

Solutions to EA-2(F) Examination Fall, 2022

Question 1

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 shortfall is the excess of the funding target over the actuarial value of assets (reduced by the funding balances).

$$\text{Funding shortfall}_{1/1/2023} = \$450,000 - \$500,000 = \$0$$

The funding shortfall cannot be less than \$0. When the funding shortfall is zero, there is no new shortfall amortization base, and the prior year shortfall bases are deemed to be fully amortized (IRC section 430(c)(6)).

In addition, the excess of the actuarial value of assets (reduced by the funding balances) over the funding target is a credit used to reduce the target normal cost (IRC section 430(a)(2)).

$$2023 \text{ minimum required contribution} = \$250,000 - (\$500,000 - \$450,000) = \$200,000$$

The **smallest amount that satisfies the minimum funding standard** (\$X) as of 9/15/2024 is equal to the minimum required contribution, reduced by any funding balances, and increased with interest at the effective interest rate from 1/1/2023 to the date of the contribution. Note that it is important to know that the plan is not subject to quarterly contributions in 2023 because penalty interest would have applied to the late quarterly contributions.

$$\$X = \$200,000 \times 1.05^{20.5/12} = \$217,384$$

Answer is B.

Question 2

The funding target is equal to the present value of the benefit accrued as of the first day of the year. Smith is age 65 (normal retirement age under the general conditions of the exam) as of 1/1/2023, so the funding target will be equal to the present value of the future expected retirement benefits.

Treasury regulation 1.430(d)-1(f)(4)(ii)(B) requires that for funding purposes, a lump sum must generally be valued using the 417(e) mortality (post-retirement) and using the funding segment rates. However, regulation 1.430(d)-1(f)(4)(iii)(D) provides that when the plan equivalence for determining the lump sum value (at retirement age) is an interest rate other than the 417(e) applicable interest rate, then the lump sum is valued using the applicable mortality table for post-retirement mortality, and either the plan interest rate or the funding segment rates for post-retirement interest, whichever gives the larger present value.

In this question, the immediate annuity factor using the funding segment rates is not given, although with the funding segment rates given as 5%, 6%, and 7%, the immediate annuity factor would be smaller than that using only the plan interest rate of 5%, so the immediate annuity factor for determining the lump sum based upon the plan interest rate (12.621) must be used. Note that the immediate annuity factor using the 417(e) applicable interest rate (11.461) is irrelevant for this purpose (although it is also smaller than the factor using 5%, in any case).

$$\text{\$X} = \text{Funding target for Smith} = \$100 \times 12 \times 12.621 = \$15,145$$

Answer is D.

Question 3

The amount of the required quarterly contribution installment under IRC section 430(j)(3)(D) is equal to 25% of the smaller of 90% of the minimum required contribution for the current year or 100% of the minimum required contribution for the preceding year.

In determining quarterly contribution installments for a plan year, if either the current year or the prior year is a short plan year, then the minimum required contribution in that calculation must be determined based upon whether the current plan year is a short year or a full year. If the current year is a full year and the prior year a short year, then the prior year minimum required contribution must be annualized to reflect what it would have been had the prior year been a full year. Alternatively, if the current year is a short year and the prior year a full year, then the prior year minimum required contribution must be prorated to reflect what it would have been had the prior year been a short year (covering the same number of months as the current short year). See Treasury regulation 1.430(j)-1(c)(7).

Because the prior year in this question was a short year, for purposes of taking 100% of the prior year minimum required contribution, the prior year short year minimum must be annualized. The statement is false.

Answer is B.

Question 4

For purposes of determining the market value of assets, Treasury regulation 1.430(g)-1(d)(2) states that contributions for the current year that have been deposited before the current year valuation date must be removed from the market value of assets by interest, adjusting them from the date deposited to the current year valuation date using the current year effective interest rate. In this question, the contributions for 2023 deposited on 4/30/2023 and 9/30/2023 must be increased with interest (using the 5% effective rate) to the 12/31/2023 valuation date, and subtracted from the fair market value of assets as of that date.

$$\begin{aligned} \$X &= \$500,000 - (\$30,000 \times 1.05^{8/12}) - (\$40,000 \times 1.05^{3/12}) \\ &= \$500,000 - \$30,992 - \$40,491 = \$428,917 \end{aligned}$$

Answer is B.

Question 5

Section 4.02 of Revenue Procedure 2017-56 provides rules for automatic approval when there is a change in valuation software. Under the terms of that section, automatic approval is granted if each of the target normal cost, funding target, and actuarial value of assets are within 2% of those values comparing the new software to the old software, for both the current and prior year valuations. (Note that the 2% comparison is reduced to 1% if the automatic approval was used for the prior year as well. In this question, it is stated that there was no change in the valuation software for 2022, so the 2% comparison can be used.)

For each of the target normal cost, funding target, and actuarial value of assets used in the 2022 valuation, the values using the new software must be between 98% and 102% of the actual values used.

Range for target normal cost = \$98,000 to \$102,000 (98% and 102% of \$100,000, respectively)

Range for funding target = \$539,000 to \$561,000 (98% and 102% of \$550,000, respectively)

Range for assets = \$490,000 to \$510,000 (98% and 102% of \$500,000, respectively)

Considering the four scenarios:

Scenario I: Automatic approval is allowed, as all three values are within the 98% to 102% range.

Scenario II: Automatic approval is not allowed, as the actuarial value of assets is below 98%.

Scenario III: Automatic approval is not allowed, as the funding target is above 102%.

Scenario IV: Automatic approval is not allowed, as the target normal cost is below 98%.

Answer is A.

Question 6

- I. When the vesting schedule is changed under the terms of a plan, the termination rate assumption must be reviewed because there is no need to assume termination of employment when a participant is fully vested (as the benefit cannot be forfeited at that point). The change in the vesting schedule will typically affect the timing of when a participant fully vests, as well as the percentage of vesting at each age prior to full vesting.
- II. When a plan's early retirement subsidies change, then the retirement rate assumption must be reviewed and possibly changed to reflect the increased or decreased probability of a participant electing early retirement. If the benefit becomes more subsidized, then early retirements are likely to increase, and if the benefit becomes less subsidized, then early retirements are likely to decrease.
- III. If the definition of disability changes under the terms of a plan, then the disability assumption must be reviewed to determine whether it is more or less likely that participants will become disabled under the eligibility requirements of the plan.

All statements are true.

Answer is D.

Question 7

When a plan does not provide enhanced disability benefits, no additional benefit would be paid if a participant becomes disabled. There is no need to use a disability assumption in this case. The statement is false.

Answer is B.

Question 8

IRC section 4971(e)(2) provides that when there is a funding deficiency, if the employer is a part of a controlled group, then each member of the controlled group is jointly and severally liable for the excise tax. The statement is true.

Answer is A.

Question 9

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 two valuation dates.

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 plan-related 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 3rd segment interest rate, then that 3rd segment interest rate is used. In this question, the assumed rate of return for each year of 7.5% is larger than the segment 3 rate for each year, so the segment 3 rate of 5% is used to determine the expected earnings for 2021 and the segment 3 rate of 6% is used to determine the expected earnings for 2022. For purposes of the expected earnings, the benefit payments and expenses are all paid mid-year, and only earn 6 months of interest. The only contributions were made for 2022. A contribution of \$125,000 was made during the year on 4/1/2022, and will be expected to earn 9 months of interest. The second contribution for 2022 of \$75,000 is a receivable and must be discounted using the 2022 effective interest rate of 5.2% and added to the market value of assets as of 1/1/2023.

The 1/1/2023 market value of assets including the 2022 receivable contribution is:

$$\$1,500,000 + \$75,000/1.052^{5/12} = \$1,500,000 + \$73,432 = \$1,573,432$$

The expected earnings for 2021 are:

$$(\$1,000,000 \times .05) - [(\$50,000 + \$10,000) \times (1.05^{6/12} - 1)] = \$48,518$$

The expected earnings for 2022 are:

$$(\$1,250,000 \times .06) + [(\$125,000) \times (1.06^{9/12} - 1)] - [(\$62,500 + \$12,500) \times (1.06^{6/12} - 1)] \\ = \$78,367$$

$$\begin{aligned} &1/1/2021 \text{ adjusted fair market value (adjusted to 1/1/2023, including the 2022 receivable contribution)} \\ &= \$1,000,000 - \$50,000 - \$10,000 + \$48,518 \\ &\quad + \$125,000 - \$62,500 - \$12,500 + \$78,367 + \$73,432 = \$1,190,317 \end{aligned}$$

$$\begin{aligned} &1/1/2022 \text{ adjusted fair market value (adjusted to 1/1/2023, including the 2022 receivable contribution)} \\ &= \$1,250,000 + \$125,000 - \$62,500 - \$12,500 + \$78,367 + \$73,432 = \$1,451,799 \end{aligned}$$

$$1/1/2023 \text{ actuarial value} = (\$1,190,317 + \$1,451,799 + \$1,573,432)/3 = \$1,405,183$$

Under IRC section 430(g)(3)(B)(iii), the actuarial value of assets cannot be less than 90% of the market value of the assets (including receivable contributions). 90% of \$1,573,432 is equal to \$1,416,089. The actuarial value of assets must be increased to this amount.

The 1/1/2023 actuarial value of assets is equal to \$1,416,089.

Answer is C.

Question 10

The accrued liability under the Entry Age Normal funding method is equal to the accumulated value of the prior normal costs (as of the 1/1/2023 valuation date). The normal cost under the Entry Age Normal funding method is based upon the projected benefit at assumed retirement age (65 in this question, per exam general conditions), and the normal cost payments are assumed to begin at hire age. The 3.5% salary scale is incorporated into the determination of the projected benefit. Smith was hired at age 34 and is age 54 as of the 1/1/2023 valuation date, so the 2022 salary must be projected 11 years to obtain the projected final salary.

$$\text{Projected final salary} = \$150,000 \times 1.035^{11} = \$218,995$$

$$\text{Projected benefit} = 50\% \times \$218,995 = \$109,498$$

The present value of benefits must be determined at “entry age” (age at hire, not the age of entry into the plan). 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 (the general conditions for the exam state that there are no preretirement decrements).

The commutation functions used for the post-retirement annuity are found in the tables of supplementary factors provided with the examination, for a female participant using 7% interest.

$$\begin{aligned} \text{PVFB}_{34} &= \$109,498 \times \ddot{a}_{65}^{(12)} \times v^{31} = \$109,498 \times \frac{N_{65}^{(12)}}{D_{65}} \times 0.122773 \\ &= \$109,498 \times \frac{124,946}{11,489} \times 0.122773 = \$146,201 \end{aligned}$$

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 3.5% salary scale.

Implicit interest rate for amortizing = $(1.07/1.035) - 1 = 0.033816$, or 3.3816%

$$NC_{34} = PVFB_{34} / \ddot{a}_{\overline{31}|0.033816} = \$146,201 / 19.66784 = \$7,433.51$$

The normal cost as of 1/1/2023 (when Smith is age 54) is equal to the normal cost at age 34, increased by 3.5% per year (since the normal cost increases by the same percentage as does the salary under the exam general conditions).

$$NC_{54} = NC_{34} \times 1.035^{20} = \$7,433.51 \times 1.989789 = \$14,791.12$$

The accrued liability is equal to the accumulation of the past normal costs through Smith's current age on 1/1/2023 (20 years of accumulation from age 34 to 54).

$$\$X = AL_{54} = NC_{54} \times \ddot{s}_{\overline{20}|0.033816} = \$14,791.12 \times 28.88301 = \$427,212$$

Answer is C.

Note: The accrued liability can also be determined by taking the difference between the present value of future benefits at attained age of 54 and the present value of future normal costs at age 54.

$$\begin{aligned} PVFB_{54} &= \$109,498 \times \ddot{a}_{65}^{(12)} \times v^{11} = \$109,498 \times \frac{N_{65}^{(12)}}{D_{65}} \times 0.475093 \\ &= \$109,498 \times \frac{124,946}{11,489} \times 0.475093 = \$565,751 \end{aligned}$$

$$AL_{54} = PVFB_{54} - (NC_{54} \times \ddot{a}_{\overline{11}|0.033816}) = \$565,751 - (\$14,791.12 \times 9.36646) = \$427,211$$

Note that the \$1 difference is a rounding error.

Question 11

The frozen initial liability (FIL) cost method consists of a normal cost and various amortization charges and credits. This question concerns the normal cost and not the amortization bases.

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

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

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 (although it is not known whether there is a credit balance in this question, in any case). Note that the market value of assets is not used for purposes of the normal cost.

When the plan benefits are not based upon compensation, the temporary annuity is equal to the ratio of the present value of future service to the number of active participants (this is the average temporary annuity as described in Revenue Procedure 2000-40).

The only item not provided but needed to calculate the normal cost as of 1/1/2023 is the unfunded liability as of 1/1/2023. That can be developed by the information provided from the 2022 valuation. The current year unfunded liability is equal to the sum of the prior year unfunded liability and prior year normal cost, increased with interest to the current year at the valuation interest rate, and then reduced by the interest-adjusted contribution from the prior year. The 2022 contribution of \$20,500 was contributed on 6/30/2022, so it is given 6 months of interest.

$$1/1/2023 \text{ unfunded liability} = [(\$150,000 + \$5,250) \times 1.07] - (\$20,500 \times 1.07^{6/12}) = \$144,912$$

Note that it is also acceptable to use simple interest to accumulate the \$20,500 contribution (the result is almost the same, \$144,900), which will also give an answer in the correct answer range.

$$1/1/2023 \text{ normal cost} = \frac{\$400,000 - \$200,000 - \$144,912}{75/6} = \$4,407$$

Answer is B.

Question 12

IRC section 432(j)(2) defines the funded percentage as the ratio of the actuarial value of assets to the unit credit accrued liability (regardless of the cost method being used to determine the minimum required contribution). The funded percentage for this plan is:

$$\text{Funded percentage} = \$1,015,000 / \$1,250,000 = 81.2\%$$

Statement I is true.

The funding deficiency for 2023, as of 12/31/2023, is equal to the sum of the 12/31/2022 deficiency, the 1/1/2023 normal cost, and the 1/1/2023 amortization charges, all increased with interest to 12/31/2023, and then reduced by the contribution for 2023 (which does not receive any interest as it was contributed on 12/31/2023).

$$12/31/2023 \text{ funding deficiency} = [(\$40,000 + \$130,000 + \$40,000) \times 1.065] - \$180,000 = \$43,650.$$

Statement II is true.

IRC section 432(b)(2)(B) states that a plan is in critical status if it has an accumulated funding deficiency for the current year. The accumulated funding deficiency for 2023 is \$43,650.

Statement III is true.

Answer is D.

Question 13

IRC section 432(e)(7)(A) states that certain contributions for a plan that is in critical status are subject to a 5% surcharge.

$$\text{\$X} = (\$125,000 \times 1.05) + \$95,000 = \$226,250$$

Answer is C.

Question 14

IRC section 432(b)(3)(A) requires an actuarial certification of the critical or endangered status of a multiemployer plan for the plan year no later than the 90th day of the year. For the 2023 year, that date is 3/31/2023.

IRC section 432(b)(3)(A) requires that a rehabilitation plan be adopted no later than 240 days after the due date for the certification that the plan is in critical status. For the 2023 year, that date is 11/26/2023. (Note that the actual certification date was early, 3/15/2023, but the adoption date of the rehabilitation plan is 240 days after the due date for certification, not the actual certification date.)

The actual date that the rehabilitation plan was adopted was 11/30/2023, so it was adopted 4 days late.

IRC section 4971(g)(4)(B) provides an excise tax of \$1,100 per day that the adoption date of the rehabilitation plan is late. The excise tax is:

$$\$1,100 \times 4 = \$4,400$$

The statement is false.

Answer is B.

Question 15

IRC section 404(a)(1)(D) states that the assets used to determine the unfunded current liability is the asset value used for purposes of determining the minimum required contribution under IRC section 431(c)(2). This is the actuarial value of assets, not the market value of assets. The statement is false.

Answer is B.

Question 16

IRC section 432(c)(3)(A)(i) requires that for a plan in endangered status, the plan's funded percentage by the end of the funding improvement period must be equal to the funded percentage as of the beginning of the first plan year that the plan is in endangered status, plus 33% of the difference between 100% and the first year funded percentage. Note that the funded percentage is defined in IRC section 432(j)(2) as the ratio of the actuarial value of assets to the unit credit accrued liability (regardless of the cost method being used to determine the minimum required contribution). The funded percentage for this plan as of 1/1/2023, the first year that it is in endangered status, is:

$$\text{Funded percentage} = \$660,000/\$1,000,000 = 66\%$$

$$X\% = 66\% + 33\% \times (100 - 66) = 77.22\%$$

Answer is D.

Question 17

- I. IRC section 430(i)(1)(B)(i) states that for plans that are at-risk, there is a funding assumption that requires that any active participant eligible to retire in the current year or any of the following 10 years must be assumed to retire at the earliest retirement date, but not before the end of the current year. In this question, all active participants who have reached early retirement eligibility as of 1/1/2023 must be assumed to retire on 12/31/2023, not 1/1/2023. The statement is false.
- II. IRC section 430(i)(1)(B)(ii) states that for plans that are at-risk, there is a funding assumption that requires that it is assumed that all participants will elect the form of benefit that would provide the highest present value of benefits. If a plan has a lump sum option that provides a present value greater than any other optional form, then the lump sum option must be assumed. The statement is false.
- III. The form of benefit assumption required by IRC section 430(i)(1)(B)(ii) has nothing to do with the timing of a participant's retirement. The most valuable form of benefit must be assumed for all participants, not necessarily the normal form, when a plan is currently at-risk. The statement is false.

Answer is A.

Question 18

In a cash balance plan, the funding target is equal to the present value of the projected hypothetical account balance, using the funding segment rates. The portion of the funding target attributable to the death benefit payable if Smith died at age 64 is equal to the death benefit payable at age 64 (attributable to past service prior to 1/1/2023), multiplied by the probability of death occurring at age 64, discounted to Smith's current age of 58 on 1/1/2023.

The death benefit payable at age 64 is equal to the hypothetical account balance as of 1/1/2023, accumulated for 6 years to age 64, using the plan's interest crediting rate of 3% per year.

$$\text{Projected hypothetical account balance} = \$500,000 \times 1.03^6 = \$597,026$$

Smith is 6 years from age 64, so the lump sum death benefit would be paid at a time when the segment 2 interest rate would apply (payments made within a period of 6 to 20 years from the valuation date). So the interest discount for purposes of the funding target would be based upon the segment 2 interest rate of 6%.

$$\text{Discounted death benefit at age 58} = \$597,026 \div 1.06^6 = \$420,880$$

This must be multiplied by the probability that Smith dies at age 64.

$$\$X = \$420,880 \times {}_6p_{58} \times q_{64} = \$420,880 \times 0.977 \times 0.006 = \$2,467$$

Answer is C.

Question 19

Smith is age 60 as of 1/1/2023, with 23 years of service, qualifying for the disability benefit. The annuity that Smith actually receives begins on 1/1/2023. The funding target for Smith is equal to the value of the annuity as of 1/1/2023. In order to value an annuity with payments beginning on the valuation date, the segment 1 interest rate of 5% is used to discount payments made during the first 5 years (from age 60 to 65), the segment 2 interest rate of 6% is used to discount payments made during years 6 through 20 (from age 65 through age 80), and the segment 3 interest rate of 7% is used to discount payments at age 80 and later. The commutation functions used are found in the tables of supplementary factors provided with the examination, for a male participant using 5%, 6% and 7% interest.

$$\begin{aligned}\text{Correct funding target} &= \$833.33 \times 12 \times \left[\frac{N_{60@5\%}^{(12)} - N_{65@5\%}^{(12)}}{D_{60@5\%}} + \frac{N_{65@6\%}^{(12)} - N_{80@6\%}^{(12)}}{D_{60@6\%}} + \frac{N_{80@7\%}^{(12)}}{D_{60@7\%}} \right] \\ &= \$9,999.96 \times \left[\frac{681,130 - 462,019}{50,097} + \frac{229,326 - 42,670}{28,367} + \frac{19,193}{16,149} \right] = \$121,422\end{aligned}$$

$$\text{\$X} = \$121,422 - \$105,000 = \$16,422$$

Answer is B.

Question 20

- I. Revenue Procedure 2017-56, section 3.01, allows automatic approval for the asset method to be changed from the average of adjusted fair market value to fair market value, provided that the asset method has not been changed in any of the previous 4 years. The change is granted automatic approval.
- II. Revenue Procedure 2017-56, section 3.02, allows automatic approval for the valuation date to be changed to the first day of the plan year, provided that the valuation date has not been changed in any of the previous 4 years. The change is granted automatic approval.
- III. Treasury regulation 1.430(h)(2)-1(e) allows a change to the full corporate bond yield curve without requesting IRS approval, at any time. This is also illustrated in Revenue Procedure 2017-57, section 3.02(d), example 1. The change is granted automatic approval.

Answer is D.

Question 21

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 a 5-year smoothing period.

The adjustment to the 1/1/2023 market value of assets is equal to $\frac{4}{5}$ of the gain/loss during 2022, plus/minus $\frac{3}{5}$ of the gain/loss during 2021, plus/minus $\frac{2}{5}$ of the gain/loss during 2020, plus/minus $\frac{1}{5}$ of the gain/loss during 2019. Losses are added, and gains are subtracted.

The asset gain/loss has been provided for 2019 through 2021, but not 2022. The asset gain/loss for 2022 is equal to the difference between the actual market value of assets as of 1/1/2023 (\$245,000) and the expected value of assets. The expected value is determined by calculating the expected 2022 earnings using the valuation interest rate of 7%. Note that the benefit payments paid on 7/1/2022 receive 6 months of expected earnings (simple or compound interest can be used – simple interest is used in this solution), and the contribution for 2022 deposited on 4/1/2022 receives 9 months of expected earnings.

$$\begin{aligned} \text{Expected AVA}_{1/1/2023} \\ = (\$208,000 \times 1.07) + (\$25,000 \times 1.0525) - (\$27,000 \times 1.035) = \$220,928 \end{aligned}$$

The actual assets as of 1/1/2023 are \$245,000, so there is a 2022 asset gain of \$24,072 (\$245,000 – \$220,928).

Under Revenue Procedure 2000-40, 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.

$$\begin{aligned} \text{AVA}_{1/1/2023} &= \$245,000 - (\frac{4}{5} \times \$24,072) - (\frac{3}{5} \times \$35,000) - (\frac{2}{5} \times \$20,000) + (\frac{1}{5} \times \$15,000) \\ &= \$199,742, \text{ but not less than } \$196,000 (\$245,000 \times 80\%) \end{aligned}$$

The actuarial value of assets as of 1/1/2023 is \$199,742.

Answer is B.

Question 22

IRC sections 430(i)(4) and 430(i)(6) provide that a plan is considered to be at-risk if:

- (1) The funding target attainment percentage (determined without using the additional at-risk funding assumptions) for the prior year is less than 80%,
- (2) The funding target attainment percentage (determined using the additional at-risk funding assumptions) for the prior year is less than 70%, and
- (3) The plan had more than 500 participants on at least one day of the prior year.

Condition (3) is satisfied as each of the plans has always had more than 600 participants.

Each of the plans must satisfy both conditions (1) and (2) in order to be at-risk for 2024.

Plan I: Without the additional at-risk funding assumptions:

$$\text{FTAP} = (\$972,000 - \$50,000)/\$1,200,000 = 76.83\% \quad \rightarrow \quad \text{Condition (1) is satisfied.}$$

With the additional at-risk funding assumptions:

$$\text{FTAP} = (\$972,000 - \$50,000)/\$1,325,000 = 69.58\% \quad \rightarrow \quad \text{Condition (2) is satisfied.}$$

Plan I is at-risk for 2024.

Plan II: Without the additional at-risk funding assumptions:

$$\text{FTAP} = \$1,300,000/\$1,600,000 = 81.25\% \quad \rightarrow \quad \text{Condition (1) is not satisfied.}$$

Plan II is not at-risk for 2024.

Plan III: Without the additional at-risk funding assumptions:

$$\text{FTAP} = (\$1,700,000 - \$100,000)/\$2,100,000 = 76.19\% \quad \rightarrow \quad \text{Condition (1) is satisfied.}$$

With the additional at-risk funding assumptions:

$$\text{FTAP} = (\$1,700,000 - \$100,000)/\$2,200,000 = 72.73\% \quad \rightarrow \quad \text{Condition (2) is not satisfied.}$$

Plan III is not at-risk for 2024.

Answer is B.

Question 23

Treasury regulation 1.430(d)-1(c)(1)(ii) provides that for purposes of the funding target, when a death benefit is not based on the actual benefit accruals or credited years of service, then it must be pro-rated based upon the ratio of years of service to date (as of the valuation date) to years of service at the age the death benefit would be paid.

In this question, Smith has 12 years of service as of the valuation date of 1/1/2023, and would have 22 years of service at age 60. The portion of the death benefit taken into account for the mortality decrement at age 60 is equal to \$10,000 multiplied by $12/22$ (not $12/27$).

The statement is false.

Answer is B.

Question 24

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. It is given that the plan is not at-risk.

$$\text{Cushion amount} = (50\% \times \$258,000) + (\$279,400 - \$258,000) = \$150,400$$

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

$$\$8,900 + \$258,000 + \$150,400 - \$269,800 = \$147,500$$

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:

$$\$11,100 + \$309,600 - \$269,800 = \$50,900$$

The deductible limit is the larger of the IRC section 404(o)(2)(A) and 404(o)(2)(B) limits, which is \$147,500.

Answer is C.

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 \$147,500 is increased using the 5.5% effective interest rate to 12/31/2023, the result is \$155,613. This is in the same answer range. Also note that the minimum required contribution of \$0 is provided. If the minimum required contribution is larger than the otherwise deductible limit, then the minimum required contribution could be deducted. That is not the case in this question.

Answer is C.

Question 25

IRC section 431(b)(6) provides that all funding standard account items, including the credit balance, be credited with interest to the end of the plan year using the valuation interest rate, not the actual investment return rate for the year.

The statement is false.

Answer is B.

Question 26

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 a 5-year smoothing period.

The adjustment to the 1/1/2023 market value of assets is equal to $\frac{4}{5}$ of the gain/loss during 2022, plus/minus $\frac{3}{5}$ of the gain/loss during 2021, plus/minus $\frac{2}{5}$ of the gain/loss during 2020, plus/minus $\frac{1}{5}$ of the gain/loss during 2019. Losses are added, and gains are subtracted. The asset gain/loss has been provided for each year.

Under Revenue Procedure 2000-40, 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.

$$\begin{aligned} \text{AVA}_{1/1/2023} &= \$2,400,000 - (\frac{4}{5} \times \$462,500) + (\frac{3}{5} \times \$80,000) - (\frac{2}{5} \times \$450,000) - (\frac{1}{5} \times \$181,250) \\ &= \$1,861,750, \text{ but not less than } \$1,920,000 (\$2,400,000 \times 80\%) \end{aligned}$$

The actuarial value of assets as of 1/1/2023 is \$1,920,000.

Answer is B.

Question 27

The funding target is equal to the present value of the benefit accrued as of the first day of the plan year. The accrued benefit is calculated using only past salary history – salary cannot be projected with the assumed salary increases for this purpose.

$$1/1/2023 \text{ accrued benefit: } 2\% \times \$60,000 \times 10 \text{ years of service} = \$12,000$$

The annuity start date is at age 65 (assumed retirement age based upon exam general conditions), 5 years from now (technically the first day of the sixth year from the current year). The segment 2 interest rate of 6% is used to discount payments made from age 65 to age 80 (the 6th through 20th years from now), and the segment 3 interest rate of 7% is used to discount payments made from age 80 on. There are no assumed pre-retirement decrements (general exam conditions). The commutation functions used are found in the tables of supplementary factors provided with the examination, for a male participant using 6% and 7% interest.

$$\begin{aligned} 1/1/2023 \text{ funding target} &= \$12,000 \times \left[\frac{N_{65@6\%}^{(12)} - N_{80@6\%}^{(12)}}{D_{65@6\%}} v_{6\%}^5 + \frac{N_{80@7\%}^{(12)}}{D_{65@7\%}} v_{7\%}^5 \right] \\ &= \$12,000 \times \left[\frac{229,326 - 42,670}{20,406} (0.747258) + \frac{19,193}{11,084} (0.712986) \right] \\ &= \$96,838 \end{aligned}$$

Answer is B.

Question 28

In a cash balance plan, the funding target is equal to the present value of the projected hypothetical account balance, using the funding segment rates. The given hypothetical account balance for Smith must be projected to age 65 (the assumed normal retirement age under the general conditions of the exam), using the plan's interest crediting rate of 5.50% per year. Smith is age 62 on 1/1/2023, so the hypothetical account balance must be accumulated for 3 years.

$$\text{Projected hypothetical account balance} = \$575,000 \times 1.055^3 = \$675,189$$

The assumed form of benefit is a lump sum. Smith is 3 years from age 65, so the lump sum would be paid at a time when the segment 1 interest rate of 5% would apply (payments made within 5 years from the valuation date).

$$\text{Funding target} = \$675,189 \times v_{5\%}^3 = \$583,253$$

Answer is D.

Question 29

Treasury regulation 1.430(f)-1(f)(2)(i) provides that elections to add to the prefunding balance must be made by the minimum funding due date for the plan year for which the addition is an excess contribution. In this question, the excess contribution is for the 2023 plan year (to be added to the prefunding balance on 1/1/2024). The minimum funding due date for the 2023 plan year is 8½ months after the end of the plan year, which is 9/15/2024 (not 10/15/2024, the extended form 5500 due date).

The statement is false.

Answer is B.

Question 30

The unpaid minimum required contribution for 2023 is equal to the minimum required contribution, reduced by the discounted contribution (discounted using the plan effective rate of 6%) and further reduced by the prefunding balance (the general conditions of the exam state that it is assumed that the prefunding balance is applied to help to pay for the minimum required contribution, if needed).

Unpaid minimum required contribution = $\$120,000 - (\$120,000/1.06) - \$3,500 = \$3,292$

IRC section 4971(a)(1) provides that there is a 10% excise tax on the unpaid minimum required contribution.

$\$X = 10\% \times \$3,292 = \$329$

Answer is B.

Question 31

Page 29 of the SOA Study Note “Assessment and Selection of Actuarial Assumptions” provides general considerations with regard to plan provisions that could have an effect on the choice of actuarial assumptions. Included in this list is consideration of the forms of payment of retirement benefits and the basis for optional forms of payment.

Adding an early retirement subsidy falls within the optional forms of payment category, and would, therefore, require a review of the retirement rate assumption for the 2023 plan year.

The statement is true.

Answer is A.

Question 32

The funding shortfall is the excess of the funding target over the actuarial value of assets (reduced by the funding balances – note that there are no funding balances in this question).

$$\text{Funding shortfall}_{1/1/2022} = \$1,500,000 - \$1,300,000 = \$200,000$$

Quarterly contributions are required for the 2023 plan year in this question because there was a funding shortfall in 2022.

The amount of the quarterly contribution under IRC section 430(j)(3)(D) is equal to 25% of the smaller of 90% of the minimum required contribution for the current year or 100% of the minimum required contribution for the preceding year. These amounts must be determined based upon the given data.

For 2022 there is a fresh start on the shortfall amortization bases, and all prior bases are deemed to be fully amortized, due to a change to IRC section 430(c) under the American Rescue Plan Act of 2021. The 2022 funding shortfall is amortized over a period of 15 years, using the given amortization factor.

The minimum required contribution as of the first day of the plan year is equal to the sum of the target normal cost and the shortfall amortization charge.

$$\text{Minimum required contribution for 2022: } \$275,000 + (\$200,000/10.3758) = \$294,276$$

$$\text{Funding shortfall}_{1/1/2023} = \$1,875,000 - \$1,900,000 = \$0$$

When the funding shortfall is \$0, there is no new shortfall amortization base. In addition, all prior shortfall amortization bases are considered to be fully amortized. See IRC section 430(c)(6). The excess of the actuarial value of assets (reduced by the funding balances) over the funding target is used to reduce the target normal cost. See IRC section 430(a)(2).

$$\text{Minimum required contribution for 2023: } \$300,000 - (\$1,900,000 - \$1,875,000) = \$275,000$$

$$90\% \text{ of 2023 minimum required contribution} = 90\% \times \$275,000 = \$247,500$$

The smaller of the 2022 minimum required contribution or 90% of the 2023 minimum required contribution is \$247,500 (90% of the 2023 minimum required contribution).

$$\text{\$X} = 25\% \times \$247,500 = \$61,875$$

Answer is B.

Question 33

IRC section 412(c)(1)(A) allows a waiver of minimum funding no more often than 3 times within any 15 year period for single employer plans. In this question, waivers have been approved in 2009, 2010, and 2020. The years 2009 through 2023 is a 15-year period, so no waiver can be granted in 2023.

The statement is false.

Answer is B.

Question 34

The 2023 AFTAP is certified after the valuation date. Treasury regulation 1.430(d)-1(c)(1)(iii)(A) states that for purposes of determining the funding target and target normal cost, anticipated funding based limits on unpredictable contingent event benefits expected to occur on or after the valuation date cannot be taken into account. As a result, the 2023 AFTAP certified as 58% cannot be taken into account for the 1/1/2023 valuation. The 5% probability of an unpredictable contingent event occurring during the year must be assumed.

The statement is false.

Answer is B.

Note: IRC section 436(b)(1) provides that an unpredictable contingent event benefit cannot be paid if the AFTAP is less than 60%. The 2023 certified AFTAP of 58% would prevent that payment if the event occurred on or after the certification date of 2/15/2023 during 2023. However, on the 1/1/2023 valuation date, what is important is the presumed AFTAP as of that date. For purposes of this question, it must be assumed that the prior year AFTAP was certified as being greater than or equal to 60%.

Question 35

The funding target is equal to the present value of the accrued benefit as of the first day of the plan year. Smith is age 40 on 1/1/2022, with 8 years of service.

Compensation must be limited to the IRC section 401(a)(17) limit (listed in a table provided with the exam) for each year before averaging. The 2018 compensation of \$250,000 is not limited as it is below the IRC section 401(a)(17) compensation limit of \$275,000; the 2019 compensation of \$275,000 is not limited as it is below the IRC section 401(a)(17) compensation limit of \$280,000; the 2020 compensation of \$300,000 is limited to the IRC section 401(a)(17) compensation limit of \$285,000. The 2021 compensation is much smaller than the previous 3 years and is not part of the high consecutive 3-year average.

$$1/1/2022 \text{ accrued benefit} = 6\% \times \frac{250,000 + 275,000 + 285,000}{3} \times 8 \text{ years of service} = \$129,600$$

The limitation of IRC section 415(b) must be considered with regard to the accrued benefit. Smith entered the plan on 1/1/2018 and has 4 years of plan participation as of 1/1/2022. The IRC section 415(b) dollar limit for 2022 is \$245,000 (this can be found in a table provided with the exam). This is reduced when years of plan participation are less than 10, as is the case for Smith.

$$1/1/2022 \text{ IRC section 415(b) dollar limit} = \frac{4}{10} \times \$245,000 = \$98,000$$

The IRC section 415(b) percent of salary limit is equal to 100% of the high consecutive 3-year average salary, reduced when years of service are less than 10. Smith has 8 years of service as of 1/1/2022.

$$1/1/2022 \text{ IRC section 415(b) percent of salary limit} = \frac{8}{10} \times \frac{250,000 + 275,000 + 285,000}{3} = \$216,000$$

The overall 415(b) limit is equal to the smaller of the dollar limit and the percent of salary limit. This is \$98,000. The accrued benefit as of 1/1/2022 under the plan benefit formula must be limited to \$98,000 for purposes of the determination of the funding target.

For purposes of determining the present value, the commutation functions used are found in the tables of supplementary factors provided with the examination, for a male participant using 7% interest (since Smith is more than 20 years from the assumed retirement age of 65, the segment 3 interest rate is used). Note that there are no assumed pre-retirement decrements, age 65 is the assumed retirement age, and the assumed form of benefit is a life annuity (all due to the exam general conditions).

$$\begin{aligned} \$X = \text{Funding target} &= \$98,000 \times \ddot{a}_{65}^{(12)} \times v_{7\%}^{25} = \$98,000 \times \frac{N_{65}^{(12)}}{D_{65}} \times 0.184249 \\ &= \$98,000 \times \frac{115,065}{11,084} \times 0.184249 = \$187,447 \end{aligned}$$

Answer is A.

Question 36

Under the projected unit credit cost method, the accrued liability is equal to the present value of the beginning of the year accrued benefit (using projected salary).

Smith is age 58 as of 1/1/2023, and the assumed retirement age is 65 (general conditions of the exam). The final 3-year average compensation, projected with the 3% per year assumed salary increases, is:

$$\$75,000 \times \frac{1.03^5 + 1.03^6 + 1.03^7}{3} = \frac{\$86,946 + \$89,554 + \$92,241}{3} = \$89,580$$

The salary for each year cannot exceed the IRC section 401(a)(17) salary limit. The 2023 salary limit is not given in the question, but the 2022 limit in the table provided with the exam is \$305,000. None of the projected salaries are anywhere close to that, so clearly the salaries for Smith will not exceed the IRC section 401(a)(17) salary limit in any year.

Smith has 36 years of service as of 1/1/2023. The benefit formula uses a maximum of 35 years of service, so the accrued benefit must limit the years of service to 35.

$$1/1/2023 \text{ "projected" accrued benefit} = 2\% \times \$89,580 \times 35 \text{ years of service} = \$62,706$$

For purposes of determining the accrued liability, the commutation functions used are found in the tables of supplementary factors provided with the examination, for a male participant using 7% interest. Note that the normal form of benefit is assumed to be a life annuity, per the exam general conditions. The general conditions also provide that unless otherwise stated, there are no assumed pre-retirement decrements.

$$\begin{aligned} \$X = 1/1/2023 \text{ accrued liability} &= \$62,706 \times \frac{N_{65}^{(12)}}{D_{65}} \div 1.07^7 \\ &= \$62,706 \times \frac{115,065}{11,084} \times 0.622750 \\ &= \$405,387 \end{aligned}$$

Answer is B.

Question 37

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 (originally age 65 in this question, and changed to age 62 for the 1/1/2023 valuation).

Smith was hired at age 40 and is age 60 as of the valuation date, and will have 25 years of service at the old assumed retirement of 65, 22 years at the new assumed retirement age of 70.

First, the accrued liability must be determined using the old assumed retirement age of 65.

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. Note that the retirement benefit is payable annually (not monthly) at the beginning of the year.

$$\begin{aligned} PVFB_{40} &= \$600 \times 25 \text{ years of service} \times \ddot{a}_{65} \times \frac{D_{65}}{D_{40}} = \$15,000 \times \frac{N_{65}}{D_{65}} \times \frac{D_{65}}{D_{40}} \\ &= \$15,000 \times \frac{N_{65}}{D_{40}} = \$15,000 \times \frac{130,212}{66,495} = \$29,373 \end{aligned}$$

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

$$NC_{ra=65} = PVFB_{40} / \ddot{a}_{40:\overline{25}|} = \$29,373 / \left(\frac{N_{40} - N_{65}}{D_{40}} \right) = \$29,373 / \left(\frac{950,513 - 130,212}{66,495} \right) = \$2,381$$

The accrued liability is equal to the accumulation of the past normal costs through Smith's current age on 1/1/2023 (20 years of accumulation from age 40 to 60).

$$AL_{ra=65} = NC_{ra=65} \times \ddot{s}_{40:\overline{20}|} = \$2,381 \times \left(\frac{N_{40} - N_{60}}{D_{60}} \right) = \$2,381 \times \left(\frac{950,513 - 202,205}{16,563} \right) = \$107,572$$

Next, the accrued liability must be determined using the new assumed retirement age of 62. Note that Smith will now have 22 years of service at the assumed retirement age.

$$\begin{aligned} PVFB_{40} &= \$600 \times 22 \text{ years of service} \times \ddot{a}_{62} \times \frac{D_{62}}{D_{40}} = \$13,200 \times \frac{N_{62}}{D_{62}} \times \frac{D_{62}}{D_{40}} \\ &= \$13,200 \times \frac{N_{62}}{D_{40}} = \$13,200 \times \frac{170,232}{66,495} = \$33,793 \end{aligned}$$

$$NC_{ra=62} = PVFB_{40} / \ddot{a}_{40:\overline{22}|} = \$33,793 / \left(\frac{N_{40} - N_{62}}{D_{40}} \right) = \$33,793 / \left(\frac{950,513 - 170,232}{66,495} \right) = \$2,880$$

$$AL_{ra=62} = NC_{ra=62} \times \ddot{s}_{40:\overline{20}|} = \$2,880 \times \left(\frac{N_{40} - N_{60}}{D_{60}} \right) = \$2,880 \times \left(\frac{950,513 - 202,205}{16,563} \right) = \$130,117$$

The increase in the accrued liability due to the change in the assumed retirement age is:

$$\$X = \$130,117 - \$107,572 = \$22,545$$

Answer is C.

Question 38

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 target normal cost is equal to the present value of benefits expected to accrue during the plan year, plus administrative expenses expected to be paid by the plan, less the present value of mandatory employee contributions expected to be paid during the year (IRC section 430(b)(1)).

$$\text{Target normal cost}_{1/1/2023} = \$5,000 + \$200 - \$300 = \$4,900$$

The funding shortfall is the excess of the funding target over the actuarial value of assets (reduced by the funding balances – none in this question).

$$\text{Funding shortfall}_{1/1/2023} = \$20,000 - \$15,000 = \$5,000$$

The 2023 shortfall amortization base is equal to the funding shortfall less the sum of the outstanding balances of the prior shortfall bases and waived deficiency bases. There are no shortfall bases established before 2023, and there are no prior waived deficiencies (exam general conditions). The 2023 funding shortfall is amortized over a period of 15 years. The factor can be found in the table of selected amortization factors (for the segment rates 5%, 6%, 7%), provided with the exam.

$$\text{Amortization of 2023 funding shortfall} = \$5,000/10.3758 = \$482$$

$$2023 \text{ minimum required contribution} = \$4,900 + \$482 = \$5,382$$

Answer is B.

Question 39

The target normal cost is equal to the present value of the increase in the benefit accrual for the year. The accrued benefit must be determined on each of 1/1/2023 and 12/31/2023 for Smith. For 2023, the assumed salary increase of 5% is applied to the 2022 salary to determine an expected 2023 salary.

$$\text{Final 3-year average salary as of 1/1/2023} = \frac{\$105,000 + \$135,000 + \$155,000}{3} = \$131,667$$

$$\text{Final 3-year average salary as of 12/31/2023} = \frac{\$135,000 + \$155,000 + (\$155,000 \times 1.05)}{3} = \$150,917$$

Smith has 6 years of service as of 1/1/2023, and 7 years of service as of 12/31/2023.

$$\text{Accrued benefit as of 1/1/2023} = 8\% \times \$131,667 \times 6 \text{ years of service} = \$63,200$$

$$\text{Accrued benefit as of 12/31/2023} = 8\% \times \$150,917 \times 7 \text{ years of service} = \$84,514$$

$$\text{Increase in 2023 accrued benefit} = \$84,514 - \$63,200 = \$21,314$$

Smith is age 44 as of 1/1/2023, 21 years from the normal retirement age of 65 (per the general conditions of the exam), so the segment 1 interest rate of 5% and the segment 2 interest rate of 6% are not used. The segment 3 interest rate of 7% is used to discount benefits paid at age 65 and later (payments made more than 20 years from the valuation date). 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 (the general conditions for the exam state that there are no preretirement decrements). The commutation functions used are found in the tables of supplementary factors provided with the examination, for a male participant using 7% interest.

$$\begin{aligned} \text{Target normal cost (5\% salary increase)} &= \$21,314 \times \left[\frac{N_{65@7\%}^{(12)}}{D_{65@7\%}} v_{7\%}^{21} \right] \\ &= \$21,314 \times \left[\frac{115,065}{11,084} (0.241513) \right] = \$53,438 \end{aligned}$$

If the 2022 assumed rate of compensation increases (10%) had continued to be used in 2023, then the final 3-year average salary as of 12/31/2023 would have been higher. Using 10%:

$$\text{Final 3-year average salary as of 12/31/2023} = \frac{\$135,000 + \$155,000 + (\$155,000 \times 1.1)}{3} = \$153,500$$

$$\text{Accrued benefit as of 12/31/2023} = 8\% \times \$153,500 \times 7 \text{ years of service} = \$85,960$$

$$\text{Increase in 2023 accrued benefit} = \$85,960 - \$63,200 = \$22,760$$

$$\begin{aligned} \text{Target normal cost (10\% salary increase)} &= \$22,760 \times \left[\frac{N_{65@7\%}^{(12)}}{D_{65@7\%}} v_{7\%}^{21} \right] \\ &= \$22,760 \times \left[\frac{115,065}{11,084} (0.241513) \right] = \$57,064 \end{aligned}$$

$$\$X = \$57,064 - \$53,438 = \$3,626$$

Answer is D.

Note: With such a large benefit formula, the IRC section 415(b) limit should be considered as possibly limiting the beginning and/or end of year accrued benefits. The percentage of compensation limit would not apply as it is phased in at the rate of 10% per year, and the benefit formula is only 8% of the 3-year average salary.

The dollar limit for 2023 is not provided in this question, so there is not enough information to determine whether the dollar limit applies. Note that the general conditions state that the 415 limits do not apply unless there is sufficient information to apply the limits, so the dollar limit can be ignored (note that the given years of plan participation would have been important in determining the dollar limit).

Based upon the information provided, it can be assumed that the IRC section 415(b) limit does not apply in this question.

Question 40

The 5-year extension of the amortization period under IRC section 431(d) for bases established on or before 1/1/2023 requires a reamortization of the outstanding balance of the bases as of 1/1/2023, with an additional 5 years added to the remaining period. Note that the 2022 experience loss is established on 1/1/2023 and would also be included because the extension applies to eligible bases created on or before 1/1/2023, and this base was created on 1/1/2023. The extension only applies to charge bases, so the given experience gain base (a credit base) is not affected.

Note that the bases that cannot be extended will have the same amortizations and therefore balance out (there will be no change in the minimum required contribution with regard to these bases). It is only necessary to look at the two bases that are extended, the combined charge base and the experience loss base (with 13 years remaining before the extension), as well as the new experience loss base. The difference in their amortizations before and after the extension will be the answer to this question.

Combined charge base

$$\text{Amortization as of 1/1/2023 (before extension)} = \frac{\$9,000,000}{\ddot{a}_{\overline{7}|}} = \$1,560,728$$

$$\text{New amortization as of 1/1/2023} = \frac{\$9,000,000}{\ddot{a}_{\overline{12}|}} = \$1,058,989$$

Prior experience Loss

$$\text{Amortization as of 1/1/2023} = \frac{\$700,000}{\ddot{a}_{\overline{13}|}} = \$78,276$$

$$\text{New amortization as of 1/1/2023} = \frac{\$700,000}{\ddot{a}_{\overline{18}|}} = \$65,036$$

New experience Loss

$$\text{Amortization as of 1/1/2023} = \frac{\$725,000}{\ddot{a}_{\overline{15}|}} = \$74,394$$

$$\text{New amortization as of 1/1/2023} = \frac{\$725,000}{\ddot{a}_{\overline{20}|}} = \$63,958$$

$$\$X = [(\$1,560,728 - \$1,058,989) + (\$78,276 - \$65,036) + (\$74,394 - \$63,958)] \times 1.07 = \$562,194$$

Answer is D.

Question 41

IRC section 430(h)(1) and ERISA regulation 901.20(e)(1)(i) require that the non-prescribed actuarial assumptions used in a valuation be reasonable individually and in combination. It would be necessary in each valuation for the actuary to determine whether the non-prescribed assumptions continue to be reasonable. The statement is true.

Answer is A.

Question 42

IRC section 430(i)(1)(A) provides that in an at-risk plan, the funding target is equal to the funding target determined using the at-risk assumptions.

IRC section 430(i)(1)(C) provides for a load of the funding target in an at-risk plan when the plan was at risk in at least two of the past four prior years. The four years prior to 2023 are 2019 through 2022. The plan was at-risk in 2021 and 2022, so there is a loading factor to apply in 2023.

The load is equal to 4% of the not at-risk funding target, plus \$700 per plan participant.

$$\text{Load} = (4\% \times \$3,250,000) + (\$700 \times 570) = \$529,000$$

$$\text{At-risk funding target with load} = \$3,737,500 + \$529,000 = \$4,266,500$$

IRC section 430(i)(5) provides for a transition to the at-risk year when a plan was not at-risk in any of the 4 prior years. The plan was last not at-risk in 2020, so for 2023 (the third consecutive year that the plan is at-risk), the funding target is equal to 60% of the at-risk funding target (with load) plus 40% of the not at-risk funding target.

$$\$X = (\$4,266,500 \times 60\%) + (\$3,250,000 \times 40\%) = \$3,859,900$$

Answer is D.

Question 43

Revenue Procedure 2017-56 provides automatic approval to switch to a first day valuation, but not to a last day valuation, unless the plan has terminated, which it has not in this question. The statement is false.

Answer is B.

Question 44

The target normal cost is equal to the present value of the increase in the benefit accrual for the year. The accrued benefit must be determined on each of 1/1/2023 and 12/31/2023 for Smith. For 2023, the assumed salary increase of 10% is applied to the 2022 salary to determine an expected 2023 salary.

The final 3-year average salary for Smith is \$200,000, as that was Smith's salary in each year prior to 2023.

$$\text{Final 3-year average salary as of 12/31/2023} = \frac{\$200,000 + \$200,000 + (\$200,000 \times 1.1)}{3} = \$206,667$$

Smith has 4 years of service as of 1/1/2023, and 5 years of service as of 12/31/2023.

$$\text{Accrued benefit as of 1/1/2023} = 3.5\% \times \$200,000 \times 4 \text{ years of service} = \$28,000$$

$$\text{Accrued benefit as of 12/31/2023} = 3.5\% \times \$206,667 \times 5 \text{ years of service} = \$36,167$$

$$\text{Increase in 2023 accrued benefit} = \$36,167 - \$28,000 = \$8,167$$

Smith is age 55 as of 1/1/2023, 10 years from the normal retirement age of 65 (per the general conditions of the exam), so the segment 1 interest rate of 5% is not used. The segment 2 interest rate of 6% is used to discount benefits paid between ages 65 and 75 (payments made within 6 to 20 years after the valuation date). The segment 3 interest rate of 7% is used to discount benefits paid at age 75 and later (payments made more than 20 years from the valuation date). 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 other than the termination decrement, which will be dealt with later in this solution (the general conditions for the exam state that there are no preretirement decrements other than any specified in the question). The commutation functions used are found in the tables of supplementary factors provided with the examination, for a male participant using 6% and 7% interest. Without regard to the termination assumption:

$$\begin{aligned} \text{Target normal cost} &= \$8,167 \times \left[\frac{N_{65@6\%}^{(12)} - N_{75@6\%}^{(12)}}{D_{65@6\%}} v_{6\%}^{10} + \frac{N_{75@7\%}^{(12)}}{D_{65@7\%}} v_{7\%}^{10} \right] \\ &= \$8,167 \times \left[\frac{229,326 - 82,576}{20,406} (0.558395) + \frac{38,515}{11,084} (0.508349) \right] = \$47,223 \end{aligned}$$

Finally, the termination assumption must be taken into account. If Smith terminates on 1/1/2023 (for which there is an assumed 2.5% probability), then there would be no target normal cost for Smith as there would be no 2023 benefit accrual. There is a 97.5% probability that Smith does not terminate on 1/1/2023 (100% - 2.5%), in which case, since terminations are assumed to occur on the first day of the year, Smith would accrue a benefit in 2023.

$$\text{\$X} = \text{Target normal cost (including termination assumption)} = \$47,223 \times 0.975 = \$46,042$$

Answer is C.

Question 45

The funding target is equal to the present value of the benefit accrued as of the first day of the year. Smith is age 50 on 1/1/2023 with a monthly accrued benefit of \$1,500.

For purposes of the assumed early retirement age of 60, the accrued benefit is reduced actuarially from age 65 to age 60. Note that pre-retirement mortality is used in this question, so the actuarially reduced accrued benefit can be determined using a ratio of the “N” commutation functions.

$$\begin{aligned} \text{1/1/2023 monthly accrued benefit payable at age 60} &= \$1,500 \times \frac{N_{65@5.5\%}^{(12)}}{N_{60@5.5\%}^{(12)}} \\ &= \$1,500 \times \frac{270,947}{427,362} = \$951 \end{aligned}$$

The funding target using the old retirement assumption of age 65 will now be calculated. Smith is 15 years from retirement if retirement occurs at age 65, so the segment 2 interest rate of 6% is used to discount benefits paid between ages 65 and 70 (payments made within 6 to 20 years after the valuation date) and the segment 3 interest rate of 7% is used to discount all benefits paid at age 70 or later. The commutation functions not provided in the body of the question are found in the tables of supplementary factors provided with the examination, for a male participant using 6% and 7% interest. The normal form of benefit is assumed to be a life annuity, per the general conditions of the exam.

$$\begin{aligned} \text{Funding target (age 65 retirement)} &= \$1,500 \times 12 \times \left[\frac{N_{65@6\%}^{(12)} - N_{70@6\%}^{(12)}}{D_{50@6\%}} + \frac{N_{70@7\%}^{(12)}}{D_{50@7\%}} \right] \\ &= \$18,000 \times \left[\frac{229,326 - 142,755}{53,069} + \frac{69,043}{33,185} \right] = \$66,813 \end{aligned}$$

If Smith is assumed to retire at age 60, then the segment 2 interest rate of 6% is used to discount benefits paid between ages 60 and 70 (payments made within 6 to 20 years after the valuation date) and the segment 3 interest rate of 7% is used to discount all benefits paid at age 70 or later.

$$\begin{aligned} \text{Funding target (age 60 retirement)} &= \$951 \times 12 \times \left[\frac{N_{60@6\%}^{(12)} - N_{70@6\%}^{(12)}}{D_{50@6\%}} + \frac{N_{70@7\%}^{(12)}}{D_{50@7\%}} \right] \\ &= \$11,412 \times \left[\frac{350,697 - 142,755}{53,069} + \frac{69,043}{33,185} \right] = \$68,459 \end{aligned}$$

With the new assumption that there is a 50% probability of retiring at age 60 (and therefore a 50% probability of retiring at age 65), the funding target based on the new assumptions is:

$$\text{Funding target (new assumptions)} = 50\% \times (\$66,813 + \$68,459) = \$67,636$$

The increase in the funding target due to the change in retirement assumption is:

$$\text{\$X} = \$67,636 - \$66,813 = \$823$$

Answer is C.

Question 46

The minimum required contribution under the Entry Age Normal cost method is equal to the normal cost plus the amortization charges of the various bases less the amortization credits of the various bases. The normal cost, the amortization charges, and the amortization credits have been provided for both 2022 and 2023. The minimum required contribution for a multiemployer plan is always determined as of the last day of the year, so each of these items must be increased with interest at the 7% valuation interest rate.

$$12/31/2022 \text{ minimum required contribution} = \$180,000 \times 1.07 = \$192,600$$

The credit balance as of 12/31/2022 is equal to the excess of the sum of the 12/31/2021 credit balance (which is given to be \$50,000) and the 2022 contribution of \$200,000 (which was contributed on 7/1/2023 and is not credited with interest because it was contributed after the end of the year) over the minimum required contribution.

$$CB_{12/31/2022} = (\$50,000 \times 1.07) + \$200,000 - \$192,600 = \$60,900$$

$$12/31/2023 \text{ minimum required contribution} = (\$185,000 + \$15,000) \times 1.07 = \$214,000$$

The credit balance as of 12/31/2023 is equal to the excess of the sum of the 12/31/2022 credit balance and the 2023 contribution of \$150,000 (which was contributed on 7/1/2023 and is given six months of interest at the valuation interest rate) over the minimum required contribution.

$$\text{\$X} = CB_{12/31/2023} = (\$60,900 \times 1.07) + (\$150,000 \times 1.07^{6/12}) - \$214,000 = \$6,324$$

Answer is B.

Note: The interest given to the contribution for 2023 could also be determined using simple interest instead of compound interest (the regulations do not specify one or the other as being required). Using simple interest, the answer to the question is:

$$\text{\$X} = CB_{12/31/2023} = (\$60,900 \times 1.07) + (\$150,000 \times 1.035) - \$214,000 = \$6,413$$

This is also in answer range B.

Question 47

Treasury regulation 1.430(i)-1(c)(2)(ii)(A) states that the \$700 per participant load for an at-risk plan includes active participants, inactive participants, and beneficiaries. In this question, only the active participants are being used for that purpose. The terminated vested and retired participants must also be included.

The statement is false.

Answer is B.

Question 48

IRC section 404(o)(6) states that the interest rates used to determine deductible limits (including the cushion amount) are the interest rates used for purposes of minimum funding under IRC section 430, but without regard to the interest rate stabilization.

The statement is false.

Answer is B.

Question 49

IRC section 436(f)(3) provides for a required reduction in the funding balances to the extent the reduction would prevent any restriction on accelerated distributions under IRC section 436(d). This plan offers a lump sum option, which is an accelerated form of distribution under IRC section 436(f)(3). Any required reduction in the prefunding balance in this question must be made before doing the 2023 valuation.

The thresholds for preventing a restriction on accelerated distributions are an adjusted funding target attainment percentage (AFTAP) of less than 60% for a full restriction, or less than 80% for a partial restriction.

$$\text{AFTAP}_{1/1/2023} = \frac{\text{Actuarial value of assets} - \text{Funding balances}}{\text{Funding target}} = \frac{\$1,300,000 - \$130,000}{\$1,600,000} = 73.125\%$$

Note that the numerator and denominator technically are each increased by amounts used to purchase annuities during the past two years for NHCEs. There are no purchases of annuities mentioned in this question.

In order to reach the 80% threshold, the numerator of the AFTAP would need to be increased to \$1,280,000 ($\$1,600,000 \times 80\%$). That means that the prefunding balance must be reduced to \$20,000.

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. A new shortfall amortization base must be determined for 2023.

The funding shortfall is the excess of the funding target over the actuarial value of assets (reduced by the funding balances).

$$\text{Funding shortfall}_{1/1/2023} = \$1,600,000 - (\$1,300,000 - \$20,000) = \$320,000$$

A new shortfall amortization base must be created, equal to the 2023 funding shortfall, reduced by the outstanding balance of prior amortization bases. For 2022 there was a fresh start on the shortfall amortization bases, and all prior bases were deemed to be fully amortized, due to a change to IRC section 430(c) under the American Rescue Plan Act of 2021. As a result, the 2022 amortization installment provided in the data for this question is the installment for the shortfall amortization base from 2022. That base was amortized over 15 years. The outstanding balance of the 2022 base as of 1/1/2023 uses a 14-year amortization factor that can be found in the table of selected amortization factors (for the segment rates 5%, 6%, 7%), provided with the exam. Note that it must be assumed that the segment rates were the same in 2022 as they are in 2023.

$$\text{Outstanding balance of 2022 shortfall amortization base} = \$38,000 \times 9.9335 = \$377,473$$

$$\text{2023 shortfall amortization base} = \$320,000 - \$377,473 = (\$57,473)$$

The 2023 funding shortfall is amortized over a period of 15 years.

$$\text{Amortization of 2023 funding shortfall} = (\$57,473)/10.3758 = (\$5,539)$$

The amortization installments from 2022 and 2023 must be combined (note that if the combined installment is less than zero, then it is set to zero).

$$\text{2023 amortization installment} = \$38,000 - \$5,539 = \$32,461$$

$$\text{2023 minimum required contribution} = \$97,000 + \$32,461 = \$129,461$$

The **smallest amount that satisfies the minimum funding standard** on 4/15/2023 (\$X) is equal to the minimum required contribution as of the first day of the year, reduced by the prefunding balance, and then increased with interest using the effective rate of interest for the year.

$$\$X = (\$129,461 - \$20,000) \times 1.0575^{3.5/12} = \$111,261$$

Answer is C.

Question 50

The minimum required contribution under the Entry Age Normal cost method is equal to the normal cost plus the amortization charges of the various bases less the amortization credits of the various bases. The normal cost, the amortization charges, and the amortization credits have been provided for 2023. The minimum required contribution for a multiemployer plan is always determined as of the last day of the year, so each of these items must be increased with interest at the 6% valuation interest rate.

The 2022 experience gain must be amortized over a period of 15 years and included as an amortization credit for 2023.

$$\text{Amortization credit for 2022 experience gain} = \$375,000 / \ddot{a}_{\overline{15}|6\%} = \$36,426$$

$$\begin{aligned} 12/31/2023 \text{ minimum required contribution} &= (\$450,000 + \$50,000 - \$7,000 - \$36,426) \times 1.06 \\ &= \$483,968 \end{aligned}$$

The credit balance as of 12/31/2023 is equal to the excess of the sum of the 12/31/2022 credit balance and the 2023 contribution of \$156,701 (which was contributed on 10/1/2023 and is given three months of interest at the valuation interest rate) over the minimum required contribution.

$$\$X = \text{CB}_{12/31/2023} = (\$600,000 \times 1.06) + (\$156,701 \times 1.06^{3/12}) - \$483,968 = \$311,032$$

Answer is D.

Note: The interest given to the contribution for 2023 could also be determined using simple interest instead of compound interest (the regulations do not specify one or the other as being required). Using simple interest, the answer to the question is:

$$\$X = \text{CB}_{12/31/2023} = (\$600,000 \times 1.06) + (\$156,701 \times 1.015) - \$483,968 = \$311,083$$

This is also in answer range D.

Question 51

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 target normal cost is equal to the present value of benefits expected to accrue during the plan year, plus administrative expenses expected to be paid by the plan, less the present value of mandatory employee contributions expected to be paid during the year (IRC section 430(b)(1)). There are no mandatory contributions in this question.

$$\text{Target normal cost}_{1/1/2023} = \$2,000 + \$500 = \$2,500$$

The funding shortfall is the excess of the funding target over the actuarial value of assets (reduced by the funding balances).

$$\text{Funding shortfall}_{1/1/2023} = \$14,000 - (\$13,000 - \$2,000) = \$3,000$$

The 2023 shortfall base is equal to the funding shortfall less the sum of the outstanding balances of the prior shortfall bases and waived deficiency bases. There are no shortfall bases established before 2023 and there are no prior waived deficiencies (because the amortization charges for bases established before 2023 is given to be \$0). The 2023 funding shortfall is amortized over a period of 15 years. The factor can be found in the table of selected amortization factors (for the segment rates 5%, 6%, 7%), provided with the exam.

$$\text{Amortization of 2023 funding shortfall} = \$3,000/10.3758 = \$289$$

$$\text{2023 minimum required contribution} = \$2,500 + \$289 = \$2,789$$

The **smallest amount that satisfies the minimum funding standard** on 1/1/2023 (\$X) is equal to the minimum required contribution as of the first day of the year, reduced by the prefunding balance.

$$\$X = \$2,789 - \$2,000 = \$789$$

Answer is C.

Question 52

The liquidity shortfall rules are described in IRC section 430(j)(4).

The liquidity shortfall is equal to 3 times the adjusted disbursements (base amount) less the liquid assets. The total disbursements are reduced by a percentage of the disbursements during the past 12 months for the period ending on 3/31/2023 that were non-recurring (used to purchase annuities or pay lump sums). The percentage is equal to the funding target attainment percentage for the plan year (which is determined as of the valuation date of 1/1). Note that the 1/1/2022 funding target attainment percentage is used to adjust the non-recurring disbursements paid in 2022, and the 1/1/2023 funding target attainment percentage is used to adjust the non-recurring disbursements paid in 2023. In this question, the FTAP for 2022 is the same as the FTAP for 2023, both 85%.

$$\text{Total disbursements} = \$275,000 + \$15,000 + \$450,000 + \$130,000 = \$870,000$$

$$\text{Adjusted disbursements} = \$870,000 - [85\% \times (\$450,000 + \$130,000)] = \$377,000$$

$$\text{Base amount} = 3 \times \$377,000 = \$1,131,000$$

$$\text{Liquidity shortfall} = \$1,131,000 - \$1,000,000 = \$131,000$$

Answer is B.

Note: The amount of the required quarterly contribution is not needed to compute the amount of the liquidity shortfall. Additionally, the 2/1/2023 contribution of \$300,000 made in the form of liquid assets is part of the \$1,000,000 liquid asset value, and cannot be used to pay for the 3/31/2023 liquidity shortfall.

Question 53

Treasury regulation 1.430(d)-1(d)(1)(i) provides that if a plan amendment has been adopted no later than the valuation date for a plan year and becomes effective no later than the last day of the plan year, then the plan amendment must be taken into account in determining the funding target and target normal cost for the plan year (as long as it is permitted to take effect under IRC section 436(c)).

In this question, the plan amendment was adopted before the 1/1/2023 valuation date (adopted on 12/15/2022), and becomes effective before the end of the plan year (effective on 7/1/2023). The plan amendment must be taken into account for 2023, and the statement is true.

Answer is A.

Question 54

The target normal cost is equal to the present value of the increase in the 2022 accrued benefit. Smith is age 43 on 1/1/2022, with 4 years of service.

$$1/1/2022 \text{ accrued benefit} = 13\% \times \frac{35,000 + 40,000 + 45,000}{3} \times 4 \text{ years of service} = \$20,800$$

The assumed compensation increase of 5% is taken into account in determining the end of year accrued benefit. The projected 2022 compensation for Smith is:

$$\$45,000 \times 1.05 = \$47,250$$

$$12/31/2022 \text{ accrued benefit} = 13\% \times \frac{40,000 + 45,000 + 47,250}{3} \times 5 \text{ years of service} = \$28,654$$

The limitation of IRC section 415(b) must be considered with regard to the accrued benefit. Smith has 3 years of plan participation as of 1/1/2022. The IRC section 415(b) dollar limit for 2022 is \$240,000 (as given in a table provided with the exam). This is reduced when years of plan participation are less than 10, as is the case for Smith.

$$1/1/2022 \text{ IRC section 415(b) dollar limit} = \frac{3}{10} \times \$240,000 = \$72,000$$

The IRC section 415(b) percent of salary limit is equal to 100% of the high consecutive 3-year average salary, reduced when years of service are less than 10. Smith has 4 years of service as of 1/1/2022.

$$1/1/2022 \text{ IRC section 415(b) percent of salary limit} = \frac{4}{10} \times \frac{35,000 + 40,000 + 45,000}{3} = \$16,000$$

The overall 415(b) limit is equal to the smaller of the dollar limit and the percent of salary limit. This is \$16,000. The accrued benefit as of 1/1/2022 under the plan benefit formula (\$20,800) must be limited to \$16,000 for purposes of the determination of the target normal cost.

As of 12/31/2022, Smith has earned an additional year of plan participation, so the IRC section 415(b) dollar limit will increase to \$96,000 ($\frac{4}{10} \times \$240,000$). The IRC section 415(b) percent of salary limit will also increase:

$$12/31/2022 \text{ IRC section 415(b) percent of salary limit} = \frac{5}{10} \times \frac{40,000 + 45,000 + 47,250}{3} = \$22,042$$

The overall 415(b) limit is equal to \$22,042 as of 12/31/2022. The end of year accrued benefit (\$28,654) is limited to \$22,042 for purposes of the determination of the target normal cost.

$$\text{Increase in the 2022 accrued benefit for Smith} = \$22,042 - \$16,000 = \$6,042$$

For purposes of determining the present value, the commutation functions used are found in the tables of supplementary factors provided with the examination, for a male participant using 7% interest (since Smith is more than 20 years from the assumed retirement age of 65, the segment 3 interest rate is used). Note that there are no assumed pre-retirement decrements, age 65 is the assumed retirement age, and the assumed form of benefit is a life annuity (all due to the exam general conditions).

$$\begin{aligned}\text{Target normal cost} &= \$6,042 \times \ddot{a}_{65}^{(12)} \times v_{7\%}^{22} = \$6,042 \times \frac{N_{65}^{(12)}}{D_{65}} \times 0.225713 \\ &= \$6,042 \times \frac{115,065}{11,084} \times 0.225713 = \$14,157\end{aligned}$$

Answer is B.

Question 55

The minimum required contribution under an immediate gain cost method (note that the method is not provided in the data for this question, but it must be assumed to be an immediate gain method because the experience gain and loss information for 2022 as well as prior experience gain and loss amortization bases is provided) is equal to the normal cost plus the amortization charges of the various bases less the amortization credits of the various bases. All of the amortization bases in effect for the 2023 plan year (and established before 2023) have been provided, specifically the outstanding balance as of 1/1/2023 and the number of years remaining to amortize each base. For multiemployer plans, the amortization charge or credit does not change from year to year unless the assumed pre-retirement interest rate has changed, which it has not in this question. The amortization charges/credits for each of the bases that existed on 1/1/2023 are:

$$\text{Amortization of combined charge base} = \frac{\$750,000}{\ddot{a}_{\overline{7}|.07}} = \$130,061$$

$$\text{Amortization of experience loss} = \frac{\$225,000}{\ddot{a}_{\overline{13}|.07}} = \$25,160$$

$$\text{Amortization of experience gain} = \frac{\$250,000}{\ddot{a}_{\overline{14}|.07}} = (\$26,716)$$

The experience loss for 2022 is amortized over a period of 15 years as of 1/1/2023.

$$\text{1/1/2023 amortization of 2022 experience loss} = \frac{\$150,000}{\ddot{a}_{\overline{15}|.07}} = \$15,392$$

In order to determine the **smallest amount that satisfies the minimum funding standard**, the credit balance must be subtracted from the normal cost plus amortization charges less amortization credits. This is determined as of the last day of the year, so all items must be given interest using the valuation interest rate (7% in this question).

$$\$X = (\$250,000 + \$130,061 + \$25,160 - \$26,716 + \$15,392 - \$35,000) \times 1.07 = \$384,020$$

Answer is B.

Question 56

The four quarterly contribution due dates for the 2023 plan year are 4/15/2023, 7/15/2023, 10/15/2023, and 1/15/2024.

The contributions made for 2023 can be used to pay for the quarterly installments. The first quarterly contribution due date is 4/15/2023, and the 3/31/2023 contribution of \$6,500,000 can be used to pay for the required quarterly contribution of \$2,000,000. This is also a large enough contribution to pay for the \$2,000,000 required quarterly contributions due on 7/15/2023 and 10/15/2023. The 12/31/2023 contribution is enough to pay for the fourth quarterly contribution of \$2,000,000, due on 1/15/2024. All of the quarterly contributions are paid on time.

The employer contributions for 2023 can be discounted with interest at the 2023 plan effective rate of 5% in order to determine the remaining minimum required contribution still to be funded, as of 1/1/2023.

Remaining minimum required contribution on 1/1/2023

$$= \$12,000,000 - (\$6,500,000/1.05^{3/12}) - (\$2,000,000/1.05) = \$3,674,041$$

This is accumulated at the plan effective rate to 9/15/2024 to find the additional contribution required to satisfy the minimum funding standard.

$$\text{\$X} = \$3,674,041 \times 1.05^{20.5/12} = \$3,993,396$$

Answer is D.

Question 57

IRC section 436(f)(3) provides for a required reduction in the funding balances to the extent the reduction would prevent any restriction on accelerated distributions under IRC section 436(d). This plan offers a lump sum option, which is an accelerated form of distribution under IRC section 436(f)(3). Any required reduction in the prefunding balance in this question must be made before doing the 2023 valuation.

The thresholds for preventing a restriction on accelerated distributions are an adjusted funding target attainment percentage (AFTAP) of less than 60% for a full restriction, or less than 80% for a partial restriction.

$$\begin{aligned} \text{AFTAP}_{1/1/2023} &= \frac{\text{Actuarial value of assets} - \text{Funding balances}}{\text{Funding target}} \\ &= \frac{\$4,800,000 - \$300,000 - \$1,200,000}{\$5,200,000} = 63.46\% \end{aligned}$$

Note that the numerator and denominator technically are each increased by amounts used to purchase annuities during the past two years for NHCEs. There are no purchases of annuities mentioned in this question.

In order to reach the 80% threshold, the numerator of the AFTAP would need to be increased to \$4,160,000 ($\$5,200,000 \times 80\%$). That means that the funding standard carryover balance would be reduced to zero (the funding standard carryover balance must be reduced to zero before any reduction in the prefunding balance can be made) and the prefunding balance would be reduced to \$640,000 ($\$4,800,000 - \$4,160,000$).

$$\text{\$X} = 640,000$$

Answer is B.

Question 58

The funding target is equal to the present value of the benefit accrued as of the first day of the year. Smith is age 42 on 1/1/2023 with 10 years of service. The plan amendment increases the accrual for each year of service from \$80 to \$100, an increase in monthly benefit of \$20 per year of service. The increase in the funding target for Smith due to this amendment can be determined by calculating the present value of the \$20 per year of service.

Increase in Smith's accrued benefit as of 1/1/2023 = \$20 × 10 years of service = \$200

For purposes of determining the present value, the commutation functions used are found in the tables of supplementary factors provided with the examination, for a female participant using 7% interest (since Smith is more than 20 years from the assumed retirement age of 65, the segment 3 interest rate of 7% is used). Note that there are no assumed pre-retirement decrements, age 65 is the assumed retirement age, and the assumed form of benefit is a life annuity (all due to the exam general conditions). The increase in the funding target is:

$$\begin{aligned} \$X &= \$200 \times 12 \times \ddot{a}_{65}^{(12)} \times v_{7\%}^{23} = \$2,400 \times \frac{N_{65}^{(12)}}{D_{65}} \times 0.210947 \\ &= \$2,400 \times \frac{124,946}{11,489} \times 0.210947 = \$5,506 \end{aligned}$$

Answer is B.

Question 59

IRC section 401(a)(17) requires that each year's compensation not exceed the maximum provided for that year. So the 2022 compensation paid to Smith of \$450,000 must be limited to the section 401(a)(17) limit for 2022 of \$305,000 (from a table of 401(a)(17) limits provided with the exam). The statement is true.

Answer is A.

Question 60

IRC section 431(c)(1) requires that all costs for a multiemployer plan be computed using a single cost method. This plan uses the Entry Age Normal method, so costs with regard to the disability benefit must be calculated using the Entry Age Normal method, not the Unit Credit method. The statement is true.

Answer is A.