still alive, and is equal to zero for Jones, who is no longer alive.

$$\text{Smith actual liability on 1/1/2013} = \$30{,}000 \times \frac{N_{75}}{D_{66}} = \$30{,}000 \times \frac{33{,}380}{8{,}936} = \$112{,}064$$

X = Loss for Smith = $112,064 - $110,922 = $1,142
Y = Gain for Jones = $22,184
Z = ($1,142) + $22,184 = $21,042

Answer is A.

Question 42

Smith is currently age 50, and will begin receiving the 5-year certain annuity at age 65, in 15 years. The life only portion of the annuity will begin in 20 years, at age 70.

The segment 1 interest rate is used to value payments made during the next 5 years, the segment 2 interest rate is used to value payments made during the period from the 6th through 20th years from the current date, and the segment 3 interest rate is used to value payments beginning after 20 years. Therefore, the 5-year certain annuity payable between ages 65 and 70 is valued using the segment 2 rate of 5%, and the life only portion of the annuity payable beginning at age 70 is valued using the segment 3 rate of 6%. There is no pre-retirement mortality assumed, so the discount from age 65 back to age 50 is on an interest only basis.

$$\text{Lump sum} = \$20,000 \times [\ddot{a}_{\overline{5}|5\%}\, v^{15}_{5\%} + \ddot{a}_{70}\, {}_{5}p_{65}\, v^{20}_{6\%}]$$
$$= \$20,000 \times [(4.545951 \times 0.481017) + (9.78 \times 0.90 \times 0.311805)]$$
$$= \$98,624$$

Answer is B.

Question 43

IRC section 430(i)(4)(A) requires that for a plan to be at-risk, the FTAP for the prior year (determined on a not at-risk basis) must be less than 80% and the FTAP for the prior year (determined using the additional at-risk assumptions) must be less than 70%. The statement is false because it does not require both conditions to be true for the plan to be at-risk.

Answer is B.

Question 44

The normal cost under the projected unit credit cost method is equal to the present value of the current year benefit accrual, basing that accrual on projected final average compensation.

The projected final 3-year average compensation for each participant is:

$$\$34,000 \times \frac{1.02^{23} + 1.02^{24} + 1.02^{25}}{3} = \$54,694$$

The 2013 projected accrual for each participant is equal to $546.94 (1% of $54,694).

Normal cost $= 1,000 \times \$546.94 \times (N_{65}^{(12)} / D_{40}) = \$741,614$

The minimum required contribution is equal to the normal cost, plus the amortization charges, less the amortization credits.

Minimum required contribution$_{1/1/2013}$ = \$741,614 + \$550,000 - \$200,000 = \$1,091,614

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution less the credit balance. The question is asking for this amount as of the last day of the plan year, so the difference must be increased with interest to the end of the year using the valuation interest rate of 7.5%.

$X = (\$1,091,614 - \$100,000) \times 1.075 = \$1,065,985$

Answer is D.

Question 45

The normal cost under the Aggregate cost method is generally equal to:

$$\frac{\text{Present value of future benefits - Actuarial value of assets (reduced by the credit balance)}}{\text{Temporary annuity}}$$

When the plan benefits are flat dollar amounts, the temporary annuity is equal to the average of the present value of future service of the participants (average of temporary life annuities).

There are assumed retirement ages in this question. The present value of future benefits (PVFB) for each participant must include the present value for each possible retirement age, with each present value multiplied by the probability of retirement at that age. In addition, when there are assumed probabilities of retirement at various ages for a participant, the temporary annuity for that participant is equal to the sum of each temporary annuity for each retirement age, with each individual temporary annuity multiplied by the probability of retiring at that age.

PVFB for Smith
Assumed retirement age 62 $= \$100 \times 17$ years of service $\times 12 \times \ddot{a}_{62}^{(12)} \times v^7 \times 0.25$
$$= \$30,310$$
Assumed retirement age 65 $= \$100 \times 20$ years of service $\times 12 \times \ddot{a}_{65}^{(12)} \times v^{10} \times 0.75$
$$= \$80,785$$
Total PVFB $= \$30,310 + \$80,785 = \$111,095$

PVFB for Jones
Jones is already age 63 as of the valuation date, so it must be assumed that Jones will not retire until age 65.
Assumed retirement age 65 $= \$100 \times 22$ years of service $\times 12 \times \ddot{a}_{65}^{(12)} \times v^2 = \$211,314$

$$\text{Normal cost} = \frac{\$111,095 + \$211,314 - (\$250,000 - \$500)}{[(.25a_{\overline{7|}} + .75a_{\overline{10|}}) + .a_{\overline{2|}}]/2} = \$16,406$$

There are no amortization bases under the Aggregate method. The smallest amount that satisfies the minimum funding standard is equal to the normal cost reduced by the credit balance. This is increased with interest using the valuation interest rate (7.5%) to the end of 2013.

$(\$16,406 - \$500) \times 1.075 = \$17,099$

Answer is E.

Question 46

The deductible limit for a single employer plan under IRC section 404(o)(2)(A) is equal to the sum of the funding target, the target normal cost, and the cushion amount, with the sum being reduced by the actuarial value of assets. The cushion amount under IRC section 404(o)(3)(A) is equal to the sum of 50% of the funding target plus the increase in the funding target if future compensation increases were taken into account. The plan is not at-risk, so the not at-risk numbers should be used.

Cushion amount = (50% × 18,000,000) + (19,500,000 − 18,000,000) = 10,500,000

The IRC section 404(o)(2)(A) deductible limit is:

$$600,000 + 18,000,000 + 10,500,000 - 12,750,000 = 16,350,000$$

For plans that are not at-risk, the deductible limit can be determined under IRC section 404(o)(2)(B), if that gives a larger result than the deductible limit under IRC section 404(o)(2)(A). The deductible limit under IRC section 404(o)(2)(B) is equal to the sum of the funding target and target normal cost, if each were determined as if the plan was at-risk, with the sum being reduced by the actuarial value of assets.

The IRC section 404(o)(2)(B) deductible limit is:

$$800,000 + 20,250,000 - 12,750,000 = 8,300,000$$

The deductible limit is the larger of the IRC section 404(o)(2)(A) and 404(o)(2)(B) limits, which is 16,350,000.

Answer is D.

Question 47

The minimum required contribution under the unit credit cost method is equal to the normal cost, plus the amortization charges, less the amortization credits.

Minimum required contribution$_{1/1/2012}$ = \$250,000 + \$500,000 = \$750,000

This is reduced by the credit balance of \$100,000 and the 2012 contribution made 12/31/2012 to determine a 2012 funding deficiency. The minimum required contribution and the credit balance must be increased with interest at the valuation interest rate to the end of the 2012 plan year (funding deficiencies for multiemployer plans are always determined at the end of the year).

2012 funding deficiency = (\$750,000 - \$100,000) × 1.07 - \$300,000 = \$395,500

This funding deficiency must be included as part of the 2013 minimum required contribution.

The normal cost and the net amortization charges are given as of 1/1/2013. However, the 2012 experience gain or loss must be determined and amortized over a period of 15 years, as it is given that the new amortization base for 1/1/2013 is not included.

The experience gain or loss is equal to the difference between the actual unfunded liability and the expected unfunded liability.

The actual unfunded liability is equal to the excess of the accrued liability over the actuarial value of the assets.

Actual UAL$_{1/1/2013}$ = \$5,400,000 - \$4,280,000 = \$1,120,000

The expected unfunded liability is equal to the prior year unfunded accrued liability plus the prior year normal cost, increased with interest at the valuation interest rate to the current year, and then reduced by the prior year contribution (no interest is given to the 2012 contribution since it was contributed on the last day of the year).

Expected UAL$_{1/1/2013}$ = [(\$5,000,000 - \$4,250,000) + \$250,000] × 1.07 - \$300,000 = \$770,000

2012 Loss = \$1,120,000 - \$770,000 = \$350,000

Amortization of 2012 loss = \$350,000/$\ddot{a}_{\overline{15}|}$ = \$35,914

Minimum required contribution$_{1/1/2013}$ = \$350,000 + \$500,000 + \$35,914 + \$395,500
$$= \$1,281,414$$

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution less the credit balance. There is no credit balance because there was a funding deficiency as of the end of 2012. The contribution $X is contributed on 12/31/2013, so the minimum required contribution must be brought forward with interest for one year.

$$\$X = \$1,281,414 \times 1.07 = \$1,371,113$$

Answer is D.

Question 48

The 5-year extension of the amortization period for bases existing as of 1/1/2012 requires a reamortization of the outstanding balance of the bases as of 1/1/2013, with an additional 5 years added to the remaining period. Note that the 2012 experience loss of $900,000 is established on 1/1/2013, so it is ignored for purposes of this question. In addition, the extension only applies to charge bases, so the given actuarial gain can be ignored as well.

The outstanding balance of the two remaining bases that are affected by the amortization period extension must be determined as of 1/1/2013. The outstanding balance of those bases as of 1/1/2012 can be amortized over the remaining period as of 1/1/2012, and then multiplied by the annuity due factor for one fewer year to obtain the outstanding balance as of 1/1/2013.

<u>Method change base</u>

$$\text{Amortization as of } 1/1/2012 = \frac{\$3,000,000}{\ddot{a}_{\overline{12|}}} = \$360,775$$

$$\text{Outstanding balance as of } 1/1/2013 = \$360,775 \times \ddot{a}_{\overline{11|}} = \$2,837,164$$

$$\text{New amortization as of } 1/1/2013 = \frac{\$2,837,164}{\ddot{a}_{\overline{16|}}} = \$288,708$$

<u>Actuarial Loss</u>

$$\text{Amortization as of } 1/1/2012 = \frac{\$750,000}{\ddot{a}_{\overline{15|}}} = \$79,038$$

$$\text{Outstanding balance as of } 1/1/2013 = \$79,038 \times \ddot{a}_{\overline{14|}} = \$721,288$$

$$\text{New amortization as of } 1/1/2013 = \frac{\$721,288}{\ddot{a}_{\overline{19|}}} = \$67,372$$

Decrease in minimum required contribution as of 12/31/2013:

[($360,775 - $288,708) + ($79,038 - $67,372)] × 1.075 = $90,013

Answer is D.

Question 49

The first day of a funding improvement period is defined in IRC section 432(c)(4) as the first day of the plan year beginning after the earlier of:

(1) The second anniversary of the date of the adoption of the funding improvement plan, or
(2) The expiration of the collective bargaining agreements in effect on the due date for the actuarial certification of endangered status for the initial endangered year (provided that as of the due date, the plan covers at least 75% of the active participants in the multiemployer plan).

In this question, the funding improvement plan is adopted on 10/31/2013. The second anniversary of that date is 10/31/2015.

The initial due date for the actuarial certification of endangered status is the 90th day of the plan year (IRC section 432(b)(3)(A)). The initial certification of endangered status was done in 2013, on 3/31/2013. At that time, there were 1,150 active participants. During 2013, the bargaining agreement expired for Employer 1, leaving 1,000 active participants. This is still more than 75% of the 1,150 active participants. During 2014, the bargaining agreements for Employers 2 and 3 expire. That brings the remaining active participants down to only 200, below the 75% threshold.

The first day of the plan year after the earlier of these two events is 1/1/2015. This is the first day of the funding improvement period.

Answer is C.

Question 50

A plan is in critical status under IRC section 432(b)(2)(A) if both:

(1) The funded percentage of the plan is less than 65%, and
(2) The plan has a funding deficiency in the current plan year, or is projected to have a funding deficiency for any of the next 6 succeeding years.

The first condition above is satisfied in this question, but the second condition is not mentioned. Therefore, the statement is false.

Answer is B.

Question 51

The minimum required contribution is equal to the sum of the target normal cost and the amortization of the shortfall and waiver bases. There were no amortization bases as of 1/1/2011, so the minimum required contribution is equal to the target normal cost of $45,000.

There are no funding balances as of 1/1/2012 because there were no funding balances as of 1/1/2011 and the minimum required contribution of $45,000 was contributed for 2011 on 1/1/2011. There was no excess contribution that could have been used to create a funding balance.

The funding shortfall as of 1/1/2012 is equal to the excess, if any, of the funding target over the actuarial value of the assets.

Funding shortfall$_{1/1/2012}$ = $500,000 − $455,075 = $44,925

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the total pre-funding balance if the employer elects to use any part of it to reduce the minimum contribution requirement, but not reduced by the funding standard carryover balance) is at least as large as the funding target. The plan is not exempt from creating a new shortfall base because the assets are less than the funding target (and there are no funding balances).

The funding shortfall is amortized over 7 years.

Amortization of 1/1/2012 funding shortfall = $44,925/5.99 = $7,500

The smallest amount that satisfies the minimum funding standard is contributed for 2012, so there are still no funding balances as of 1/1/2013. The funding shortfall as of 1/1/2013 is equal to the excess, if any, of the funding target over the actuarial value of the assets.

Funding shortfall$_{1/1/2013}$ = $550,000 − $549,500 = $500

The plan is not exempt from creating a new shortfall base because the assets are less than the funding target. The new shortfall base is equal to the funding shortfall, less the outstanding balance of the 2012 shortfall base. There are 6 years remaining to amortize the 2012 shortfall base.

Outstanding balance of 2012 shortfall base = $7,500 × 5.41 = $40,575

2013 shortfall amortization base = $500 - $40,575 = ($40,075)

The 2013 shortfall base is amortized over 7 years.

Amortization of 1/1/2013 shortfall base = ($40,075)/6.16 = $6,506

Minimum required contribution$_{1/1/2013}$ = $60,000 + $7,500 - $6,506 = $60,994

This is also the smallest amount that satisfies the minimum funding standard as of 1/1/2013. $X = $60,994

Answer is D.

Question 52

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the <u>total</u> pre-funding balance if the employer elects to use any part of it to reduce the minimum contribution requirement, but not reduced by the funding standard carryover balance) is at least as large as the funding target. The general conditions of the exam state that it is assumed that the employer elects to use the prefunding balance to reduce the minimum required contribution. This election was clearly made in 2012 because the prefunding balance has decreased as of 1/1/2013, and no mention was made of the employer electing to reduce the prefunding balance. In any case, the plan was exempt from creating a shortfall amortization base in 2012 because even if the actuarial value of the assets is reduced by the prefunding balance, they are equal to the funding target.

In 2013, the employer does not elect to use the prefunding balance to reduce the minimum required contribution. The actuarial value of the assets in 2013 is larger than the funding target. The plan is exempt from creating a shortfall amortization base in 2013.

The 2013 minimum required contribution as of 1/1/2013 is equal to the target normal cost of $225,000.

Answer is B.

Question 53

The normal cost under the unit credit cost method is equal to the present value of the accrual for the year. For plans with employee contributions, the normal cost is reduced by the amount of the employee contribution (which in this case must be discounted to the beginning of the year because it is made at the end of the year) to obtain the employer's normal cost.

$$NC_{1/1/2013} = \$75 \times 12 \times 10.85 \times v^9 = \$5,780$$

Employer normal cost $= \$5,780 - (\$500/1.06) = \$5,308$

Answer is B.