Solutions to EA-2(F) Examination
Fall, 2013

Question 1

I. Assumed compensation increases should include consideration of both productivity growth and a merit scale. The statement is false.

II. Assumed compensation increases should be equal to assumed inflation plus productivity and merit increases. Assumed increases in the Social Security Wage Base should be equal to assumed inflation plus productivity increases. In each case, the assumption is at least as large as the assumed inflation rate. The statement is false.

III. Assumed increases in the Social Security Wage Base should be equal to assumed inflation plus productivity increases, not the expectations of national wage growth. The statement is false.

See page 40 of the *Assessment and Selection of Actuarial Assumptions for Measuring Pension Obligations* study note.

Answer is E.

Question 2

The actuarial assumptions and method for a plan are established upon the filing of the Form 5500 Schedule SB (Treasury regulation 1.430(d)-1(f)(1)(iii)). Only the Commissioner can determine that the assumptions were unreasonable or the method impermissible once the Schedule SB has been filed (Treasury regulation 1.430(d)-1(f)(1)(ii)). Both the assertion and reason are true, and the reason is a correct explanation of the assertion.

Answer is A.

Question 3

Under IRC section 430(h)(3), a substitute mortality table can be used in certain circumstances, with IRS approval. The statement is false.

Answer is B.

Question 4

I. In a hybrid plan, the interest crediting rate assumption must be based on the interest crediting rate of the plan (see Treasury Regulation 1.430(d)-1(f)(5)). It is not required to be equal to the crediting rate as of the valuation date. The statement is false.

II. There is no requirement under IRC section 430 to make an assumption of compensation increases greater than 0%. The statement is false.

III. The plan actuary must make an assumption as to the probability of electing a benefit in an optional form (such as a lump sum). See IRC section 430(h)(4). The statement is true.

Answer is D.

Question 5

Treasury Regulation 1.430(d)-1(f)(3) states that assumptions other than interest and mortality must be reasonable, and take into account both the experience of the plan and reasonable expectations. The removal of the post-retirement medical benefits prior to age 65 could result in some participants delaying their retirement to age 65. This should be considered when determining the assumed retirement age. Both the assertion and the reason are false statements.

Answer is E.

Question 6

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). For a last day valuation, the funding balances must be increased with interest from the first day of the year to the last day of the year using the plan effective rate.

Prefunding balance$_{12/31/2014}$ = \$40,000 × 1.06 = \$42,400

Funding shortfall$_{12/31/2014}$ = \$350,000 – (\$360,000 – \$42,400) = \$32,400

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 prefunding 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 exam general conditions state that the employer elects to use the prefunding balance to satisfy the minimum required contribution unless information to the contrary is provided in the question, 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 2014 shortfall base is equal to the funding shortfall, amortized over 7 years.

2014 shortfall amortization installment = \$32,400/5.92 = \$5,473

The minimum required contribution (as of the valuation date of 12/31/2014) is equal to the sum of the target normal cost and the shortfall amortization installment.

12/31/2014 minimum required contribution = \$100,000 + \$5,473 = \$105,473

The smallest amount that satisfies the minimum funding standard, if contributed on 9/15/2015, is equal to the minimum required contribution, reduced by the prefunding balance, increased with interest using the plan effective rate from 12/31/2014 to 9/15/2015.

X = (\$105,473 - \$42,400) × $1.06^{8.5/12}$ = \$65,731

Answer is B.

Question 7

I. Generally, a change in the interest rate assumption used to determine the funding target and target normal cost is subject to IRS approval. However, in the case of a change from the segment rates to the full yield curve, Treasury Regulation 1.430(h)(2)-1(e)(1) allows the change without approval from the Secretary (although the plan sponsor must make this election and notify the plan's enrolled actuary).

II. Once an election is made to use the full yield curve, IRS approval must be obtained if the plan sponsor would like to use the segment rates. Approval from the Secretary is required in this scenario. See Treasury Regulation 1.430(h)(2)-1(e)(1).

III. Other than for the plan years beginning in 2009 and 2010, a change in the lookback month for the segment rates is considered a change in cost method that must be approved by the IRS. Approval from the Secretary is required in this scenario. See Treasury Regulation 1.430(h)(2)-1(h)(3).

Answer is B.

Question 8

IRC section 430(h)(1) requires that each assumption be reasonable individually, as well as in combination. The statement is true.

Answer is A.

Question 9

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 true.

Answer is A.

Question 10

Treasury regulation 1.430(d)-1(f)(4)(ii) states that for plans with optional forms of benefits, the probability that future benefit payments will be taken in an optional form should be determined from the plan's experience (so it is not reasonable to assume the election of a life annuity by all participants based upon the experience of the plan). Treasury regulation 1.430(d)-1(f)(4)(iii)(B) states that in the case of single sum distributions subject to IRC section 417(e)(3), the 417(e)(3) mortality should be used for funding purposes, but the 430(h)(2) interest rates should still be used for purposes of discounting the single sum from the date it is expected to be paid to the current valuation date. Statement I is true, but statements II and III are false.

Answer is E.

Question 11

Page 21 of the *Assessment and Selection of Actuarial Assumptions for Measuring Pension Obligations* study note addresses the issue of assumed retirement age selection and the use of retirement rates. It indicates that a single assumed retirement age may be appropriate for small plans, so the one participant plan in the assertion could reasonably use a single retirement age, making the assertion true.

The reason is also a true statement because the data for such a small group may not be meaningful enough to use a table of retirement rates. However, this is not the reason that the assertion is true.

So, both the assertion and the reason are true, but the reason is not a correct explanation of the assertion.

Answer is B.

Question 12

Quarterly contribution installments for 2014 are due on 4/15/2014, 7/15/2014, 10/15/2014, and 1/15/2015 (see IRC section 430(j)(3)(C)(ii)). A plan sponsor may elect to apply a funding balance (adjusted with interest at the plan effective rate to the due date of the installment) to pay for the quarterly contribution requirement under Treasury regulation 1.430(j)-1(c)(4).

When a quarterly contribution installment is late, the contribution used to pay for the installment is discounted with an additional 5 percentage points added to the plan effective rate. To the extent the quarterly contribution is late, the additional 5% is used for discounting from the actual contribution date to the quarterly contribution due date (and the plan effective rate is used to discount from the due date back to the first day of the plan year). See Treasury regulation 1.430(j)-1(b)(4)(ii). Note that the amount of the quarterly contribution is not increased when it is late.

Treasury regulation 1.430(f)-1(d)(1)(i)(B)(1) provides rules relating to the use of the funding standard carryover balance or the prefunding balance to pay for a late quarterly contribution. Since the employer made an election on 8/15/2015 to apply the prefunding balance to the four $20,000 quarterly contribution installments, each of the installments is considered late. With the 2014 plan effective rate being 7%, the discounting rate for the period from 8/15/2015 to the quarterly due date must include the extra 5 percentage points (for a total of 12%), and the discounting rate from the quarterly due date to 1/1/2014 is 7%.

The discounting of each of the 4 quarterly installments is as follows:

4/15/2014 quarterly installment: 16 months at 12%, 3.5 months at 7%
7/15/2014 quarterly installment: 13 months at 12%, 6.5 months at 7%
10/15/2014 quarterly installment: 10 months at 12%, 9.5 months at 7%
1/15/2015 quarterly installment: 7 months at 12%, 12.5 months at 7%

The present value as of 1/1/2014 of the prefunding balance used to pay for the quarterly installments is:

4/15/2014 quarterly installment: $\$20{,}000 \times v_{12\%}^{\frac{16}{12}} \times v_{7\%}^{\frac{3.5}{12}} = \$16{,}859$

7/15/2014 quarterly installment: $\$20{,}000 \times v_{12\%}^{\frac{13}{12}} \times v_{7\%}^{\frac{6.5}{12}} = \$17{,}053$

10/15/2014 quarterly installment: $\$20{,}000 \times v_{12\%}^{\frac{10}{12}} \times v_{7\%}^{\frac{9.5}{12}} = \$17{,}249$

1/15/2015 quarterly installment: $\$20{,}000 \times v_{12\%}^{\frac{7}{12}} \times v_{7\%}^{\frac{12.5}{12}} = \$17{,}447$

Total = $16,859 + $17,053 + $17,249 + $17,447 = $68,608

This amount is also used to pay for the minimum required contribution as per the election made by the employer.

The remaining prefunding balance available to reduce the minimum required contribution as of 1/1/2014 is equal to the original $90,000, reduced by the $80,000 elected to be used on 8/15/2015 to pay for the quarterly installments (with the $80,000 discounted at the plan effective rate of 7% as required under Treasury regulation 1.430(f)-1(d)(1)(i)(B)(1)).

Remaining prefunding balance as of 1/1/2014 = $90,000 – ($80,000 × $v_{7\%}^{\frac{19.5}{12}}$) = $18,329

The total prefunding balance available to be used to reduce the minimum required contribution for 2014 is:

$18,329 + $68,608 = $86,937

The minimum required contribution still due as of 1/1/2014 is:

$105,000 - $86,937 = $18,063.

The contribution $X is paid on 9/15/2015, so the remaining contribution due must be increased at the plan effective rate of 7% from 1/1/2014 to 9/15/2015.

$X = $18,063 × $1.07^{(20.5/12)}$ = $20,276

Answer is D.

Question 13

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). The funding target is equal to the present value of the accrued benefit in effect at the beginning of the year (using salary history through the end of the prior year).

Smith has 6 years of service as of 1/1/2014 and 7 years of service as of 12/31/2014.

The beginning and end of year accrued benefits can be determined using both the original 5-year average formula and the new 3-year average formula.

Old plan (5-year average)

1/1/2014 accrued benefit

$$= 10\% \times 6 \text{ years of service} \times \frac{55{,}000 + 57{,}500 + 49{,}000 + 52{,}000 + 54{,}000}{5}$$

$$= 32{,}100$$

Note that the high consecutive 5-year average occurs from 2009 through 2013.

12/31/2014 accrued benefit

$$= 10\% \times 7 \text{ years of service} \times \frac{57{,}500 + 49{,}000 + 52{,}000 + 54{,}000 + (54{,}000 \times 1.04)}{5}$$

$$= 37{,}612$$

Note that the high consecutive 5-year average occurs from 2010 through 2014, assuming a 4% increase in the 2013 salary.

New plan (3-year average)

1/1/2014 accrued benefit

$$= 10\% \times 6 \text{ years of service} \times \frac{50{,}000 + 55{,}000 + 57{,}500}{3}$$

$$= 32{,}500$$

Note that the high consecutive 3-year average occurs from 2008 through 2010.

12/31/2014 accrued benefit

$$= 10\% \times 7 \text{ years of service} \times \frac{50{,}000 + 55{,}000 + 57{,}500}{3}$$

$$= 37{,}917$$

Note that the high consecutive 3-year average occurs from 2008 through 2010, assuming a 4% increase in the 2013 salary (which is not large enough to increase the high consecutive 3-year average).

It is assumed based upon the general conditions of the exam that normal retirement age is 65. Smith is currently age 39 on 1/1/2014. The segment 3 rate of 7.5% is used for both the target normal cost and the funding target because Smith is more than 20 years from retirement.

Target normal cost (old plan) = $(37{,}612 - 32{,}100) \times \ddot{a}_{65}^{(12)} \times v^{26}$
$= 5{,}512 \times 10 \times 0.152539 = 8{,}408$

Funding target (old plan) = $32{,}100 \times \ddot{a}_{65}^{(12)} \times v^{26}$
$= 32{,}100 \times 10 \times 0.152539 = 48{,}965$

Target normal cost (new plan) = $(37{,}917 - 32{,}500) \times \ddot{a}_{65}^{(12)} \times v^{26}$
$= 5{,}417 \times 10 \times 0.152539 = 8{,}263$

Funding target (new plan) = $32{,}500 \times \ddot{a}_{65}^{(12)} \times v^{26}$
$= 32{,}500 \times 10 \times 0.152539 = 49{,}575$

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 (old plan) = \$48,965 – (\$50,000 - \$1,000) = (\$35)
Funding shortfall (new plan) = \$49,575 – (\$50,000 - \$1,000) = \$575

If the funding shortfall is less than or equal to zero, then there is no new shortfall base, and all existing amortization bases are considered to be fully amortized. In addition, the excess of the actuarial value of the assets (reduced by the funding balances) over the funding target is used to reduce the target normal cost (see IRC section 430(a)(2)). This will be the case for the plan before the amendment.

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. It is given that the employer does not elect to use the prefunding balance in 2014 to satisfy the minimum required contribution, so the amended plan is exempt from creating a new shortfall base because the assets (not reduced by the prefunding balance) exceed the funding target ($50,000 exceeds $49,575).

Neither plan (before and after the amendment) has a shortfall base to amortize. The minimum required contribution for each plan is equal to the target normal cost (with the excess asset value of $35 used to reduce the target normal cost for the plan before the amendment).

Minimum required contribution (old plan) = 8,408 – 35 = 8,373
Minimum required contribution (new plan) = 8,263

Decrease in minimum required contribution = X = 8,373 – 8,263 = 110

Answer is A.

Question 14

The social security level income option is a prohibited payment for purposes of the accelerated distribution restriction of IRC section 436 (see Treasury regulation 1.436-1(j)(6)(i)(A) and IRC section 411(a)(9)). Plans that provide for accelerated distributions are required to reduce the funding balances (beginning with the funding standard carryover balance) if doing so would prevent the plan from having an IRC section 436 restriction placed on the plan with regard to those distributions.

The 2014 AFTAP is not certified until 5/2/2014. As of 1/1/2014, the presumed AFTAP is equal to the 2013 certified AFTAP of 89%. As of 4/1/2014, the presumed AFTAP is equal to the 2013 certified AFTAP less 10%, which is 79%. As this is less than 80%, there would be a partial restriction on accelerated distribution payments. However, it is possible that the presumed AFTAP can be increased to 80% if some of the funding balances are reduced. In order to make that determination, a presumed funding target must be determined based upon the actual 1/1/2014 funding balances, actuarial value of assets, and presumed AFTAP.

$$\text{Presumed AFTAP} = \frac{\text{Actuarial value of assets - Funding balances}}{\text{Presumed funding target}}$$

$$79\% = \frac{550{,}000 - 10{,}000 - 5{,}000}{\text{Presumed funding target}} \quad \rightarrow \quad \text{Presumed funding target} = 677{,}215$$

Note that the receivable contribution for 2013 is not included because it has not yet been contributed as of 4/1/2014.

The presumed AFTAP can be increased to 80% if the funding standard carryover balance is reduced to 3,228.

$$80\% = \frac{550{,}000 - 3{,}228 - 5{,}000}{677{,}215}$$

The 2014 AFTAP is certified on 5/2/2014, and includes the 5/1/2014 contribution (X) that is receivable for 2013, discounted with interest for 4 months using the 2013 plan effective rate.

$$92\% = \frac{550{,}000 + (X \div 1.07^{\frac{4}{12}}) - 3{,}228 - 5{,}000}{640{,}000} \quad \rightarrow \quad X = 48{,}101$$

Answer is B.

Question 15

The hypothetical balance at the end of 2014 (before the 2014 pay credit is added) includes one year of interest credit at 4.5%.

Hypothetical balance as of end of year = $100{,}000 \times 1.045 = 104{,}500$

2013 pay credit = $155{,}000 - 104{,}500 = 50{,}500$

Treasury regulation 1.430(d)-1 (and specifically example 13 of regulation 1.430(d)-1(f)(9)) states that the target normal cost for a hybrid plan with assumed lump sum payouts is equal to the current year pay credit, accumulated to the assumed retirement age using the interest crediting rate, and then discounted back to attained age as of the valuation date using the segment interest rates. Smith is age 46 on the valuation date, 19 years before the assumed age 65 retirement age (assumed based on the exam general conditions). Since a lump sum is assumed to be paid at that time, there will be only one payment, and the segment 2 interest rate of 6.5% is used to discount that lump sum (the segment 2 rate is used to discount payments made more than 5 years and not more than 20 years from the valuation date as required by IRC section 430(h)(2)(C)(ii)).

Target normal cost = $50{,}500 \times 1.045^{19} \div 1.065^{19} = 35{,}226$

Using the same regulation and example, the funding target for a hybrid plan is equal to the hypothetical balance as of the beginning of the year, accumulated to retirement age using the interest crediting rate, and then discounted back to attained age as of the valuation date using the segment interest rates.

Funding target = $100{,}000 \times 1.045^{20} \div 1.065^{19} = 72{,}893$

X = $35{,}226 + 72{,}893 = 108{,}119$

Answer is D.

Question 16

IRC section 432(b)(2)(D) provides that a plan is in critical status if the sum of the fair market value of assets and the present value of expected employer contributions for the current year and each of the next 4 years is less than the present value of benefits projected to be paid in the current year and each of the next 4 years.

Sum of 1/1/2014 market value of assets and expected future contributions =
$350{,}000 + 50{,}000 + (100{,}000 \times 4) = 800{,}000$

Present value of expected future payments =
$90{,}000 + (150{,}000 \times 2) + (250{,}000 \times 2) = 890{,}000$

The plan is in critical status because $800{,}000 < 890{,}000$.

A plan is in endangered status under IRC section 432(b)(1) only if it is not in critical status. The statement is false.

Answer is B.

Question 17

The deductible limit under IRC section 404(a)(1)(A) for a multiemployer defined benefit plan is generally equal to the greater of the minimum required contribution or the normal cost plus limit adjustment, with the limit adjustment being equal to the 10-year amortization of the 404 bases. In this case, the normal cost plus limit adjustment is clearly larger. Regardless of the valuation date, the deductible limit for multiemployer plans is determined as of the last day of the year, so the normal cost plus 10-year amortization of the bases must be increased with interest at the valuation rate of 8% to 12/31/2014.

Normal cost plus limit adjustment (as of end of year) = (321,000 + 139,000) × 1.08
= 496,800

The normal cost plus limit adjustment is limited, if necessary, by the full funding limitation (greater of the ERISA full funding limitation or the RPA'94 full funding limitation). The ERISA full funding limitation has been provided and is clearly much larger than the normal cost plus limit adjustment, so the full funding limitation does not apply.

Finally, IRC section 404(a)(1)(D) allows for a deductible limit (without regard to the full funding limit) of 140% of current liability reduced by the actuarial value of assets (all determined as of the last day of the year).

(140% × 12,201,000) – 9,021,000 = 8,060,400

This is the deductible limit, because it is larger than the normal cost plus limit adjustment.

Answer is D.

Question 18

Actuarial gains result when the funding target is smaller than expected, or the actuarial value of assets is larger than expected. In a cash balance plan, the funding target is determined by increasing the cash balance account using the interest crediting rate to the assumed retirement age, and then discounting it using the segment interest rates. When the interest crediting rate is smaller than the segment rates (as in this question), the resulting funding target is less than the current cash balance account.

I. It is assumed that lump sum distributions are taken if termination occurs before retirement. The funding target is discounted using the segment rates, which are all greater than the 5% interest crediting rate, so the actual distribution upon termination of employment is greater than the funding target for any participant. Termination of employment greater than those assumed would result in an actuarial loss, not a gain.

II. Preretirement deaths result in the payment of a lump sum. For the same reason as statement I, preretirement deaths greater than assumed would result in an actuarial loss, not a gain.

III. This statement is a little vague, but it must be assumed that it means that more retirees than assumed elect the life annuity. The simplest example to consider for this statement is to assume that all participants are more than 20 years from assumed retirement age. In that case, all benefits are discounted using the segment 3 interest rate of 7.5% (regardless of whether a life annuity or lump sum is elected). In that case, there will be no gain or loss regardless of which form of benefit is elected, because in either case all benefits are discounted using 7.5% for purposes of determining the funding target. So, an increase in the number of participants electing a life annuity will not necessarily result in a gain.

All three statements are false.

Answer is A.

Question 19

The experience gain or loss for a participant in retirement status is equal to the difference between the actual and expected liability for the participant. Smith is alive on 1/1/2015, so the actual liability is the present value of the life annuity:

Actual liability = $\$8{,}000 \times 12\,\ddot{a}_{66}^{(12)} = \$8{,}000 \times 12 \times 10.06 = \$965{,}760$

The expected liability as of 1/1/2015 is equal to the actual liability as of 1/1/2014, increased with interest to 1/1/2015 (the mortality is already included in the present value), and reduced by the accumulated (to 1/1/2015) expected benefit payments during 2014. Using the initial distribution date in 2014 of 1/1 to the final distribution date in 2014 of 12/1, the average payment date in 2014 is 6/15. So it can be estimated that the accumulated monthly distributions from 2014 are equivalent to an accumulated distribution of the entire \$96,000 (\$8,000 × 12) made on 6/15/2014 (accumulated to 12/31/2014).

$$\text{Expected liability} = (\$8{,}000 \times 12\,\ddot{a}_{65}^{(12)} \times 1.07) - (\$8{,}000 \times 12 \times [1 + (.07 \times \tfrac{13}{24})])$$

$$= \$1{,}055{,}962 - \$99{,}640$$

$$= \$956{,}322$$

The actual liability is more than expected, so there is a loss.

Loss = \$965,760 - \$956,322 = \$9,438

Answer is E.

Question 20

The target normal cost for a single employer plan is reduced by the employee contributions paid for the year (valued as of the plan valuation date). See Treasury regulation 1.430(d)-1(b)(1)(iii)(A). The target normal cost is calculated as the present value of the benefits expected to be accrued during the year.

Net employer target normal cost = $200,000 - $16,000 = $184,000

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$_{1/1/2014}$ = $3,100,000 – ($2,900,000 - $200,000) = $400,000

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 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. There is no prefunding balance in this question, and the plan is not exempt from creating a new shortfall base because the assets (not reduced by the carryover balance) are less than the funding target. The 2014 shortfall base is equal to the funding shortfall, amortized over 7 years.

2014 shortfall amortization installment = $400,000/5.92 = $67,568

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

2014 minimum required contribution = $184,000 + $67,568 = $251,568

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution reduced by the funding balances (provided the employer elects to use the funding balances to reduce the minimum). The general conditions of the exam state that unless it is stated otherwise, the employer elects to use the funding balances to reduce the minimum required contribution to the extent they are available.

$X = $251,568 - $200,000 = $51,568

Answer is D.

Question 21

I. IRC section 432(c)(3)(A)(i) indicates that the plan's funding percentage must increase by at least 33% of the difference between 100% and the funded percentage before the funding improvement period. There is no 20% requirement, unless the plan is seriously endangered, in which case 20% is substituted for 33%. The statement is false.

II. IRC section 432(c)(3)(A)(ii) indicates that the funding improvement plan must be designed such that there is no funding deficiency for any year during the funding improvement period. The statement is true.

III. While a plan cannot be amended during a funding improvement period to increase liabilities unless required by law, the plan cannot reduce benefits already accrued (such as an early retirement subsidy), which would be a violation of IRC section 411(d). The statement is false.

Answer is C.

Question 22

For plans using the full yield curve to determine the target normal cost and funding target, the segment rates are not needed. Revenue Notice 2009-22 describes the method that can be used to determine actuarial value of assets for single employer plans. In general, under section III of that notice, the actuary uses an assumed rate of return to determine the actuarial value of assets. However, under subsection B of section III, plans generally cannot use an assumed rate of return greater than the segment 3 rate used to determine the target normal cost and/or funding target. Subsection C of section III provides rules for plans using the full yield curve to determine a segment 3 rate to be used for that purpose (generally equal to the average of the segment 3 rates over a 24-month period). Based upon that subsection, plans that use the full yield curve for funding must still apply the segment 3 rate limitation to the assumed rate of return.

The statement is false.

Answer is B.

Question 23

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.

The funding waiver for 2013 is equal to $410,000. This waived deficiency is amortized under IRC section 430(e) over a period of 5 years, beginning with 2014. The amortization is based upon the 2013 segment rates (the year in which the deficiency was waived). The segment 1 rate applies to the first 4 payments (from 1/1/2014 through 1/1/2017) and the segment 2 rate applies to the final payment on 1/1/2018. Note the use of an annuity-immediate because the first payment is on 1/1/2014, one year after the waived deficiency is created.

$$\text{Amortization of 2013 waived deficiency} = \frac{\$410{,}000}{a_{\overline{4}|5.5\%} + v^{5}_{6.5\%}} = \$96{,}812$$

The outstanding balance of the 2013 waived deficiency as of 1/1/2014 is determined using the 2014 segment rates. All 5 installments are still due, and an annuity-due is now used because the first installment is due on 1/1/2014.

Outstanding balance of 2013 waived deficiency as of 1/1/2014 =

$$\$96{,}812 \times \ddot{a}_{\overline{5}|5\%} = \$96{,}812 \times 4.545951 = \$440{,}103$$

The outstanding balance of the 2013 shortfall amortization base as of 1/1/2014 can be determined using the 6-year amortization factor for 2014 (there are 6 years left to pay off the 2013 shortfall base).

Outstanding balance of 2013 shortfall amortization base as of 1/1/2014 =

$$\$330{,}000 \times 5.29 = \$1{,}745{,}700$$

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).

$\text{Funding shortfall}_{1/1/2014} = \$7{,}700{,}000 - (\$5{,}200{,}000 - \$20{,}000 - \$80{,}000) = \$2{,}600{,}000$

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 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 (regardless of whether they are reduced by the prefunding balance) are less than the funding target. The 2014 shortfall base is equal to the funding shortfall less the outstanding balance of prior shortfall and waiver bases, and the base is amortized over 7 years.

2014 shortfall amortization base = $2,600,000 - $1,745,700 - $440,103 = $414,197

Amortization of 2014 shortfall base = $414,197 ÷ 6.00 = $69,033

2013 minimum required contribution = $85,000 + $330,000 + $69,033 + $96,812
= $580,845

Answer is D.

Question 24

The 5-year extension of the amortization period for bases existing as of 1/1/2013 requires a reamortization of the outstanding balance of the bases as of 1/1/2014, with an additional 5 years added to the remaining period. Note that the 2013 actuarial loss of $775,000 is established on 1/1/2014, 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 1/1/2014. The outstanding balance of those bases as of 1/1/2013 can be amortized over the remaining period as of 1/1/2013, and then multiplied by the annuity due factor for one fewer year to obtain the outstanding balance as of 1/1/2014.

Combined charge base

$$\text{Amortization as of 1/1/2013} = \frac{\$9{,}700{,}000}{\ddot{a}_{\overline{8}|}} = \$1{,}540{,}514$$

$$\text{Outstanding balance as of 1/1/2014} = \$1{,}540{,}514 \times \ddot{a}_{\overline{7}|} = \$8{,}771{,}450$$

$$\text{New amortization as of 1/1/2014} = \frac{\$8{,}771{,}450}{\ddot{a}_{\overline{12}|}} = \$1{,}054{,}841$$

Actuarial Loss

$$\text{Amortization as of 1/1/2013} = \frac{\$710{,}000}{\ddot{a}_{\overline{15}|}} = \$74{,}822$$

$$\text{Outstanding balance as of 1/1/2014} = \$74{,}822 \times \ddot{a}_{\overline{14}|} = \$682{,}814$$

$$\text{New amortization as of 1/1/2014} = \frac{\$682{,}814}{\ddot{a}_{\overline{19}|}} = \$63{,}779$$

Decrease in minimum required contribution as of 12/31/2014:

[($1,540,514 - $1,054,841) + ($74,822 - $63,779)] × 1.075 = $533,970

Answer is C.

Question 25

IRC section 432(e)(4) describes the length of a rehabilitation period. The IRC section states that the rehabilitation period is a 10-year period beginning on the first day of the plan year following the earlier of:

(i) The second anniversary of the date of the adoption of the rehabilitation plan, or
(ii) The expiration of the collective bargaining agreements in effect on the due date for the actuarial certification of critical status for the initial critical year and covering at least 75% of the active participants as of that date.

In this question, the second anniversary of the rehabilitation plan adoption date (10/1/2014) is 10/1/2016.

The total number of active participants is equal to:

150 + 400 + 300 + 275 = 1,125

75% of active participants = 75% × 1,125 = 844

When the 12/31/2015 collective bargaining agreement expires, at least 75% of the active participants will be covered by expired collective bargaining agreements.

The earlier of 12/31/2015 and 10/1/2016 is 12/31/2015. The first day of the next plan year is 1/1/2016. That is the date on which the rehabilitation period begins. The rehabilitation period ends after 10 years, on 12/31/2025.

The statement is false.

Answer is B.

Question 26

The minimum required contribution is equal to the target normal cost plus the amortization of the 2013 and 2014 shortfall amortization bases.

The target normal cost is equal to the present value of the 2014 benefit accrual ($50 per month), and the funding target is equal to the present value of the 1/1/2014 accrued benefit (based upon past accruals). Each active participant is age 35 on 1/1/2014, and retirement age is assumed to be age 65 (general conditions of the exam). Only the segment 3 interest rate (7.5%) is used to determine the present value, because each participant has more than 20 years before reaching the assumed retirement age. Each active participant's accrued benefit on 1/1/2014 is $500 per month ($50 times 10 years of service).

$$\text{Target normal cost} = 50 \times 12 \times \ddot{a}^{(12)}_{65@7.5\%} \times v^{30}_{7.5\%} \times 50 \text{ active participants}$$
$$= 50 \times 12 \times 10.05 \times 0.114221 \times 50 = 34{,}438$$

$$\text{Funding target} = 500 \times 12 \times \ddot{a}^{(12)}_{65@7.5\%} \times v^{30}_{7.5\%} \times 50 \text{ active participants}$$
$$= 500 \times 12 \times 10.05 \times 0.114221 \times 50 = 344{,}376$$

The funding shortfall for 2014 is the excess, if any, of the funding target (including the inactive participants) over the actuarial value of the assets (reduced by the prefunding balance and the funding standard carryover balance).

$$\text{Funding shortfall}_{1/1/2014} = (4{,}500{,}000 + 344{,}376) - (4{,}500{,}000 - 50{,}000) = 394{,}376$$

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 ($4,500,000 - $50,000) is less than the funding target ($4,500,000 + $344,376), so the plan is not exempt from creating a new shortfall amortization base in 2014.

The new base is equal to the funding shortfall less the outstanding balance of the 2013 shortfall base. The outstanding balance of the 2013 shortfall amortization base as of 1/1/2014 can be determined using the 6-year amortization factor for 2014 (there are 6 years left to pay off the 2013 shortfall base).

Outstanding balance of 2013 shortfall amortization base as of 1/1/2014 =

$$25{,}000 \times 5.24 = 131{,}000$$

The 2014 shortfall base is amortized over 7 years.

2014 shortfall installment = (394,376 – 131,000)/5.92 = 44,489

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.

2014 minimum required contribution = (34,438 + 35,000) + 25,000 + 44,489 = 138,927

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution less the prefunding balance.

X = 138,927 - $50,000 = $88,927

Answer is D.

Question 27

The liquidity requirement applies to a plan if the plan had a funding shortfall as of the prior year valuation date and there were more than 100 participants on any day of the prior plan year (see IRC section 430(j)(4)(B)). There have always been more than 1,000 participants in this plan. The funding shortfall as of 1/1/2013 (the prior year valuation date) is equal to the funding target less the actuarial value of assets (reduced by the funding balances), including both liquid and illiquid assets.

$\text{Funding shortfall}_{1/1/2013} = 2{,}500{,}000 - (2{,}000{,}000 + 200{,}000) = 300{,}000$

Therefore, the liquidity requirement applies for the 2014 plan year.

There is a liquidity shortfall under IRC section 430(j)(4)(E) if the liquid assets (unreduced by any funding balances) is less than three times the adjusted disbursements during the last 12-month period. Liquidity shortfalls are determined as of the end of each plan quarter, so the 12-month period ends with that quarter. Liquidity payments are due 15 days after the end of the quarter. Specifically, this question is asking for the liquidity payment on 4/15/2014, so that is for the quarter ending 3/31/2014.

The disbursements that must be considered are those that were made from 4/1/2013 through 3/31/2014. The total amount of disbursements made during that period is:

$$\begin{aligned}\text{Total disbursements} &= (205{,}000 + 5{,}000) + (250{,}000 + 5{,}000) \\ &\quad + (270{,}000 + 5{,}000) + (280{,}000 + 5{,}000 + 50{,}000 + 100{,}000) \\ &= 1{,}175{,}000\end{aligned}$$

The adjusted disbursements are equal to the total disbursements reduced by a percentage of the disbursements paid in the form of a lump sum or annuity purchase. That percentage is the funding target attainment percentage (FTAP) as of the valuation date for the current plan year. The FTAP is equal to the ratio of the actuarial value of assets (reduced by the funding balances) to the funding target.

$$\text{FTAP}_{1/1/2014} = \frac{2{,}250{,}000 + 250{,}000}{3{,}050{,}000} = 0.8197, \text{ or } 81.97\%$$

The only disbursements paid in the form of a lump sum or annuity purchase were made during the period from 1/1/2014 through 3/31/2014 in the amounts of $50,000 and $100,000, for a total of $150,000.

$\text{Adjusted disbursements} = 1{,}175{,}000 - (150{,}000 \times 81.97\%) = 1{,}052{,}045$

The liquid assets as of 3/31/2014 are equal to $2,300,000.

Liquidity shortfall$_{3/31/2014}$ = (1,052,045 × 3) – 2,300,000 = 856,135

This is the contribution $X needed to be made on 4/15/2014 to satisfy the liquidity requirement.

Answer is D.

Note: Any contribution needed to satisfy the liquidity requirement is limited to the amount needed to fully fund the plan. For this purpose, a plan is fully funded if the additional liquid contribution, when added to the actuarial value of assets less funding balances, is exactly equal to the sum of the funding target and target normal cost for the year. In this case:

2,250,000 + 250,000 + Y = 3,050,000 + 350,000 → Y = 900,000

The liquidity shortfall of 856,125 is less than 900,000, so it need not be limited.

Question 28

The funding target is equal to the present value of the accrued benefit with regard to the retirement benefit, plus the present value of the accrued benefit with regard to the death benefit. In determining the present value of the retirement benefit, the segment interest rates must be used. Smith is age 64 as of 1/1/2014. The segment 1 interest rate (applicable to payments made during the first 5 years from the valuation date) is applicable for Smith's annual payments from age 65 and prior to age 69 (the payment at age 69 is discounted using the segment 2 rate because it is made at the beginning of the 6th year from the valuation date). The segment 2 interest rate (applicable to payments that begin at least 5 years and no more than 20 years from the valuation date) is applicable for Smith's payments beginning at age 69 and prior to age 84. The segment 3 interest rate (applicable to payments that begin at least 20 years from the valuation date) is applicable for Smith's benefit payments beginning at age 84.

Present value of retirement benefit

$$= 18{,}500 \times \left[\frac{N_{65@seg1} - N_{69@seg1}}{D_{64@seg1}} + \frac{N_{69@seg2} - N_{84@seg2}}{D_{64@seg2}} + \frac{N_{84@seg3}}{D_{64@seg3}} \right]$$

$$= 18{,}500 \times \left[\frac{3{,}527 - 2{,}478}{306} + \frac{1{,}203 - 175}{167} + \frac{77}{92} \right] = 192{,}784$$

Note that the discount to Smith's current age of 64 includes preretirement mortality, as required in the question.

The death benefit is an annuity to the spouse equal to the participant's accrued benefit, payable immediately upon death. Deaths are assumed to occur at the beginning of the year, so the only year prior to retirement in which Smith could possibly die with a preretirement death benefit is the current year. If Smith should die on 1/1/2014, then Smith's spouse would receive an immediate annuity of $18,500 per year. The present value of that benefit uses the segment rates as described above, although the segment 1 rate would apply from age 64 and prior to age 69 (the spouse is the same age as Smith). The present value of the death benefit is equal to the present value of those payments multiplied by the probability of Smith's death at age 64.

Present value of death benefit

$$= q_{64} \times 18{,}500 \times \left[\frac{N_{64@seg1} - N_{69@seg1}}{D_{64@seg1}} + \frac{N_{69@seg2} - N_{84@seg2}}{D_{64@seg2}} + \frac{N_{84@seg3}}{D_{64@seg3}} \right]$$

$$= 0.0105 \times 18{,}500 \times \left[\frac{3{,}833 - 2{,}478}{306} + \frac{1{,}203 - 175}{167} + \frac{77}{92} \right] = 2{,}218$$

Funding target = 192,784 + 2,218 = 195,002

Answer is B.

Question 29

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.

$$\text{Normal cost} = \frac{\$7{,}200{,}000 - \$4{,}500{,}000}{\$35{,}000{,}000 \,/\, \$3{,}500{,}000} = \$270{,}000$$

This is the total normal cost (both employer and employee paid) because it includes the present value of all benefits, and the actuarial value of assets from both employee and employer contributions.

The employer portion of the normal cost is equal to the total normal cost, less the employee contributions.

Employee contributions = 2.5% × \$3,500,000 = \$87,500

Employer normal cost = \$270,000 - \$87,500 = \$182,500

Answer is A.

Question 30

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 50 with 31 years of service. The annual accrued benefit, payable at age 65 is $25,000. The actual benefit that Smith will receive is the unreduced accrued benefit because Smith has at least 30 years of service. The actual liability is equal to the present value of the $25,000 benefit payable immediately at age 50.

Actual liability = $25{,}000 \times \ddot{a}_{50}^{(12)} = 25{,}000 \times 12.84 = 321{,}000$

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 55 (with a probability of 50%) or 65 (with a probability of 50%), and there are no assumed pre-retirement decrements.

$$\begin{aligned}\text{Expected liability} &= 25{,}000 \times \left[(\ddot{a}_{55}^{(12)} \times v^5 \times 0.5) + (\ddot{a}_{65}^{(12)} \times v^{15} \times 0.5)\right] \\ &= 25{,}000 \times \left[(12.15 \times 0.7130 \times 0.5) + (10.26 \times 0.3624 \times 0.5)\right] \\ &= 154{,}765\end{aligned}$$

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

X = 321,000 – 154,765 = 166,235

Answer is C.

Question 31

The smoothed value method of determining actuarial value of assets is described in Revenue Procedure 2000-40. For a plan using 5-year smoothing, the actuarial value of assets is equal to the market value of assets, plus (minus) $\frac{4}{5}$ of the prior year asset loss (gain), plus (minus) $\frac{3}{5}$ of the second prior year asset loss (gain), plus (minus) $\frac{2}{5}$ of the third prior year asset loss (gain), plus (minus) $\frac{1}{5}$ of the fourth prior year asset loss (gain).

In this question, the asset loss amounts are given for the years 2010 through 2012 (the second, third and fourth prior years). The asset gain or loss for 2013 must be determined.

The actual asset earnings for 2013 is equal to the 1/1/2014 market value of assets, reduced by the 1/1/2013 market value of assets (adjusted for contributions and benefit payments made during 2013).

Actual 2013 asset earnings = 205,000 – (186,000 + 20,000 – 21,500) = 20,500

The expected asset earnings for 2013 is the expected return (using the assumed interest rate of 7.5%) on the 1/1/2013 market value of assets, the contribution made on 10/1/2013 (with pro-rated interest for 3 months) and the benefit payments made during 2013. It is given that the benefit payments were made uniformly throughout 2013, so it can be assumed that this is equivalent to them all being paid on June 30 (halfway through the year). Either simple interest or compound interest can be used for this purpose (the Revenue Procedure does not require one or the other, just consistency).

Expected 2013 asset earnings = $(186{,}000 \times 0.075) + (20{,}000 \times \frac{3}{12} \times 0.075)$
$- (21{,}500 \times \frac{6}{12} \times 0.075) = 13{,}519$

There is an asset gain in 2013 because the actual return was greater than expected.

2013 asset gain = 20,500 – 13,519 = 6,981

1/1/2014 smoothed asset value = $205{,}000 - (\frac{4}{5} \times 6{,}981) + (\frac{3}{5} \times 30{,}000)$
$+ (\frac{2}{5} \times 25{,}000) + (\frac{1}{5} \times 7{,}000) = 228{,}815$

For multiemployer plans, the actuarial value of assets must be no greater than 120% of the market value of assets (Treasury regulation 1.412(c)(2)-1(b)). 120% of 205,000 equals 246,000. The actuarial value of assets is equal to the smoothed value of 228,815.

Answer is C.

Question 32

IRC section 436(f)(3) requires a deemed reduction in the funding balances of single employer plans if the reduction would allow the plan to avoid a restriction on accelerated distributions. IRC section 436(d) provides for restrictions on accelerated distributions if the adjusted funding target attainment percentage (AFTAP) is less than 60%, or to a lesser extent if the AFTAP is at least 60% but less than 80%.

The AFTAP under IRC section 436(j)(2) is defined to be the ratio of the actuarial value of assets (reduced by the funding balances) to the funding target. The AFTAP is always determined as of the valuation date.

$$\text{2014 AFTAP} = \frac{6{,}900{,}000 - (55{,}120 + 30{,}000)}{8{,}600{,}000} = 0.7924, \text{ or } 79.24\%$$

The 2014 AFTAP can be increased to 80% if there is a deemed reduction to the funding balances (note that the funding standard carryover balance must be reduced before the prefunding balance). In order for the AFTAP to equal exactly 80%, the numerator of the ratio must be equal to 6,880,000 (80% of 8,600,000). This would require that the funding balances be reduced to 20,000.

X = (55,120 + 30,000) – 20,000 = 65,120

Answer is D.

Question 33

IRC section 404(o)(3) provides rules to determine the cushion amount for purposes of the deductible limit. In general it provides for a cushion amount equal to 50% of the funding target, plus an additional amount. For plans that do not base benefits on compensation, this additional amount is based upon expected increases in benefits based upon the average annual increase during the past 6 years. The statement is therefore false.

Answer is B.

Question 34

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:

(1.075/1.04) – 1 = 0.033654, or 3.3654%

Although this plan has 100 participants, they are all the same age (51, as of 1/1/2014) 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.

Compensation must be increased at 4% per year for funding purposes. Since each participant is currently age 51, the final 3-year average compensation will include compensation paid 12, 13, and 14 years from 2013.

Final 3-year average compensation for each participant

$$= \$30{,}000 \times \frac{1.04^{12} + 1.04^{13} + 1.04^{14}}{3} = \$49{,}978$$

Each participant was hired at age 45 and will have 20 years of service at retirement.

Projected retirement benefit for each participant = 2% × \$49,978 × 20 years = \$19,991

Present value of future benefits = $100 \times \$19{,}991 \times \ddot{a}_{65}^{(12)} \times v_{7.5\%}^{14}$

$$= 100 \times \$19{,}991 \times 9.90 \times 0.363313 = \$7{,}190{,}360$$

$$\text{Normal cost} = \frac{\$7{,}190{,}360 - (\$2{,}000{,}000 - \$75{,}000)}{\ddot{a}_{\overline{14}|3.3654\%}} = \$462{,}253$$

Answer is C.

Question 35

IRC section 432(b)(3)(A) requires that the plan actuary certify the plan's status under IRC section 432 no later than the 90th day of the plan year. The statement is true.

Answer is A.

Question 36

The shortfall amortization bases must be developed for years prior to 2014 since they are not given, and the question does not state that there were no funding shortfalls in prior years. The funding shortfall 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).

$\text{Funding shortfall}_{1/1/2012} = 2{,}100{,}000 - (2{,}200{,}000 - 50{,}000) = (50{,}000)$

There is no shortfall amortization base created in 2012, and any prior shortfall amortization bases become fully amortized because the funding shortfall is less than or equal to zero (IRC section 430(c)(6)).

$\text{Funding shortfall}_{1/1/2013} = 2{,}300{,}000 - (2{,}400{,}000 - 225{,}000) = 125{,}000$

The 2013 shortfall amortization base is 125,000, and is amortized over 7 years.

2013 shortfall amortization installment = $125{,}000 \div 5.92 = 21{,}115$

$\text{Funding shortfall}_{1/1/2014} = 2{,}350{,}000 - (2{,}600{,}000 - 300{,}000) = 50{,}000$

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. In this question, there is a prefunding balance, and the plan sponsor elects to use it to reduce the minimum required contribution. The actuarial value of assets reduced by the prefunding balance (2,600,000 - 300,000) is less than the funding target of 2,350,000, so the plan is not exempt from creating a new shortfall amortization base in 2014.

The new base is equal to the funding shortfall less the outstanding balance of the 2013 shortfall base. The outstanding balance of the 2013 shortfall amortization base as of 1/1/2014 can be determined using the 6-year amortization factor for 2014 (there are 6 years left to pay off the 2013 shortfall base).

Outstanding balance of 2013 shortfall amortization base as of 1/1/2014 =

$$21{,}115 \times 5.24 = 110{,}643$$

The 2014 shortfall base is amortized over 7 years.

2014 shortfall installment = (50,000 – 110,643)/5.92 = (10,244)

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

Minimum required contribution$_{1/1/2014}$ = 100,000 + 21,115 – 10,244 = 110,871

Answer is C.

Question 37

The minimum required contribution for 2013 is equal to the sum of the target normal cost and the shortfall amortization installments.

Minimum required contribution$_{1/1/2013}$ = 250,000 + 100,000 = 350,000

The entire 350,000 is waived for 2013 and is amortized beginning in 2014 (on 1/1/2014) over a period of 5 years.

$$\text{Waiver amortization installment} = \frac{350{,}000}{a_{\overline{4}|5.5\%} + v^{5}_{6.5\%}} = \frac{350{,}000}{3.505150 + 0.729881} = 82{,}644$$

Note that the 2013 waived deficiency is amortized using the 2013 segment rates as an annuity immediate, because the first installment is made one year after the date of the deficiency. That necessitates the use of the second segment rate for the final payment.

The minimum required contribution for 2014 is equal to the sum of the target normal cost, the 2013 waived deficiency installment, and the shortfall amortization installments.

Minimum required contribution$_{1/1/2014}$ = 275,000 + 82,644 + 125,000 = 482,644

Answer is D.

Question 38

The minimum required contribution under the unit credit cost method is equal to the normal cost plus amortization charges less amortization credits. This is offset by any credit balance and contributions made for the plan year to determine whether there is a credit balance or funding deficiency. The credit balance or funding deficiency is determined as of the last day of the plan year, so all items determined prior to the last day must be increased with interest using the valuation interest rate.

Amortization bases created due to plan amendments (such as the new $100,000 base that must be created in 2014) are amortized over 15 years.

$$\text{Minimum required contribution}_{1/1/2014} = 100{,}000 + 75{,}000 - 50{,}000 + \frac{100{,}000}{\ddot{a}_{\overline{15}|}}$$

$$= 100{,}000 + 75{,}000 - 50{,}000 + 10{,}261$$

$$= 135{,}261$$

$$\text{Credit balance}_{12/31/2014} = (80{,}000 \times 1.07) + 100{,}000 - (135{,}261 \times 1.07) = 40{,}871$$

Answer is B.

Question 39

The asset valuation method described in this question is the smoothed value method that is detailed in Revenue Procedure 2000-40. The actuarial value of assets under this method is equal to the current market value of assets, adjusted by adding a percentage of past year losses and subtracting a percentage of past year gains, with a smoothing period of no more than 5 years. This question uses the maximum 5-year period.

The adjustment to the current market value of assets is equal to $\frac{4}{5}$ of the prior year gain/loss, $\frac{3}{5}$ of the second prior year gain/loss, $\frac{2}{5}$ of the third prior year gain/loss, and $\frac{1}{5}$ of the fourth prior year gain/loss.

In no event can the actuarial value of assets exceed 120% of the market value of assets, or be less than 80% of the market value of assets.

$X = 1{,}000{,}000 + (\frac{4}{5} \times 100{,}000) + (\frac{3}{5} \times 150{,}000) + (\frac{2}{5} \times 200{,}000) + (\frac{1}{5} \times 300{,}000)$
$= 1{,}310{,}000$, but not to exceed $1{,}200{,}000$ $(1{,}000{,}000 \times 120\%)$

$Y = 1{,}250{,}000 - (\frac{4}{5} \times 250{,}000) + (\frac{3}{5} \times 100{,}000) + (\frac{2}{5} \times 150{,}000) + (\frac{1}{5} \times 200{,}000)$
$= 1{,}210{,}000$

$Y - X = 1{,}210{,}000 - 1{,}200{,}000 = 10{,}000$

Answer is A.

Question 40

The deductible limit under IRC section 404 generally cannot be determined by including cost of living increases in the IRC section 415 limits that have not yet taken effect (IRC section 404(j)(2)). However, IRC section 404(o)(3)(B)(ii) provides an exception with regard to determination of the cushion amount only when a plan is covered by the PBGC.

The statement is false.

Answer is B.

Question 41

It is important in this question to follow the chronology of events during the 2013 year. First, the employer elects to voluntarily reduce the prefunding balance by $1,800,000.

Prefunding balance after reduction = $6,200,000 – $1,800,000 = $4,400,000

Next, the employer makes an election on 4/15/2013 to use $400,000 of the prefunding balance to satisfy the quarterly contribution requirement on that date. That election also requires the employer to use that same $400,000 prefunding balance to offset the minimum required contribution. There is nothing else of importance to be determined from this election because the election was made timely (by the due date of the quarterly contribution).

On 7/1/2013 the employer contributes $6,180,000, enough to satisfy the remaining quarterly contribution requirements for the 2013 year. Discounting this to 1/1/2013 using the 2013 plan effective rate of 6%:

$\$6{,}180{,}000 \times v_{6\%}^{6/12} = \$6{,}002{,}547$

The employer elects to add any excess contribution to the prefunding balance. Regulation 1.430(f)-1(b)(3)(iii) states that for purposes of determining the excess contribution, any portion of the prefunding balance that is elected to reduce the minimum required contribution must be ignored.

Excess contribution = $6,002,547 – $3,000,000 = $3,002,547

IRC section 430(f)(8) states that the unused prefunding balance is rolled forward with interest to the next plan year using the actual asset rate of return for the plan (12% in this question). However, IRC section 430(f)(6)(B)(ii) states that any increase to the prefunding balance from excess contributions is increased using the plan effective rate for the year (6%). Note that the $400,000 of prefunding balance used to pay for the 4/15/2013 quarterly contribution was not used to determine the excess contribution, so it is still considered as part of the prefunding balance for purposes of applying 2013 rates of return, and thus is rolled forward using the actual asset rate of return.

$\text{Prefunding balance}_{1/1/2014} = (\$4{,}400{,}000 \times 1.12) + (\$3{,}002{,}547 \times 1.06) = \$8{,}110{,}700$

Answer is D.

Question 42

The minimum required contribution under the unit credit cost method is equal to the normal cost plus amortization charges less amortization credits. This is offset by any existing credit balance and contributions made for the plan year to determine whether there is a credit balance or funding deficiency as of the end of the plan year. The credit balance or funding deficiency is determined as of the last day of the plan year, so all items determined prior to the last day must be increased with interest using the valuation interest rate.

Amortization bases created due an experience gain (such as the new $1,400,000 base that must be created on 1/1/2014) are amortized over 15 years, and the amortization is a credit.

$$\text{Minimum required contribution}_{1/1/2014} = 400{,}000 + 1{,}800{,}000 - 1{,}300{,}000 - \frac{1{,}400{,}000}{\ddot{a}_{\overline{15}|}}$$

$$= 400{,}000 + 1{,}800{,}000 - 1{,}300{,}000 - 147{,}537$$

$$= 752{,}463$$

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution less the credit balance. The credit balance as of 1/1/2014 is $800,000, so no contribution is needed to satisfy the minimum funding standard. However, the question states that an additional contribution of $900,000 is deposited on 1/1/2014.

$$\text{Credit balance}_{12/31/2014} = (800{,}000 \times 1.075) + (900{,}000 \times 1.075) - (752{,}463 \times 1.075)$$

$$= 1{,}018{,}602$$

Answer is D.

Question 43

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 (general conditions of the exam), so the not at-risk numbers should be used.

Cushion amount = (50% × 6,350,000) + (7,250,000 – 6,350,000) = 4,075,000

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

275,000 + 6,350,000 + 4,075,000 – 6,200,000 = 4,500,000

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:

385,000 + 8,800,000 – 6,200,000 = 2,985,000

The deductible limit is the larger of the IRC section 404(o)(2)(A) and 404(o)(2)(B) limits, which is 4,500,000.

Answer is D.

Note: Without regulations for IRC section 404(o), it is unclear as to whether the deductible limit is determined as of the valuation date, or as of the close of the employer's fiscal year (which has traditionally been when the deductible limit is determined). In this question, if 4,500,000 is increased using the 6% effective interest rate to 12/31/2014, the result is 4,770,000. This is in the same answer range.

Question 44

The minimum required contribution under the unit credit cost method is equal to the normal cost plus amortization charges less amortization credits. The normal cost is the present value of the benefit accrual for the current year. Effective in 2014, the plan benefit formula is amended so that the benefit per year of service is increased from \$26 to \$28 for all years of service. The formula change results in a pro-rata increase in the normal cost, so the revised normal cost under the new formula is equal to the normal cost under the original formula multiplied by the ratio of the two dollar multipliers.

$\text{Normal cost}_{1/1/2014} = \$500{,}000 \times (28/26) = \$538{,}462$

In addition, a new amortization base must be created due to the increase in the past service liabilities created by the retroactive application of the amendment to all years of service. The accrued liability represents the past service liability, and only active participants receive the benefit of the amendment.

Increase in accrued liability = \$8,000,000 × (2/26) = \$615,385

The increase in accrued liability is amortized over a 15-year period.

The experience gain or loss for 2013 must be calculated (this is done before reflecting the plan amendment). The experience gain or loss is equal to the difference between the expected unfunded liability and the actual unfunded liability (the difference between the accrued liability before the amendment and the actuarial value of the assets).

$\text{Actual unfunded liability}_{1/1/2014} = (\$8{,}000{,}000 + \$6{,}000{,}000) - \$10{,}000{,}000 = \$4{,}000{,}000$

The expected unfunded liability can be determined using the balance equation.

Expected unfunded liability = Outstanding balance of the amortization bases – Credit balance

The outstanding balance of each amortization base is equal to the present value of the remaining amortization payments.

$$\begin{aligned}\text{Expected unfunded liability} &= (\$300{,}000\,\ddot{a}_{\overline{13}|}) + (\$250{,}000\,\ddot{a}_{\overline{14}|}) - \$500{,}000 \\ &= (\$300{,}000 \times 8.942686) \\ &\quad + (\$250{,}000 \times 9.357651) - \$500{,}000 \\ &= \$4{,}522{,}219\end{aligned}$$

Note that the new amortization base due to the plan amendment is ignored for purposes of the determination of the 2013 experience gain or loss.

2013 gain = \$4,522,219 – \$4,000,000 = \$522, 219

The gain is amortized over a period of 15 years, and becomes an amortization credit.

Minimum required contribution as of 1/1/2014:

$$\$538{,}462 + \$300{,}000 + \$250{,}000 + \frac{\$615{,}385}{\ddot{a}_{\overline{15}|}} - \frac{\$522{,}219}{\ddot{a}_{\overline{15}|}}$$

$$= \$538{,}462 + \$300{,}000 + \$250{,}000 + \$63{,}146 - \$53{,}586 = \$1{,}098{,}022$$

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution, reduced by the credit balance. The question is asking for this as of the end of the year, so the result must be increased with interest.

$X = (\$1{,}098{,}022 - \$500{,}000) \times 1.07 = \$639{,}884$

Answer is B.

Question 45

The accrued liability under the entry age normal funding method is equal to the accumulated value of the prior normal costs (as of the valuation date). The normal costs are based upon the projected benefit at assumed retirement age (65 in this question, per the general conditions of the exam). The 4% salary scale is incorporated into the determination of the projected benefit. Smith is age 50 as of the valuation date, so the 2013 salary must be projected 15 years to obtain the projected final salary.

Final salary = $\$100{,}000 \times 1.04^{15} = \$180{,}094$
Projected benefit = $40\% \times \$180{,}094 = \$72{,}038$

The present value of benefits must be determined at entry age (age at hire). Smith was hired at age 34. Note that the discount for years prior to normal retirement age is based on interest only because there is no mention of any preretirement decrements.

$PVFB_{34} = \$72{,}038 \times \ddot{a}_{65}^{(12)} \times v^{31} = \$72{,}038 \times 9.58 \times 0.122773 = \$84{,}729$

The normal cost is equal to the PVFB amortized over the total years to retirement. Since there is a salary scale, and the normal cost must be determined as a level percentage of salary (per the general conditions of the exam), an implicit interest rate is used incorporating both the 7% interest rate and the 4% salary scale.

Implicit interest rate for amortizing = (1.07/1.04) – 1 = .028846, or 2.8846%

$NC_{34} = PVFB_{34} / \ddot{a}_{\overline{31}|.028846} = \$84{,}729/20.896040 = \$4{,}055$

The normal cost as of 1/1/2014 (when Smith is age 50) is equal to the normal cost at age 34, increased by 4% per year (since the normal cost increases by the same percentage as does the salary).

$NC_{50} = NC_{34} \times 1.04^{16} = \$4{,}055 \times 1.872981 = \$7{,}595$

The accrued liability is equal to the accumulation of the past normal costs through Smith's current age on 1/1/2014 (16 years of accumulation from age 34 to 50). This accumulation also uses the implicit interest rate.

$AL_{50} = NC_{50} \times \ddot{s}_{\overline{16}|.028846} = \$7{,}595 \times 20.550576 = \$156{,}082$

Answer is C.

Question 46

The shortfall amortization base must be developed for 2014. The funding shortfall 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).

Funding shortfall$_{1/1/2014}$ = 60,000,000 – (61,000,000 – 4,000,000) = 3,000,000

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. In this question, there is a prefunding balance, and the general conditions of the exam state that the plan sponsor elects to use it to reduce the minimum required contribution. The actuarial value of assets reduced by the prefunding balance (61,000,000 – 4,000,000) is less than the funding target of 60,000,000, so the plan is not exempt from creating a new shortfall amortization base in 2014.

The new base is equal to the funding shortfall less the outstanding balance of the 2012 and 2013 shortfall bases (with 5 and 6 years remaining, respectively). The outstanding balance as of 1/1/2014 of each prior shortfall amortization bases is determined using the 2014 segment rates. The segment 1 rate is used to discount each of the first 5 remaining payments, and the segment 2 rate is used to discount each additional payment.

$$\text{Outstanding balance of 2012 shortfall base} = 500{,}000 \times \ddot{a}_{\overline{5}|5\%}$$
$$= 500{,}000 \times 4.545950$$
$$= 2{,}272{,}975$$

$$\text{Outstanding balance of 2013 shortfall base} = 350{,}000 \times (\ddot{a}_{\overline{5}|5\%} + v^5_{6\%})$$
$$= 350{,}000 \times (4.545950 + 0.747258)$$
$$= 1{,}852{,}623$$

2014 shortfall amortization base = 3,000,000 – 2,272,975 – 1,852,623 = (1,125,598)

The 2014 shortfall base is amortized over 7 years.

$$\text{2014 shortfall installment} = (1{,}125{,}598)/(\ddot{a}_{\overline{5}|5\%} + v^5_{6\%}\ddot{a}_{\overline{2}|6\%})$$
$$= (1{,}125{,}598)/(4.545950 + [0.747258 \times 1.943396])$$
$$= (187{,}657)$$

2014 shortfall amortization charge = 500,000 + 350,000 – 187,657 = 662,343

Answer is D.

Question 47

Treasury regulation 1.430(f)-1(f)(3)(ii) allows a plan sponsor to revoke an election to use a funding balance to the extent that it exceeds the minimum required contribution, and the revocation must be given to both the enrolled actuary and the plan administrator. Treasury regulation 1.430(f)-1(f)(3)(iii) requires the revocation of the election to be made no later than the last day of the plan year (for plans with first day valuations).

The statement is false.

Answer is B.

Question 48

I. IRC section 430(j)(3)(A) requires that a single employer plan with a funding shortfall in the prior year make required quarterly installments for the current year. The statement is true.

II. The amount of the required quarterly installment is equal to 25% of the smaller of the prior year minimum required contribution or 90% of the current year minimum required contribution (IRC section 430(j)(3)(D)). Plans with no funding shortfall in the current year could still have a target normal cost, resulting in a minimum required contribution and, thus, a required quarterly installment. The statement is false.

III. An election can be made to use a funding balance to pay for a required quarterly installment (Treasury regulation 1.430(f)-1(d)(1)(i)(B)). However, if the election is made after the due date for making the required quarterly installment, then for purposes of offsetting the minimum required contribution for the year, the amount of the funding balance elected to be used is from the date of the election to the quarterly due date using the plan effective rate plus 5%, and from the quarterly due date to the valuation date using the plan effective rate. The statement is true.

Answer is C.

Question 49

The four quarterly due dates for the 2013 plan year are 4/15/2013, 7/15/2013, 10/15/2013, and 1/15/2014. The contribution for 2013 of $11,500 was paid on 9/1/2014, so the quarterly contributions are late by 16½ months, 13½ months, 10½ months, and 7½ months, respectively. The amounts used to pay for the quarterly contributions must be discounted from 9/1/2014 to the quarterly due date using an interest rate of 11% (the plan effective rate plus 5%) and then from the quarterly due date to 1/1/2013 using the plan effective rate of 6%. The balance ($3,500) of the contribution is discounted from 9/1/2014 to 1/1/2013 using the plan effective rate.

The present value of the contribution as of 1/1/2013 is:

$$2{,}000\, v_{11\%}^{\frac{16.5}{12}} v_{6\%}^{\frac{3.5}{12}} + 2{,}000\, v_{11\%}^{\frac{13.5}{12}} v_{6\%}^{\frac{6.5}{12}} + 2{,}000\, v_{11\%}^{\frac{10.5}{12}} v_{6\%}^{\frac{9.5}{12}} + 2{,}000\, v_{11\%}^{\frac{7.5}{12}} v_{6\%}^{\frac{12.5}{12}} + 3{,}500\, v_{6\%}^{\frac{20}{12}}$$
$$= 1{,}703 + 1{,}723 + 1{,}743 + 1{,}763 + 3{,}176 = 10{,}108$$

This exceeds the minimum required contribution of $10,000, so there is no unpaid minimum. The statement is true.

Answer is A.

Question 50

I. Upon certification by the enrolled actuary of critical status, a rehabilitation plan must be adopted no later than 240 days from the certification date (IRC section 432(e)(1)(A)). 240 days after 3/30/2014 is 11/25/2014. The statement is false.

II. The rehabilitation period is a 10-year period beginning on the first day of the first plan year following the earlier of (i) the second anniversary of the adoption date of the rehabilitation plan, or (ii) the expiration date of the current bargaining agreement (in effect on the date the certification of critical status was due and covering at least 75% of the active participants in the plan). See IRC section 432(e)(4)(A). The current bargaining agreement expires at the end of 2014, so that is clearly the earlier of the two dates. The 10-year period beings on 1/1/2015 and ends on 12/31/2024. The statement is false.

III. Generally no amendment can be made to a plan during the rehabilitation period that increases liabilities. However, if the amendment is required for qualification purposes, then the amendment is allowed under IRC section 432(f)(4)(B). The statement is false.

Answer is A.

Question 51

Under the unit credit cost method, the normal cost is equal to the present value of the current year accrual, and the accrued liability is equal to the present value of the prior year accruals (beginning of year accrued benefit). 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 63, 64, and 65. The assumed probability of retiring at each age is:

Age 63: 20%
Age 64: 80% (probability of NOT retiring at age 63) × 20% = 16%
Age 65: 80% × 80% (probability of NOT retiring at age 64) = 64%

Each participant is age 60 with 30 years of service as of 1/1/2014.

The monthly accrued benefit as of 1/1/2014 for each retirement age is:

Age 63 = \$204 × 30 years of service × [1 – (.05 × 2 years)] = \$5,508
Age 64 = \$204 × 30 years of service × [1 – (.05 × 1 year)] = \$5,814
Age 65 = \$204 × 30 years of service = \$6,120

$$\begin{aligned} AL_{1/1/2014} &= [(\$5{,}508 \times 12 \times \ddot{a}_{63}^{(12)} \times v^3 \times .2) + (\$5{,}814 \times 12 \times \ddot{a}_{64}^{(12)} \times v^4 \times .16) \\ &\qquad + (\$6{,}120 \times 12 \times \ddot{a}_{65}^{(12)} \times v^5 \times .64)] \times 10 \text{ participants} \\ &= [(\$5{,}508 \times 12 \times 12.78 \times v^3 \times .2) + (\$5{,}814 \times 12 \times 12.53 \times v^4 \times .16) \\ &\qquad + (\$6{,}120 \times 12 \times 12.27 \times v^5 \times .64)] \times 10 \text{ participants} \\ &= [\$141{,}846 + \$110{,}791 + \$430{,}951] \times 10 \\ &= \$6{,}835{,}880 \end{aligned}$$

Since the accrual is the same each year, the normal cost will be equal to one-thirtieth of the accrued liability (each participant has 30 years of past service, so one-thirtieth of that represents the one year of service that each participant earns in 2014).

$NC_{1/1/2014} = \$6{,}835{,}880 \times (1/30) = \$227{,}863$

There were no amortization bases established before 2014. An experience loss must be determined for the 2013 year. The experience loss is equal to the excess of the actual unfunded liability (accrued liability less actuarial value of assets) over the expected unfunded liability (zero).

Actual unfunded liability = \$6,835,880 – \$6,200,000 = \$635,880

This is the amount of the 2013 experience loss, and it is amortized over 15 years.

$$\text{Amortization charge} = \frac{\$635{,}800}{\ddot{a}_{\overline{15}|}} = \$61{,}766$$

The minimum required contribution is equal to the normal cost plus the amortization charge. 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, so the minimum required contribution will also be the smallest amount that satisfies the minimum funding standard. The contribution is made on 12/31/2014, so the minimum required contribution must be increased with valuation interest to the last day of the year.

\$X = (\$227,863 + \$61,766) × 1.06 = \$307,007

Answer is B.

Question 52

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).

The funding target is equal to the present value of the accrued benefit in effect at the beginning of the year (using salary history through the end of the prior year).

Smith is age 50 and has 3 years of service as of 1/1/2014. Smith's projected salary for 2014 is \$264,000 (\$240,000 × 1.1). However, that would exceed the 2014 IRC section 401(a)(17) compensation limit of \$255,000, so the 2014 projected salary must be limited to \$255,000.

The normal retirement benefit is based upon the final 3-year average salary. It is assumed based upon the general conditions of the exam that normal retirement age is 65.

Smith's final 3-year average salary is:

As of 1/1/2014: $\frac{100{,}000 + 200{,}000 + 240{,}000}{3} = 180{,}000$

As of 12/31/2014: $\frac{200{,}000 + 240{,}000 + 255{,}000}{3} = 231{,}667$

Accrued benefit as of 1/1/2014 = 10% × 180,000 × 3 years of service = 54,000
Accrued benefit as of 12/31/2014 = 10% × 231,667 × 4 years of service = 92,667

The accrued benefit cannot exceed the IRC section 415(b) limit. This limit is equal to the smaller of the high consecutive 3-year average salary (reduced pro-rata for years of service less than 10) or the dollar limit of \$205,000 (reduced pro-rata for years of plan participation less than 10). Smith was hired and entered the plan on 1/1/2011, so Smith has 3 years of service/participation as of 1/1/2014 and 4 years of service/participation as of 12/31/2014.

415 limit as of 1/1/2014 = 180,000 × (3/10) = 54,000
415 limit as of 12/31/2014 = 205,000 × (4/10) = 82,000

The end of year accrued benefit must be limited to 82,000.

The funding target as of 1/1/2014 is equal to the present value of the accrued benefit. Using the segment interest rates, the segment 2 is used for the first 5 years of payments (age 65 through 69), and segment 3 is used for ages 70 and later. There is an interest only discount prior to age 65 because the question does not state that there are pre-retirement decrements, and the exam general conditions state that there are no pre-retirement decrements.

$$\text{Funding target} = 54{,}000 \times \left[\frac{N^{(12)}_{65@6.5\%} - N^{(12)}_{70@6.5\%}}{D_{65@6.5\%}} v^{15}_{6.5\%} + \frac{N^{(12)}_{70@7.5\%}}{D_{65@7.5\%}} v^{15}_{7.5\%} \right]$$

$$= 54{,}000 \times \left[\frac{16{,}118 - 9{,}666}{1{,}540}(0.388827) + \frac{4{,}714}{839}(0.337966) \right]$$

$$= 190{,}508$$

$$\text{Target normal cost} = (82{,}000 - 54{,}000) \times \left[\frac{N^{(12)}_{65@6.5\%} - N^{(12)}_{70@6.5\%}}{D_{65@6.5\%}} v^{15}_{6.5\%} + \frac{N^{(12)}_{70@7.5\%}}{D_{65@7.5\%}} v^{15}_{7.5\%} \right]$$

$$= (82{,}000 - 54{,}000) \times \left[\frac{16{,}118 - 9{,}666}{1{,}540}(0.388827) + \frac{4{,}714}{839}(0.337966) \right]$$

$$= 98{,}782$$

X = 190,508 + 98,782 = 289,290

Answer is B.

Question 53

IRC section 430(f)(3)(C) requires that in order to be able to elect to apply the funding balances to reduce the minimum required contribution, the ratio of the prior year actuarial value of assets (reduced only by the prefunding balance but not the carryover balance) to the prior year funding target must be at least 80%.

$X = $900,000 - $200,000 = $700,000

Answer is B.

Question 54

The accrued liability under the entry age normal funding method is equal to the accumulated value of the prior normal costs (as of the valuation date). The normal costs are based upon the projected benefit at assumed retirement age (65 in this question, per the general conditions of the exam).

Smith was hired at age 45 and is age 45 as of the valuation date, so there is no accrued liability for Smith because Smith has no past service.

Jones was hired at age 45 and is age 55 as of the valuation date, and will have 20 years of service at retirement.

Jones' projected benefit at age 65 = \$300 × 20 years of service = \$6,000

The present value of benefits must be determined at entry age (age at hire). The commutation functions can be used to determine that present value.

$$\text{Jones PVFB}_{45} = \$6{,}000 \times \ddot{a}_{65} \times \frac{D_{65}}{D_{45}} = \$6{,}000 \times \frac{N_{65}}{D_{65}} \times \frac{D_{65}}{D_{45}}$$

$$= \$6{,}000 \times \frac{N_{65}}{D_{45}} = \$6{,}000 \times \frac{22{,}745}{7{,}142} = \$19{,}108$$

The normal cost is equal to the PVFB amortized over the total years to retirement.

$$\text{Jones NC} = \text{PVFB}_{45} / \ddot{a}_{45:\overline{20}|} = \$19{,}108 / \left(\frac{N_{45} - N_{65}}{D_{45}} \right)$$

$$= \$19{,}108 / \left(\frac{106{,}115 - 22{,}745}{7{,}142} \right) = \$1{,}637$$

The accrued liability is equal to the accumulation of the past normal costs through Jones' current age on 1/1/2014 (10 years of accumulation from age 45 to 55).

$$\text{Jones AL} = \text{NC} \times \ddot{s}_{45:\overline{10}|} = \$1{,}637 \times \left(\frac{N_{45} - N_{55}}{D_{55}} \right)$$

$$= \$1{,}637 \times \left(\frac{106{,}115 - 52{,}143}{3{,}932} \right) = \$22{,}470$$

Brown was hired at age 45 and is age 65 as of the valuation date, and has 20 years of service at retirement.

Brown's projected benefit at age 65 = \$300 × 20 years of service = \$6,000

Since Brown is at retirement age, the accrued liability is simply the present value of benefits.

$$\text{Brown PVFB} = \$6{,}000 \times \ddot{a}_{65} = \$6{,}000 \times \frac{N_{65}}{D_{65}} = \$6{,}000 \times \frac{22{,}745}{2{,}090} = \$65{,}297$$

The total accrued liability is:

\$22,470 + \$65,297 = \$87,767

Answer is D.

Question 55

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 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).

Minimum required contribution for Employer A = $400,000 + $80,000 = $480,000

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution reduced by the funding balances (provided the employer elects to use the funding balances to reduce the minimum). The general conditions of the exam state that unless it is stated otherwise, the employer elects to use the funding balances to reduce the minimum required contribution to the extent they are available. However, the funding balances can only be used to reduce the minimum required contribution if the ratio of the actuarial value of assets (reduced by the prefunding balance but not the carryover balance) to the funding target in the prior year is at least 80%. It is given that the FTAP for the prior year (2013), which also includes the assets reduced by the carryover balance, is 85% for Employer A. If the assets had not been reduced by the carryover balance, then the FTAP would have been even larger than 85%. Therefore, the funding balances can be used to reduce the minimum required contribution for Employer A for 2014.

$X = $480,000 - $150,000 - $100,000 = $230,000

Answer is A.

Question 56

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.

Generally, when there are mandatory employee contributions, the total normal cost is calculated and then reduced by the current year employee contributions. The amount of the current year employee contribution is not known. Therefore, an alternative method must be used. The total present value of future benefits is reduced by the present value of future employee contributions in the direct determination of the employer normal cost.

$$\text{Employer normal cost} = \frac{\$10{,}000{,}000 - \$200{,}000 - \$4{,}500{,}000}{\$6{,}500{,}000 / \$1{,}000{,}000} = \$815{,}385$$

Answer is A.