Solutions to EA-2(F) Examination
Fall, 2021

Question 1

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 2021 and 2022. 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.

12/31/2021 minimum required contribution = ($750,000 + $350,000 – $300,000) × 1.07 = $856,000

The credit balance as of 12/31/2021 is equal to the excess of the sum of the 12/31/2020 credit balance (which is given to be $0) and the 2021 contribution (which was contributed on 1/1/2021 and is given one year of interest at the valuation interest rate) over the minimum required contribution.

$CB_{12/31/2021}$ = ($900,000 × 1.07) – $856,000 = $107,000

12/31/2022 minimum required contribution = ($700,000 + $200,000 – $250,000) × 1.07 = $695,500

The credit balance as of 12/31/2022 is equal to the excess of the sum of the 12/31/2021 credit balance and the 2022 contribution (which was contributed on 7/1/2022 and is given six months of interest at the valuation interest rate) over the minimum required contribution.

$X = $CB_{12/31/2022}$ = ($107,000 × 1.07) + ($975,000 × $1.07^{6/12}$) – $695,500 = $427,538

Answer is C.

Notes: The interest given to the contribution for 2022 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 = $CB_{12/31/2022}$ = ($107,000 × 1.07) + ($975,000 × 1.035) – $695,500 = $428,115

This is also in answer range C.

One other note: The actual rate of return on assets is provided in this question, but is not used in the solution. For single employer plans, the funding balances are adjusted from one year to the next by the actual asset rate of return, but for multiemployer plans, the credit balances are always adjusted using the valuation interest rate.

Question 2

The accrued liability under the Entry Age Normal funding method is equal to the accumulated value of the prior normal costs (as of the 1/1/2022 valuation date). The normal cost under the Entry Age Normal funding method is based upon the projected benefit at assumed retirement age (62 in this question), and the normal cost is assumed to begin at hire age. The 1.5% salary scale is incorporated into the determination of the projected benefit. Smith was hired at age 44 and is age 50 as of the 1/1/2022 valuation date, so the 2021 salary must be projected 12 years to obtain the projected final salary.

Projected final salary = $\$30{,}000 \times 1.015^{12} = \$35{,}869$
Projected benefit = $30\% \times \$35{,}869 = \$10{,}761$

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 male participant using 6% interest.

$$PVFB_{44} = \$10{,}761 \times \ddot{a}_{62}^{(12)} \times v^{18} = \$10{,}761 \times \frac{N_{62}^{(12)}}{D_{62}} \times 0.350344$$

$$= \$10{,}761 \times \frac{297{,}323}{24{,}912} \times 0.350344 = \$44{,}995$$

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 6% interest rate and the 1.5% salary scale.

Implicit interest rate for amortizing = (1.06/1.015) – 1 = 0.044335, or 4.4335%

$$NC_{44} = PVFB_{44} / \ddot{a}_{\overline{18}|.044335} = \$44{,}995/12.76667 = \$3{,}524$$

The normal cost as of 1/1/2022 (when Smith is age 50) is equal to the normal cost at age 44, increased by 1.5% per year (since the normal cost increases by the same percentage as does the salary under the exam general conditions).

$$NC_{50} = NC_{44} \times 1.015^{6} = \$3{,}524 \times 1.093443 = \$3{,}853$$

The accrued liability is equal to the accumulation of the past normal costs through Smith's current age on 1/1/2022 (6 years of accumulation from age 44 to 50).

$$\$X = AL_{50} = NC_{50} \times \ddot{s}_{\overline{6}|.044335} = \$3{,}853 \times 7.00296 = \$26{,}982$$

Answer is B.

Question 3

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 1/1/2022 and 12/31/2022 for Smith. For 2022, the assumed salary increase of 3.5% is applied to the 2021 salary to determine an expected 2022 salary.

$$\text{Final 3-year average salary as of 1/1/2022} = \frac{\$80{,}000 + \$85{,}000 + \$90{,}000}{3} = \$85{,}000$$

$$\text{Final 3-year average salary as of 12/31/2022} = \frac{\$85{,}000 + \$90{,}000 + (\$90{,}000 \times 1.035)}{3} = \$89{,}383$$

Smith has 20 years of service as of 1/1/2022, and 21 years of service as of 12/31/2022.

Accrued benefit as of 1/1/2022 = 1.5% × \$85,000 × 20 years of service = \$25,500
Accrued benefit as of 12/31/2022 = 1.5% × \$89,383 × 21 years of service = \$28,156

Increase in 2022 accrued benefit = \$28,156 – \$25,500 = \$2,656

Smith is age 50 as of 1/1/2022, 15 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 retirement benefits paid from age 65 through age 70, and the segment 3 interest rate of 7% is used to discount benefits paid at age 70 and later. 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 6% and 7% interest.

$$\text{Target normal cost} = \$2{,}656 \times \left[\frac{N^{(12)}_{65@6\%} - N^{(12)}_{70@6\%}}{D_{65@6\%}} v^{15}_{6\%} + \frac{N^{(12)}_{70@7\%}}{D_{65@7\%}} v^{15}_{7\%} \right]$$

$$= \$2{,}656 \times \left[\frac{229{,}326 - 142{,}755}{20{,}406} (0.417265) + \frac{69{,}043}{11{,}084} (0.362446) \right] = \$10{,}698$$

Answer is D.

Question 4

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

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

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

When the plan benefits are based upon compensation (not known, as the benefit formula is not given in this question), the temporary annuity is equal to the ratio of the present value of future compensation to current compensation (general conditions of the exam). Since present value of future compensation and current compensation are both provided in this question, it must be assumed that the benefit formula is salary based.

$$\text{Normal cost}_{1/1/2021} = \frac{\$320{,}000 - \$150{,}000 - \$100{,}000}{\$1{,}200{,}000 / \$150{,}000} = \$8{,}750$$

In order to determine the normal cost for 2022, experience must be used to adjust the 1/1/2021 valuation results to 1/1/2022. Since there were no new participants and no retirees (all participants were under retirement age as of both 1/1/2021 and 1/1/2022), the present value of future benefits will increase at the valuation rate of 6% (all participants will be one year closer to retirement age).

$PVFB_{1/1/2022} = \$320{,}000 \times 1.06 = \$339{,}200$

The unfunded liability is adjusted by adding the 2021 normal cost (which is a new 2021 liability), increasing the total with interest at 6%, and reducing the result by the interest-adjusted 2021 contribution (receiving only 6 months of interest because it was contributed halfway through 2021).

$UL_{1/1/2022} = [(\$100{,}000 + \$8{,}750) \times 1.06] - (\$14{,}500 \times 1.06^{6/12}) = \$100{,}346$

Note that it is also allowable to adjust the contribution using simple interest at 6%, providing 3% interest for the 6 months, resulting in unfunded liability as of 1/1/2022 of $100,340 (this is used in the normal cost determination, below).

The present value of future compensation must be adjusted by a reduction in the 2021 salary (assumed paid on 1/1/2021), and interest of 6%. The present value of expected 2022 salary is equal to the prior year expected salary increased by the 3.5% salary scale.

$PVFS_{1/1/2022} = (\$1{,}200{,}000 - \$150{,}000) \times 1.06 = \$1{,}113{,}000$

Present value of expected 2022 salary = $150,000 × 1.035 = $155,250

The actuarial value of assets as of 1/1/2022 that have been provided include the asset gain or loss for 2021.

The 1/1/2022 normal cost can now be determined.

$$\text{Normal cost}_{1/1/2019} = \frac{\$339{,}200 - \$160{,}000 - \$100{,}340}{\$1{,}113{,}000 / \$155{,}250} = \$11{,}000$$

Answer is C.

Question 5

This question involves setting actuarial assumptions based upon past experience. The SOA study note "Assessment and Selection of Actuarial Assumptions" is a source in the recommended reading list that can be used to help answer this question. At the bottom of page 7 in the study note, it is stated that for large plans (defined in the study note as plans with more than 200 participants) past experience should be considered in addition to considering current conditions of the plan as well as future expectations.

The question states that experience over the past 5 years shows that 20% to 30% of the retirees elect a lump sum form of benefit, and that future expectations are that this will remain the same. Therefore, it would be reasonable for the actuary to assume that 20% to 30% of the retirees make such an election. Only proposed form of payment option II falls in that range.

Answer is C.

Question 6

The plan in this question is frozen, with all participants retired. Any assumptions with regard to salary increases, retirement rates, and termination rates would be irrelevant. However, the mortality rates are important as all participants are in pay status, and the life expectancy of the participants is still important to the valuation of the plan.

Answer is D.

Question 7

The four quarterly due dates for the 2022 plan year are 4/15/2022, 7/15/2022, 10/15/2022, and 1/15/2023.

The plan sponsor has elected to use the $200,000 prefunding balance to pay for the 2022 quarterly contributions until it is exhausted. The prefunding balance is increased using the 2022 plan effective rate from the beginning of the year to the quarterly contribution due date, in order to see how much of the prefunding balance is remaining as of that date. The first quarterly contribution due date is 4/15/2022.

Prefunding balance as of 4/15/2022 = $\$200{,}000 \times 1.055^{3.5/12} = \$203{,}148$

This is enough to pay for the entire quarterly contribution of $150,000.

The next quarterly contribution due date is 7/15/2022.

Prefunding balance as of 7/15/2022 = $(\$203{,}148 - \$150{,}000) \times 1.055^{3/12} = \$53{,}864$

This is not enough to pay for the entire quarterly contribution of $150,000. The amount that is late is equal to $96,136 ($150,000 – $53,864). This is late by 6 months as the contribution to the plan for 2022 is not made until 1/15/2023.

In addition, the entire $150,000 quarterly contribution due on 10/15/2022 is also late (by 3 months).

When a quarterly contribution is late, it must be discounted to 1/1/2022 using an interest rate of the plan effective rate plus an additional 5 percentage points (for a total 10.5% rate in this question) for the period of time that the contribution was made late (and then discounted using the 5.5% plan effective rate for the remaining period). So, for purposes of determining the value of the $96,136 and $150,000 that can be used to pay for part of the minimum required contribution, that amount is:

$\$96{,}136/[(1.105^{6/12})(1.055^{6.5/12})] + \$150{,}000/[(1.105^{3/12})(1.055^{9.5/12})] = \$88{,}840 + \$140{,}231 = \$229{,}071$

Remaining minimum required contribution on 1/1/2022 = $700,000 – $200,000 – $229,071 = $270,929

This is accumulated at the plan effective rate to 1/15/2023 to find the additional contribution required to satisfy the minimum funding standard (in addition to the $96,136 and $150,000 that was used to satisfy the 7/15/2022 and 10/15/2022 quarterly contribution requirements).

$\$X = \$96{,}136 + \$150{,}000 + (\$270{,}929 \times 1.055^{12.5/12}) = \$96{,}136 + \$150{,}000 + \$286{,}468 = \$532{,}604$

Answer is B.

Question 8

The funding target is equal to the present value of the accrued benefits as of the first day of the plan year (1/1/2022). Each participant is age 35 with 10 years of service as of 1/1/2021 (and age 36 with 11 years of service as of 1/1/2022).

The monthly accrued benefit per participant as of 1/1/2022 is equal to:

\$50 × 11 years of service = \$550

Of the 100 active participants on 1/1/2021, 15% of them (15) were expected to terminate during 2021 (all as of the first day of the year, so that no accrual would be earned for them during 2021). The actual number of terminations was only five, on 1/2/2021 (no 2021 accrual was earned by those 5 terminated participants).

There is a 2022 loss because 10 participants who were expected to terminate did not, and they each received a 2022 accrual of \$50 per month. The 2021 loss is equal to the present value of those accruals as of 1/1/2022. The third segment rate of 6% is used to value the payments because all participants are more than 20 years from age 65.

$X = \$50 \times 10 \text{ participants} \times 12\, a_{65}^{(12)} \times v^{29} = \$500 \times 12 \times 11.2382 \times 0.184557 = \$12{,}445$

Answer is B.

Question 9

Receivable contributions for a prior year are discounted from the actual contribution date to the first day of the current plan year for purposes of determining the asset value for the current year valuation (when the valuation date is the first day of the plan year). See IRC section 430(g)(4)(A). The prior year plan effective rate is used, as the contribution is for the prior year.

So, for the 1/1/2022 valuation date, the contribution deposited on 4/1/2022 for the 2021 plan year must be discounted for 3 months back to 1/1/2022 using the 2021 plan effective rate, and added to the 1/1/2022 market value of assets for purposes of the 1/1/2022 valuation.

The statement is true.

Answer is A.

Question 10

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

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

In addition, when there is a waived funding deficiency, the outstanding balance of the waived deficiency must be used to reduce the numerator of the above ratio, as that money will be contributed to pay for part of the present value of future benefits, and does not need to be funded through normal cost.

While there is no normal cost with respect to the inactive participants, the present value of the future benefits for the inactive participants must be included as part of the total present value of future benefits. The temporary annuity only reflects the active participants.

The general conditions of the exam state that unless you are told otherwise, there are no pre-retirement decrements. So an interest-only discount is used here. In addition, the general conditions provide that normal retirement age is 65, and the normal form of benefit is a life annuity.

Each of the 10 participants are currently age 60 as of the 1/1/2022 valuation date. They will each have 25 years of service at age 65.

For the 10 active participants:

$$\text{PVFB} = 10 \times (\$50 \times 12) \times 25 \text{ years of service} \times \ddot{a}_{65}^{(12)} \times v^5 = \$150{,}000 \times \frac{N_{65}^{(12)}}{D_{65}} \times 0.783526$$

$$= \$150{,}000 \times \frac{506{,}180}{39{,}167} \times 0.783526 = \$1{,}518{,}901$$

The commutation functions used are found in the tables of supplementary factors provided with the examination, for a female participant using 5% interest.

Including the inactive participants, the total present value of future benefits is:

Total PVFB = \$1,518,901 + \$750,000 = \$2,268,901

The temporary annuity is an annuity due for the 5 total years to retirement (from age 60 to 65). Note that all active participants are the same age.

The normal cost is:

$$\$X = [\text{PVFB} - (\text{AVA} - \text{CB}) - \text{Outstanding Balance of Waiver Base}] / \ddot{a}_{\overline{5}|5\%}$$

$$= [\$2{,}268{,}901 - (\$1{,}000{,}000 - \$180{,}000) - \$100{,}000] / 4.545951 = \$296{,}726$$

Answer is D.

Question 11

The funding target is determined based upon benefits accrued due to service from prior years (before 2022 in this question). The only service that would be used to determine the death benefit is service through 12/31/2021, not projected service through normal retirement age. The statement is false.

Answer is B.

Question 12

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 (no waived deficiency in this question).

The outstanding balance of the prior shortfall amortization bases must be determined as of 1/1/2022. The ARPA 15-year amortization was adopted for the 2019 year, so all of the bases are 15-year bases. The 2019 shortfall amortization base has 12 years left to amortize it as of 1/1/2022, the 2020 base has 13 years left, and the 2021 base has 14 years left. The outstanding balances are determined using the 2022 segment rates. The first segment rate (5%) is used to discount the first 5 payments, and the second segment rate (6%) is used to discount the additional payments. The 12, 13, and 14 year factors must be calculated, as they are not provided in the data for the question.

12-year amortization factor = $\ddot{a}_{\overline{5}|5\%} + \ddot{a}_{\overline{7}|6\%}\, v_{6\%}^{5} = 8.9677$

13-year amortization factor = $\ddot{a}_{\overline{5}|5\%} + \ddot{a}_{\overline{8}|6\%}\, v_{6\%}^{5} = 9.4647$

14-year amortization factor = $\ddot{a}_{\overline{5}|5\%} + \ddot{a}_{\overline{9}|6\%}\, v_{6\%}^{5} = 9.9335$

Outstanding balance of prior shortfall amortization bases as of 1/1/2022
= ($6,000 × 8.9677) + ($6,000 × 9.4647) + ($7,000 × 9.9335) = $180,129

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

Funding shortfall$_{1/1/2022}$ = $920,000 – $800,000 = $120,000

The 2022 shortfall base is equal to the funding shortfall less the outstanding balance of the prior shortfall bases. The 2022 shortfall base is amortized over 15 years.

2022 shortfall amortization base = $120,000 – $180,129 = ($60,129)

Amortization of 2022 shortfall base = ($60,129)/10.3758 = ($5,795)

2022 minimum required contribution = $20,000 + $6,000 + $6,000 + $7,000 – $5,795 = $33,205

Answer is C.

Question 13

The plan amendment was adopted after the valuation date (assumed to be the first day of the year under the general conditions of the plan). Therefore, the plan is not required to use the plan amendment in determining the 2022 funding target and target normal cost, although it can be elected to use the plan amendment by the plan sponsor. See Treasury regulation 1.430(d)-1(d)(1)(ii). The statement is false.

Answer is B.

Question 14

Each of the three statements reflects the concepts described in the last paragraph on page 27 of the SOA study note "Assessment and Selection of Actuarial Assumptions.

I. It would be most reasonable to assume that retirements would increase at ages where early retirement subsidies first apply, as the benefits become more valuable at those ages. The statement is false.

II. It would be reasonable to assume that more retirements would occur at ages when the post-retirement medical benefits are fully subsidized (same reasoning as for statement I). This statement is true.

III. Both past and future anticipated experience should be used in selecting reasonable actuarial assumptions. The statement is false.

Answer is C.

Question 15

In a cash balance plan, the funding target is equal to the present value of the projected hypothetical account balance. 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 6% per year. Smith is age 62 on 1/1/2022, so the hypothetical account balance must be accumulated for 3 years.

Projected hypothetical account balance = $\$650{,}000 \times 1.06^3 = \$774{,}160$

In order to determine the present value for funding purposes, the projected account balance is discounted using the funding interest rate. The segment 1 rate of 5% is used for funding (segment 1 rates are used for payments within 5 years from the valuation date).

1/1/2022 funding target = $\$774{,}160 \div 1.05^3 = \$668{,}749$

Answer is D.

Question 16

The 2021 contribution must be discounted using the 2021 plan effective rate of 5% from the date of contribution (12/31/2021) to 1/1/2021 in order to find the value as of the valuation date.

Discounted value of 2021 contribution = $28,000/1.05 = $26,667

There is an excess contribution because the discounted value of the 2021 contribution exceeds the minimum required contribution.

2021 excess contribution = $26,667 – $20,000 = $6,667

The general conditions of the exam state that the excess contribution is used as an addition to the prefunding balance.

Excess contributions are increased with interest using the plan effective rate, and added to the prefunding balance on the first day of the following year (IRC section 430(f)(6)(B)). In addition, the unused existing prefunding balance is increased with interest using the 2021 actual asset rate of return (see IRC section 430(f)(8)).

Finally, the employer elected to use $20,000 of the funding balances to pay for the minimum required contribution for 2021. This must come from the funding standard carryover balance before any of the prefunding balance can be used, so only money from the funding standard carryover balance is used towards the $20,000 election (IRC section 430(f)(3)(B)). As the contribution made for 2021 was already in excess of the 2021 minimum required contribution, this $20,000 is also an excess contribution that is added to the prefunding balance on the first day of the next year. However, unlike an actual excess contribution, any funding balance that is deemed to be an excess contribution is increased with interest using the actual asset rate of return for 2021 (not the 2021 plan effective rate). See Treasury Regulation 1.430(f)-1(b)(3)(iii).

1/1/2022 prefunding balance = ($4,000 × 1.06) + ($6,667 × 1.05) + ($20,000 × 1.06) = $32,440

Answer is C.

Question 17

The funding target is equal to the present value of the benefit accrued as of the first day of the year. Smith has retired at age 65 on 1/1/2022, and has elected to receive a life with 20-year certain annuity. The monthly accrued benefit is given as $3,600 in the elected form.

The annuity factor for the 20-year certain period must be calculated. Those benefits will be paid from age 65 through 85 (the 1st through 20th years from Smith's current age of 65), so the segment 1 interest rate of 5% is used for years 1 through 5, and the segment 2 interest rate of 6% is used for years 6 through 20. Note that there will be 60 monthly payments in years 1 through 5, and 180 monthly payments in years 6 through 20.

The equivalent monthly effective rate at 5% annual effective interest is:

$1.05^{1/12} - 1 = 0.004074$, or 0.4074%

$$\ddot{a}^{(12)}_{\overline{5}|5\%} = \tfrac{1}{12}\ddot{a}_{\overline{60}|0.4074\%} = 4.4459$$

The equivalent monthly effective rate at 6% annual effective interest is:

$1.06^{1/12} - 1 = 0.004868$, or 0.4868%

$$\ddot{a}^{(12)}_{\overline{15}|6\%} = \tfrac{1}{12}\ddot{a}_{\overline{180}|0.4868\%} = 10.0251$$

The life only portion of Smith's benefit will be paid beginning at age 85, and the segment 3 interest rate of 7% is used to discount retirement benefits paid at age 85 and later. The commutation functions used are found in the tables of supplementary factors provided with the examination, for a <u>male</u> participant using 7% interest.

The funding target using the elected form of payment is:

$$\$3{,}600 \times 12 \times \left[\ddot{a}^{(12)}_{\overline{5}|5\%} + \ddot{a}^{(12)}_{\overline{15}|6\%} v^{5}_{6\%} + \frac{N^{(12)}_{85@7\%}}{D_{65@7\%}} \right]$$

$$= \$3{,}600 \times 12 \times \left[4.4459 + (10.0251)(0.7473) + \frac{8{,}003}{11{,}084} \right] = \$546{,}898$$

$\$X = \$602{,}000 - \$546{,}898 = \$55{,}102$

Answer is D.

Question 18

Receivable contributions for a prior year are discounted from the actual contribution date to the first day of the current plan year for purposes of determining the asset value for the current year valuation (when the valuation date is the first day of the plan year). See IRC section 430(g)(4)(A). The prior year plan effective rate is used.

So, for the 1/1/2022 valuation date, the contribution deposited on 6/15/2022 for the 2021 plan year must be discounted for 5.5 months back to 1/1/2022 using the 2021 plan effective rate of 5%, and the contribution deposited on 8/15/2022 for the 2021 plan year must be discounted for 7.5 months back to 1/1/2022. These amounts are added to the 1/1/2022 market value of assets for purposes of the 1/1/2022 valuation.

$$\$X = \$15{,}500{,}000 + (\$2{,}000{,}000/1.05^{5.5/12}) + (\$1{,}000{,}000/1.05^{7.5/12})$$
$$= \$15{,}500{,}000 + \$1{,}955{,}772 + \$969{,}966 = \$18{,}425{,}738$$

Answer is C.

Note that the 2021 actual rate of return on the assets and the 2022 plan effective rate are provided but not needed to answer this question.

Question 19

For multiemployer plans, amortization bases created due to an increase in past service liabilities from a plan amendment are amortized over a period of 15 years. See IRC section 431(b)(2)(B)(ii). The statement is true.

Answer is A.

Question 20

The gain or loss with regard to the retirement of a participant is equal to the difference between the actual liability (the value of the benefit that will actually be paid) and the expected liability (the accrued liability under the cost method had the participant not retired). Under the Projected Unit Credit cost method, the accrued liability is equal to the present value of the benefit accrued as of the beginning of the year (using salary projected to retirement).

Smith has retired at age 63 with 8 years of service. The actual accrued liability on 1/1/2022 of $142,000 is provided. The expected accrued liability must be calculated. This can be done by calculating the accrued liability and normal cost for Smith as of 1/1/2021, and increasing the sum of those amounts with interest from 1/1/2021 to 1/1/2022.

There is a retirement assumption that there is a 25% probability of retiring at age 62, and a 75% probability of retiring at age 65. For purposes of the expected liability, those retirement assumptions must be followed even though Smith actually retired on 12/31/2021.

If Smith retired at age 65, then the accrued benefit as of 1/1/2021 (projecting salary to retirement at the rate of 3.5% per year) would be:

$2.5\% \times \$60{,}000 \times 1.035^3 \times 7$ years of service = $11,642

If Smith retired at age 62, then the accrued benefit as of 1/1/2021 (not projecting salary because Smith would have retired on 1/1/2021) would be:

$2.5\% \times \$60{,}000 \times 7$ years of service = $10,500

The reduced accrued benefit payable at age 62 is: $\$10{,}500 \times [1 - (2\% \times 3 \text{ years})] = \$9{,}870$

The 1/1/2021 accrued liability is:

$(\$9{,}870 \times \ddot{a}_{62}^{(12)} \times 0.25) + (\$11{,}642 \times \ddot{a}_{65}^{(12)} \times v^3 \times 0.75) = \$29{,}437 + \$82{,}402 = \$111{,}839$

The normal cost is equal to the present value as of 1/1/2021 of the increase in the 2021 accrued benefit. There would be no normal cost if Smith retired on 1/1/2021 at age 62, so only the accrual payable at normal retirement age is taken into account, including the expected salary increases and the probability of retiring at age 65 of 75%.

Normal cost $= 2.5\% \times \$60{,}000 \times 1.035^3 \times \ddot{a}_{65}^{(12)} \times v^3 \times 0.75 = \$11{,}771$

Expected accrued liability as of 1/1/2022 = ($111,839 + $11,771) × 1.06 = $131,027

There is an experience loss in 2021 as the actual accrued liability exceeds the expected accrued liability.

2021 Loss = $142,000 – $131,027 = $10,973

Answer is B.

Question 21

I. Treasury regulation 1.430(d)-1(b)(1)(ii) defines the target normal cost as being equal to the present value of the benefit accrual allocated to the plan year. Therefore, if the plan year is a short year, the allocated benefit accrual to that short year has already been pro-rated for the short period, and there is no need to further pro-rate the target normal cost. The statement is false.

II. Treasury regulation 1.430(a)-1(b)(2)(ii)(A) requires that the waiver amortization installments are pro-rated in the case of a short plan year. This is done by multiplying the full year waiver amortization installment by a fraction, the numerator being the duration of the short plan year and the denominator being 1 year. The statement is true.

III. Treasury regulation 1.430(a)-1(b)(2)(ii)(A) requires that the shortfall amortization installments are pro-rated in the case of a short plan year. This is done by multiplying the full year shortfall amortization installment by a fraction, the numerator being the duration of the short plan year and the denominator being 1 year. The statement is true.

Answer is C.

Question 22

A lump sum is an accelerated form of payment under IRC section 436(d)(5). If the AFTAP is less than 80%, but would be equal to 80% if the funding balances are reduced, then the funding balances must be reduced to the extent that the AFTAP would be equal to 80% (Treasury regulation 1.436-1(a)(5)).

For 2022, the actuary has not certified the AFTAP as of 4/1/2022. The AFTAP at that time is deemed to be 75% (ten percentage points less than the 2021 certified AFTAP of 85%). See Treasury regulation 1.436-1(h)(2).

A presumed funding target must be determined for purposes of determining whether the funding balances must be reduced, as described in Treasury regulation 1.436-1(c)(2)(ii)(C).

$$\text{Presumed AFTAP} = 75\% = \frac{\text{Actuarial value of assets - Funding balances}}{\text{Presumed funding target}}$$

$$= \frac{\$300{,}000 - \$50{,}000}{\text{Presumed funding target}}$$

→ Presumed funding target = $333,333

If the prefunding balance is reduced to $33,333, then the presumed AFTAP would be:

$$\frac{\$300{,}000 - \$33{,}333}{\$333{,}333} = 80\%$$

$X = $50,000 – $33,333 = $16,667

Answer is B.

Question 23

The due date for making the first quarterly installment for a calendar year plan with a quarterly contribution requirement is 4/15 of the plan year (IRC section 430(j)(3)(C)(ii)). The same date applies to liquidity shortfall payments that are required (a liquidity shortfall payment is required for plans that are subject to the quarterly contribution requirement and had more than 100 participants on at least one day of the prior year – see IRC section 430(j)(4)(B)).

The contribution made on 4/15/2022 of $60,000 is enough to pay for the quarterly contribution requirement of $50,000, but not enough to pay for the liquidity shortfall of $75,000.

Late liquidity shortfall payment = $75,000 – $60,000 = $15,000

There is an initial 10% excise tax on late liquidity shortfall payments. See IRC section 4971(f)(1).

Excise tax = 10% of $15,000 = $1,500

The statement is false.

Answer is B.

Question 24

Treasury regulation 1.430(d)-1(f)(4)(ii)(B) requires that for funding purposes, a lump sum must be valued using the 417(e) mortality (post-retirement) and using the funding segment rates. In addition, regulation 1.430(d)-1(f)(4)(iii)(D) provides that when the plan equivalence for determining the lump sum value (at retirement age) exceeds the lump sum value (at retirement age) using 417(e) applicable interest and mortality, then the lump sum is valued using the applicable mortality table for post-retirement mortality, and the plan interest rate for post-retirement interest. The funding segment rates are always used to discount prior to retirement age.

In this question, the plan equivalence for determining the lump sum is based upon 417(e) applicable interest rates, so the funding segment 3 interest rate of 7% is used both pre and post retirement (Smith is 20 years from retirement, so only the segment 3 rates will be used for a payment that will be made at the beginning of the 21st year from the valuation date), and the 417(e) applicable mortality table is used for post retirement mortality.

$X = funding target for assumed lump sum election = $2,500 × 12 × 10.38 × $v_{7\%}^{20}$ = $80,472

Answer is A.

Question 25

In a cash balance plan, the funding target is equal to the present value of the projected hypothetical account balance. 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 4.25% per year. Smith is age 44 on 1/1/2022, so the hypothetical account balance must be accumulated for 21 years.

Projected hypothetical account balance = $\$100{,}000 \times 1.0425^{21} = \$239{,}661$

The assumed form of payment is a life annuity, not a lump sum, so the projected account balance must be converted to a life annuity using the plan conversion factor.

Equivalent life annuity = $\$239{,}661 \div 14.21 = \$16{,}866$

In order to determine the present value for funding purposes, the life annuity is discounted using the funding interest rate. The segment 3 rate of 6% is used for funding (segment 3 rates are used for payments made more than 20 years from the valuation date). The commutation functions used are found in the tables of supplementary factors provided with the examination, for a <u>female</u> participant using 6% interest.

$$\$X = \text{1/1/2022 funding target} = \$16{,}866 \times \ddot{a}_{65}^{(12)} \times v_{6\%}^{21} = \$16{,}866 \times \frac{N_{65}^{(12)}}{D_{65}} \times 0.294155$$

$$= \$16{,}866 \times \frac{250{,}067}{21{,}152} \times 0.294155 = \$58{,}653$$

Answer is B.

Question 26

Treasury regulation 1.430(j)-1(d)(2) states that the liquidity requirement cannot be satisfied by using funding balances, so the prefunding balance cannot be used. The statement is true.

Answer is A.

Question 27

Treasury regulation 1.430(g)-1(d)(2) provides rules for contributions made for the current year and before the valuation date, as is the case in this question for the last day valuation. The contribution is credited with interest using the current year plan effective rate, and then subtracted from the market value of assets as of the valuation date. If the resulting value, after subtracting the accumulated contribution, is less then zero, then the market value of assets is set to zero (negative asset values are not allowed).

12/31/2022 Market/Actuarial Value of assets = \$150,000 – (\$200,000 × $1.05^{6/12}$) = \$0

The statement is true.

Answer is A.

Question 28

The minimum required contribution under the entry age normal cost method is equal to the normal cost plus the amortization of the various charge bases less the amortization of the various credit bases. The smallest amount that satisfies the minimum funding standard is equal to the excess of the minimum required contribution over the credit balance (there is no credit balance in this question). This difference is increased with interest using the valuation interest rate to the end of the plan year (12/31/2022).

The 2021 experience loss of \$13,000 is amortized over 15 years, beginning on 1/1/2022 (IRC section 431(b)(2)(B)(iii)).

The **smallest amount that satisfies the minimum funding standard** is:

$$\$X = (\$25{,}000 + \frac{\$900{,}000}{\ddot{a}_{\overline{8}|}} - \frac{\$500{,}000}{\ddot{a}_{\overline{10}|}} + \frac{\$300{,}000}{\ddot{a}_{\overline{12}|}} + \frac{\$250{,}000}{\ddot{a}_{\overline{15}|}}) \times 1.06$$

$$= (\$25{,}000 + \$136{,}729 - \$64{,}089 + \$33{,}758 + \$24{,}284) \times 1.06 = \$165{,}023$$

Answer is D.

Question 29

The four quarterly contribution due dates for the 2022 plan year are 4/15/2022, 7/15/2022, 10/15/2022, and 1/15/2023. The required quarterly contribution was made on each of these dates in this question.

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.

90% of 2022 minimum required contribution = 90% × $110,000 = $99,000

The quarterly contribution due for each quarter of 2022 is equal to 25% of $99,000 (because the 2021 minimum required contribution of $100,000 is more than 90% of the 2022 minimum):

25% × $99,000 = $24,750

In order to determine the final contribution to be made on 6/30/2023, each contribution of $24,750 made on the various quarterly due dates must be discounted at the 2022 plan effective rate of 5.5% to the first day of 2022, and used to offset the minimum required contribution of $110,000.

Remaining minimum required contribution

$= \$110{,}000 - \$24{,}750/1.055^{3.5/12} - \$24{,}750/1.055^{6.5/12} - \$24{,}750/1.055^{9.5/12} - \$24{,}750/1.055^{12.5/12}$

$= \$110{,}000 - \$24{,}366 - \$24{,}043 - \$23{,}723 - \$23{,}407 = \$14{,}461$

The final contribution for 2022 to be deposited on 6/30/2023 is:

$\$X = \$14{,}461 \times 1.055^{18/12} = \$15{,}670$

Answer is D.

Question 30

The minimum required contribution under the entry age normal cost method is equal to the normal cost plus the amortization of the various charge bases less the amortization of the various credit bases. The smallest amount that satisfies the minimum funding standard is equal to the excess of the minimum required contribution over the credit balance. This difference is increased with interest using the valuation interest rate to the end of the plan year (12/31/2022).

Each of the amortization bases listed in this question is amortized over 15 years. See IRC section 431(b)(2)(B) and (3)(B).

The **smallest amount that satisfies the minimum funding standard** is:

$$\$X = (\$40{,}000 + \frac{\$500{,}000}{\ddot{a}_{\overline{15}|}} + \frac{\$15{,}000}{\ddot{a}_{\overline{15}|}} - \frac{\$20{,}000}{\ddot{a}_{\overline{15}|}} - \frac{\$25{,}000}{\ddot{a}_{\overline{15}|}} + \frac{\$50{,}000}{\ddot{a}_{\overline{15}|}} - \$15{,}000) \times 1.07$$

$$= (\$40{,}000 + \$51{,}306 + \$1{,}539 - \$2{,}052 - \$2{,}565 + \$5{,}131 - \$15{,}000) \times 1.07 = \$83{,}844$$

Answer is D.

Question 31

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 (no waived deficiency in this question).

The target normal cost is based on the benefit accrual during the current year (2022). The plan has been frozen beginning 12/31/2021. As a result, there is no benefit accrual for 2022, resulting in a zero target normal cost as it relates to the 2022 benefit accrual. However, the expected expenses to be paid from the plan trust are also included as part of the target normal cost (IRC section 430(b)(1)(A)(ii)). As a result, the target normal cost is equal to $6,000.

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

Funding shortfall$_{1/1/2022}$ = $370,000 – ($330,000 – $3,000 – $2,700) = $45,700

A shortfall amortization base must be created, equal to the funding shortfall, reduced by the outstanding balance of prior amortization bases. 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 shortfall base is amortized over 15 years. The 15-year amortization factor is provided in the data for the question.

Amortization of 2022 shortfall base = $45,700/10.9193 = $4,185

2022 minimum required contribution = $6,000 + $4,185 = $10,185

The **smallest amount that satisfies the minimum funding standard** on 7/1/2022 ($X) is equal to the minimum required contribution as of the first day of the year, reduced by the funding standard carryover and prefunding balances, and then increased with interest using the effective rate of interest for the year.

$X = ($10,185 – $3,000 – $2,700) × $1.05^{6/12}$ = $4,596

Answer is B.

Question 32

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

Funding shortfall$_{1/1/2021}$ = \$1,100,000 – (\$950,000 – \$10,000) = \$160,000

A shortfall amortization base must be created, equal to the funding shortfall, reduced by the outstanding balance of prior amortization bases. The American Rescue Plan Act of 2021 (ARPA) 15-year amortization rule was adopted for 2021. This means that all prior shortfall amortization bases are considered to be fully amortized. As a result, there is no outstanding balance of prior bases, and the 2021 funding shortfall of \$160,000 is amortized over 15 years, using the 15-year amortization factor provided for the 2021 year.

Amortization of 2021 shortfall base = \$160,000/10.3758 = \$15,420

There are no additions to or reductions in the prefunding balance for 2021. Therefore, it is updated to 1/1/2022 by increasing it using the actual rate of return on the assets in 2021 of 10% (IRC section 430(f)(8)).

Prefunding balance$_{1/1/2022}$ = \$10,000 × 1.1 = \$11,000

Funding shortfall$_{1/1/202}$ = \$1,220,000 – (\$1,100,000 – \$11,000) = \$131,000

The 1/1/2022 outstanding balance of the 2021 shortfall amortization base is determined using the 2022 segmented interest rates. There are 14 installments remaining, with the first 5 discounted using the first segment rate (4.75%), and the remaining installments discounted using the second segment rate (5%). This outstanding balance is:

Outstanding balance$_{1/1/2022}$ = \$15,420 × ($\ddot{a}_{\overline{5}|.0475} + \ddot{a}_{\overline{9}|.05}\, v_{.05}^{5}$) = \$160,588

The 2022 shortfall amortization base is equal to the 1/1/2022 funding shortfall reduced by the outstanding balance of the 2021 shortfall amortization base.

2022 shortfall amortization base = \$131,000 – \$160,588 = (\$29,588)

Amortization of 2022 shortfall base = (\$29,588)/10.9193 = (\$2,710)

The sum of the 2021 and 2022 shortfall amortization installments is:

\$X = \$15,420 – \$2,710 = \$12,710

Answer is B.

Question 33

Treasury regulation 1.412(c)(2)-1(b)(5) says that a method of determining the actuarial value of assets is not reasonable if it would provide a value that is either consistently above or consistently below the market value of the assets. An asset valuation method defined to be 95% of the market value of assets would always provide a value below the market value of assets. This is not a reasonable asset valuation method. The statement is true.

Answer is A.

Question 34

Treasury regulation 1.430(d)-1(d)(1)(ii) provides that when a plan amendment is adopted after the valuation date (and no later than 2½ months after the end of the plan year), the plan sponsor can elect to take that amendment into account for purposes of determining the target normal cost. The plan amendment in this question is adopted on 3/14/2022, so it falls within the time frame to be used for the 1/1/2022 valuation.

In certain situations, under Treasury regulation 1.430(d)-1(d)(2), the plan amendment adopted after the valuation date must be taken into account. That situation occurs when, if the increase in the target normal cost for the year due to the plan amendment were included in the denominator of the AFTAP under IRC section 436, it would mean that the amendment would not be permitted to take effect. This is not the case in this question, as it is stated that if the increases in the target normal cost from the amendment were included as an increase in the funding target for purposes of IRC section 436, the amendment would still be allowed to take effect.

Therefore, while it is not required to include the amendment in the 1/1/2022 valuation, the plan sponsor can elect to do so.

The statement is true.

Answer is A.

Question 35

The minimum required contribution as of the first day of the plan year is equal to the sum of the target normal cost ($70,000) and the shortfall amortization charge. In order to determine the shortfall amortization charge, the funding shortfall must first be determined.

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).

1/1/2022 funding shortfall = $1,000,000 – ($1,015,000 – $30,000) = $15,000

The plan is exempt from creating a shortfall amortization base if the actuarial value of the assets (reduced by the total prefunding balance if the employer elects to use any part of it for 2022 to reduce the minimum contribution requirement) is at least as large as the funding target. The general conditions of the exam state that the plan sponsor elects to use the prefunding balance to pay for the minimum required contribution unless it is not allowed under the Internal Revenue Code. IRC section 430(f)(3) provides that the funding balance cannot be used to offset the minimum required contribution if the funded percentage for the prior year is less than 80%. The funded percentage for this purpose is defined to be the ratio of the prior year actuarial value of assets (reduced by the prefunding balance) to the funding target.

1/1/2021 funded percentage = $1,000,000/$950,000 = 105.26%

The employer can elect to use the prefunding balance to reduce the minimum required contribution in 2022. The plan is not exempt from creating a shortfall amortization base in 2022 since the actuarial value of the assets reduced by the prefunding balance ($1,015,000 – $30,000) is less than the funding target ($1,000,000).

The shortfall amortization base is equal to the funding shortfall, reduced by the outstanding balance of prior amortization bases. 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 shortfall amortization charge is determined by amortizing the funding shortfall over 15 years using the segmented interest rates.

Shortfall amortization charge = $15,000 ÷ 10.3758 = $1,446

The **smallest amount that satisfies the minimum funding standard** on 9/1/2022 ($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. Note that interest is charged for 8 months through the date of the contribution.

$X = ($70,000 + $1,446 – $30,000) × $1.06^{8/12}$ = $43,088

Answer is B.

Question 36

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.

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 2022 are 2018 through 2021. The plan was at-risk in 2019 and 2021, so there is a loading factor to apply in 2022.

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

Load on funding target = (4% × $4,000,000) + ($700 × 750) = $685,000

At-risk funding target with load = $4,700,000 + $685,000 = $5,385,000

Similarly, IRC section 430(i)(2)(A) provides that in an at-risk plan, the target normal cost is equal to the target normal cost determined using the at-risk assumptions.

IRC section 430(i)(2)(B) provides for a load of the target normal cost in an at-risk plan when the plan was at risk in at least two of the past four prior years. The load is equal to 4% of the not at-risk target normal cost.

Load on target normal cost = 4% × $780,000 = $31,200

At-risk target normal cost with load = $920,000 + $31,200 = $951,200

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 four prior years. The plan was most recently not at-risk in 2020, so for 2022, the funding target is equal to 40% of the at-risk funding target (with load) plus 60% of the not at-risk funding target. Similarly, the target normal cost is equal to 40% of the at-risk target normal cost (with load) plus 60% of the not at-risk target normal cost.

1/1/2022 target normal cost = ($951,200 × 40%) + ($780,000 × 60%) = $848,480

1/1/2022 funding target = ($5,385,000 × 40%) + ($4,000,000 × 60%) = $4,554,000

In order to determine the shortfall amortization charge, the funding shortfall must be determined. 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).

1/1/2022 funding shortfall = $4,554,000 – ($3,800,000 – $200,000) = $954,000

The shortfall amortization base is equal to the funding shortfall, reduced by the outstanding balance of prior amortization bases.

1/1/2022 shortfall amortization base = $954,000 – $433,820 = $520,180

The minimum required contribution is:

$X = $848,480 + $46,000 + ($520,180/10.3758) = $848,480 + $46,000 + $50,134 = $944,614

Answer is C.

Question 37

IRC section 430(j)(3)(A) requires that when a quarterly contribution is not made timely, there is an annual effective 5 percentage point interest charge for the period for which the contribution is late. IRC section 430(j)(3)(B)(ii) makes it clear that the period of underpayment runs from the due date of the quarterly contribution to the date that the contribution is made (or the funding balance is elected to be used, as is the case in this question). So the discount using the plan's effective interest rate plus 5 percentage points should be from the date of the election to use the funding balance to the due date of the quarterly contribution, not the valuation date. The statement is false.

Answer is B.

Question 38

Generally, elections with regard to the use of funding balances take effect as they are elected chronologically (Treasury regulation 1.430(f)-1(d)(1)(ii)(A)). The one exception to this rule is with regard to an election to reduce the prefunding balance (including a deemed reduction due to an AFTAP certification), which is deemed to have occurred as of the valuation date for the plan year (Treasury regulation 1.430(f)-1(d)(1)(ii)(B)) and before any election to use the funding balance to pay for the current year minimum required contribution.

The election in statement I is an election to use the prefunding balance for the 2021 minimum required contribution (the year prior to 2022), so that election is taken into account first. The deemed election in statement III, with regard to the 2022 AFTAP certification must be taken into account before any election to use the prefunding balance to pay for the 2022 minimum required contribution, so the election in statement III is taken into account before the election in statement II.

Answer is B.

Question 39

Generally, increases in actuarial accrued liability due to plan amendments in a multiemployer plan are amortized over a period of 15years for purposes of the minimum required contribution (IRC section 431(b)(2)(B)(ii)). However in the case when the benefits are to be paid over a period of less than 15 years rather than as a life annuity, the amortization period is equal to that shorter period of time (IRC section 431(b)(7)(G)).

I. The benefits under this plan amendment are to be paid only in 2022, 2023 and 2024. Therefore, the amortization period would be that 3-year period. The statement is true.

II. Although the certain period added to the normal form of benefit is a 5-year period, the benefit is still payable over the life of the participant (with the first 5 years guaranteed). It would be amortized over 15 years. The statement is false.

III. Although this supplemental benefit is payable for only 3 years (from age 62 to age 65), it is payable for all future retirements (not just for the next 3 years), so it is amortized over 15 years. The statement is true.

Answer is B.

Question 40

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 3-year smoothing period.

The adjustment to the 1/1/2022 market value of assets is equal to ⅔ of the gain/loss during 2021, plus/minus ⅓ of the gain/loss during 2020. Losses are added, and gains are subtracted.

The asset gain/loss has been provided for 2020, but not 2021. The asset gain/loss for 2021 is equal to the difference between the actual market value of assets as of 1/1/2022 ($75,000) and the expected value of assets. The expected value is determined by calculating the expected 2021 earnings using the valuation interest rate of 7%. Note that the benefit payments paid on 7/1/2021 receives 6 months of expected earnings (simple or compound interest can be used – simple interest is used in this solution), and the contribution for 2021 deposited on 4/1/2021 receives 9 months of expected earnings.

Expected $AVA_{1/1/2022}$
$= (\$48{,}000 \times 1.07) + (\$2{,}000 \times 1.0525) - (\$6{,}000 \times 1.035) = \$47{,}255$

The actual assets as of 1/1/2022 are $75,000, so there is a 2021 asset gain of $27,745 ($75,000 – $47,255).

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.

$AVA_{1/1/2022} = \$75{,}000 - (⅔ \times \$27{,}745) + (⅓ \times \$6{,}000)$
$= \$58{,}503$, but not less than $60,000 ($75,000 × 80%)

The actuarial value of assets as of 1/1/2022 is $60,000.

Answer is B.

Question 41

I. When a plan sponsor is using the 24-month average segment rates for funding, the stabilization rules under IRC section 430(h)(2)(C)(iv) must be considered. Under those rules, for years beginning in 2020 through 2030, the segment rates cannot be less than 95% or more than 105% than the applicable 25-year segment rates (subject to a minimum of 5% for each 25-year segment rate). The statement is true.

II. IRC section 430(h)(2)(D)(ii) allows for an election to use the monthly corporate bond yield curve for purposes of the funding interest rate, upon approval by the IRS. The statement is true.

III. IRC section 430(h)(2)(C)(iv) requires that stabilization be considered when the 24-month average segment rates are used for funding. The statement is false.

Answer is A.

Question 42

Quarterly contributions are required for the 2022 plan year in this question because there was a funding shortfall in 2021.

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.

90% of 2022 minimum required contribution = 90% × $500,000 = $450,000

The quarterly contribution due for each quarter of 2022 is equal to 25% of $450,000 (because the 2021 minimum required contribution of $475,000 is more than 90% of the 2022 minimum):

25% × $450,000 = $112,500

The 2022 contribution of $102,000 was made on 2/15/2022, so it is given 2 months of interest (using the 2022 plan effective rate) to the quarterly due date of 4/15/2022, for purposes of determining its value in order to pay for the $112,500 quarterly requirement. The difference is the additional contribution that would need to be paid on 4/15/2022.

$X = $112,500 – ($102,000 × $1.055^{2/12}$) = $9,586

Answer is C.

Question 43

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.

In order to determine the shortfall amortization charge, the funding shortfall must be determined. 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).

Using the funding balances before the correction is made:

1/1/2022 funding shortfall = $500,000 – ($535,000 – $4,720 – $35,400) = $5,120

The plan is exempt from creating a shortfall amortization base if the actuarial value of the assets (reduced by the total prefunding balance if the employer elects to use any part of it for 2022 to reduce the minimum contribution requirement) is at least as large as the funding target. It is stated in the question that that the plan sponsor elects to use the funding balances to pay for the minimum required contribution to the extent allowed. With a target normal cost of $40,000, it is clear that at least part of the prefunding balance can be used to pay for the minimum. The plan is not exempt from creating a shortfall amortization base in 2022 since the actuarial value of the assets reduced by the prefunding balance ($535,000 – $35,400) is less than the funding target ($500,000).

The shortfall amortization base is equal to the funding shortfall, reduced by the outstanding balance of prior amortization bases. 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. So the 2022 shortfall amortization base is $5,120, which is amortized over a period of 15 years.

The minimum required contribution is:

$40,000 + ($5,120/10.3758) = $40,000 + $493 = $40,493

Using the funding balances after the correction is made:

1/1/2022 funding shortfall = $500,000 – ($535,000 – $4,040 – $30,300) = ($660)

IRC section 430(c)(4) provides that the funding shortfall cannot be less than zero, so there is no funding shortfall, and thus, no shortfall amortization base. In addition, IRC section 430(a)(2) provides that 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.

1/1/2022 target normal cost = $40,000 – $660 = $39,340

This is the minimum required contribution after the correction is made.

$X = $40,493 – $39,340 = $1,153

Answer is E.

Question 44

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

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

The general conditions of the exam state that unless the question states otherwise, there are no pre-retirement decrements. So an interest-only discount using the 6.5% valuation interest rate is used here.

Each of the 10 participants are currently age 59 as of the 1/1/2022 valuation date. They will each have 18 years of service at age 63, and 20 years of service at age 65.

For assumed retirement age 63, PVFB = $10 \times \$30 \times 12 \times 18$ years of service $\times \ddot{a}_{63}^{(12)} \times v^4$

$= \$64{,}800 \times 10.62 \times 0.777323 = \$534{,}935$

The temporary annuity is an annuity due for the 4 total years to retirement (from age 59 to 63). Note that all participants are the same age.

The normal cost is:

$[\text{PVFB} - (\text{AVA} - \text{CB})]/ \ddot{a}_{\overline{4}|6.55\%} = [\$534{,}935 - (\$300{,}000 - \$50{,}000)]/3.648476 = \$78{,}097$

For assumed retirement age 65, PVFB = $10 \times \$30 \times 12 \times 20$ years of service $\times \ddot{a}_{65}^{(12)} \times v^6$

$= \$72{,}000 \times 10.17 \times 0.685334 = \$501{,}829$

The temporary annuity is an annuity due for the 6 total years to retirement (from age 59 to 65).

The normal cost is:

$[\text{PVFB} - (\text{AVA} - \text{CB})]/ \ddot{a}_{\overline{6}|6.55\%} = [\$501{,}829 - (\$300{,}000 - \$50{,}000)]/5.155679 = \$48{,}845$

$X = \$78{,}097 - \$48{,}845 = \$29{,}252$

Answer is D.

Question 45

This statement is false for a number of reasons. First, the unfunded accrued liability should be amortized over a period of 10 years, not 15 years. See IRC section 404(a)(1)(iii).

Next, if the minimum required contribution is greater than items I or II in this statement, then that would be the deductible limit (IRC section 404(a)(1)(i).

Finally, the minimum required contribution and the amount described in item I are each potentially limited by the full funding limitation (the amount described in item II is not limited by the full funding limitation). This is described in the last paragraph of IRC section 404(a)(1).

The statement is false.

Answer is B.

Question 46

I. The funded percentage as defined in IRC section 432(j)(2) is equal to the ratio of the actuarial value of assets to the unit credit accrued liability (unit credit is used regardless of the cost method that is used for funding purposes).

   1/1/2022 funded percentage = \$1,050,000/\$1,300,000 = 80.77%

   The statement is true.

II. The funding deficiency as of the end of a plan year is the excess of the charges over the credits in the funding standard account. See IRC section 431(b).

   The 2021 charges in this question are the \$100,000 funding deficiency from 2020, the normal cost of \$150,000, and the amortization charges of \$50,000. As these numbers are all as of 1/1/2021, they must be increased with interest at the 7% valuation interest rate to the end of 2021. The only 2021 credit in this question is the contribution of \$160,000 that was made on 12/31/2021. It does not get adjusted for interest as it is contributed at the end of the year.

   12/31/2021 funding deficiency = [(\$100,000 + \$150,000 + \$50,000) × 1.07] – \$160,000 = \$161,000

   The statement is false.

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

Answer is B.

Question 47

IRC section 432(e)(7)(A) describes the surcharge that is required under the terms of a rehabilitation plan for plans in critical status. The surcharge is equal to 5% of the contribution otherwise required under the terms of the collective bargaining agreement for the first year under the rehabilitation plan, and 10% for each subsequent year. 2021 is the first year that the plan was in critical status, and it is still in critical status for 2022.

Surcharge for 2021 = 5% × $5 × 5,000 hours = $1,250
Surcharge for 2022 = 10% × $5 × 6,000 hours = $3,000

$X = $1,250 + $3,000 = $4,250

Answer is C.

Question 48

IRC section 4071(g)(1) provides that there is no excise tax due when there is a funding deficiency for a multiemployer plan that is in critical status. The statement is false.

Answer is B.

Question 49

The funding deficiency as of the end of a plan year is the excess of the charges over the credits in the funding standard account. See IRC section 431(b).

The 2022 charges in this question are the normal cost of $1,000,000, and the amortization charges of $80,000. As these numbers are all as of 1/1/2022, they must be increased with interest at the 6% valuation interest rate to the end of 2022. The 2022 credits in this question are the 12/31/2021 credit balance of $200,000, and the contribution of $900,000 that was made on 12/31/2022. The contribution does not get adjusted for interest as it is contributed at the end of the year, but the credit balance does receive interest from 12/31/2021 to 12/31/2022.

12/31/2022 funding deficiency = [($1,000,000 + $80,000 – $200,000) × 1.06] – $900,000 = $32,800

The excise tax under IRC section 4971(a)(2) is 5% of the funding deficiency for multiemployer plans.

$X = $32,800 × 5% = $1,640

Answer is B.

Question 50

I. Generally, if the cost method itself has not been changed in any of the past 4 years, the cost method could be changed to the Individual Aggregate cost method under sections 3.04 or 3.05 of Revenue Procedure 2000-40 without IRS approval. However, under section 6.02(5) of the revenue procedure, this automatic approval is not available if the plan benefits have been frozen, as they have been in this question effective 12/31/2021. The statement is false.

II. Section 6.02(5) of the revenue procedure does allow for a change to the unit credit cost method when benefit accruals have been frozen, so the method can be changed from Entry Age Normal to Unit Credit without IRS approval. The statement is true.

III. Section 5.01(3) of the revenue procedure requires that the amortization base created as a result of the change in cost method be amortized over a period of 10 years (not 15 years). The statement is false.

Answer is C.

Question 51

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.

In order to determine the shortfall amortization charge, the funding shortfall must be determined. The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the funding balances).

1/1/2022 funding shortfall = $2,000,000 – $1,600,000 = $400,000

The plan is exempt from creating a shortfall amortization base if the actuarial value of the assets (reduced by the total prefunding balance if the employer elects to use any part of it for 2022 to reduce the minimum contribution requirement) is at least as large as the funding target. There are no funding balances in this question. The plan is not exempt from creating a shortfall amortization base in 2022 since the actuarial value of the assets ($1,600,000) is less than the funding target ($2,000,000).

The shortfall amortization base is equal to the funding shortfall, reduced by the outstanding balance of prior amortization bases. 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. So the 2022 shortfall amortization base is $400,000, which is amortized over a period of 15 years.

Amortization of 2022 shortfall base = $400,000/10.3758 = $38,551

When there is a short plan year, the amortization of the shortfall base is pro-rated (see Treasury regulation 1.430(a)-1(b)(2)(ii)).

Pro-rated shortfall amortization = $38,551 × (9/12) = $28,913

The target normal cost is equal to the sum of the present value of benefits expected to accrue during the plan year and the plan related expenses expected to be paid by the trust during the plan year (IRC section 430(b)()(A)). There is no need to pro-rate this amount for the short year because both pieces of the target normal cost have already been determined with regard to the short year.

Target normal cost as of 1/1/2022 = $100,000 + $15,000 = $115,000

The minimum required contribution is:

$X = $115,000 + $28,913 = $143,913

Answer is D.

Question 52

For single employer plans, the application for a waiver of the minimum funding requirement must be submitted no later than 2½ months after the end of the plan year (IRC section 412(c)(5)(A)). For the plan year beginning on 1/1/2022, that due date would be 3/15/2023, not 9/15/2023 (which is the minimum funding due date for 2022).

The statement is false.

Answer is B.

Question 53

The funding target is based on the accrued benefits as of the first day of the plan year (1/1/2022). Smith is age 64 with 19 years of service as of 1/1/2022.

Monthly accrued benefit for Smith as of 1/1/2022 = 1% × \$100,000/12 × 19 years of service = \$1,583.33

Pre-retirement death benefit as of 1/1/2022 = 100 × \$1,583.33 = \$158,333

The funding target with respect to the death benefit is equal to the present value of the future expected death benefit payments. Smith will reach retirement at age 65, so the only possible death benefit would be payable if Smith died in 2022, with a probability of 0.0072. As the death benefit is payable at the end of the year, it must be discounted with one year of interest. The segment 1 interest rate would be used for this purpose, as the death benefit would be paid within the next 5 years (the period to which segment 1 applies).

$X = \$158,333 \times 0.0072 \times v_{5\%} = \$1,086$

Answer is A.

Question 54

I. In a cash balance plan, the funding target is equal to the present value of the projected hypothetical account balance. The given hypothetical account balance for Smith must be projected to normal retirement age using the plan's interest crediting rate. If the plan's interest crediting rate is increased by 1%, then the projected hypothetical account balance will increase accordingly. This will result in an increase in the funding target. The statement is true.

II. IRC section 430(h)(5) generally requires that changes in actuarial assumptions be approved by the IRS for PBGC covered defined benefit plans. A change in the assumptions with regard to election of alternative forms of benefits would be an example of such assumption requiring IRS approval. However, IRC section 430(h)(5)(B)(ii) provides that IRS approval is not required in the case of a plan with aggregate unfunded vested benefits as of the close of the prior year (when combined with all other defined benefits plan within the controlled group of the employer) that is less than $50,000,000. Therefore, IRS approval is not required with respect to the assumption change. The statement is true.

Answer is D.

Question 55

I. IRC section 431(c)(3)(A) states that the choice of actuarial assumptions should be consistent with past experience of a defined benefit plan. Reducing the valuation interest rate for a multiemployer plan when the experiece shows lower than anticipated rates of returns is reasonable, as it takes into account past experience. With the actuary expecting that the plan may become insolvent, there is no reason to assume that this trend will improve. Reducing the valuation rate is a reasonable change to the valuation interest rate.

II. IRC section 431(c)(3)(A) states that the choice of actuarial assumptions should be consistent with the actuary's reasonable expectations of future experience of a defined benefit plan. The valuation interest rate should be consisitent with the actuary's expectation of future returns on investments of the plan. In this statement, the increase in the valuation rate would not be consistent with the actuary's expectation in this question, and thus is not reasonable. Increasing the valuation rate is <u>not</u> a reasonable change to the valuation interest rate.

III. IRC section 431(c)(6)(E)(i) requires that the interest rate fall within the permissible range, and if it is not, then a new interest rate must be established within the permissible range. The establishment of a new interest rate within the permissible range is a reasonable change to the interest rate.

Answer is B.

Question 56

IRC section 430(j)(3)(A) requires that if there was a funding shortfall for the preceding year, then quarterly contributions are required to be made for a plan year. There was a funding shortfall in 2021 since the FTAP was less than 100%. A plan is subject to liquidity requirements if it is subject to the quarterly contribution requirement and had more than 100 participants on any day of the prior year (IRC section 430(j)(4)(B)). The liquidity requirement applies to this plan since the plan had 550 participants on 1/1/2021.

The liquidity shortfall under IRC section 430(j)(4)(E)(i) is equal to the base amount (three times the adjusted disbursements) less the value of the plan's liquid assets. The liquidity shortfall is determined as of the end of a plan quarter (3/31/2022 in this question).

The adjusted disbursements is equal to the total disbursements during the 12 month period ending on the date the liquidity shortfall is being determined (from 4/1/2021 through 3/31/2022 in this question) reduced by a "percentage" of the non-recurring disbursements (lump sum payments and purchases of annuities). The "percentage" is equal to the plan's funding target attainment percentage (FTAP) for the plan year during which the disbursements occurred (83% in both 2021 and 2022). See IRC section 430(j)(4)(E)(iv).

$\text{Total disbursements}_{3/31/2022} = \$475{,}000 + \$25{,}000 + \$135{,}000 + \$40{,}000 = \$675{,}000$

$\text{Adjusted disbursements}_{3/31/2022} = \$675{,}000 - [83\% \times (\$25{,}000 + \$135{,}000)] = \$542{,}200$

$\text{Liquidity shortfall}_{3/31/2022} = (3 \times \$542{,}200) - \$1{,}400{,}000 = \$226{,}600$

There is one other piece of information provided in this question that could impact the solution. It is given that a contribution of $325,000, made on 3/31/2022, would increase the plan's 1/1/2022 FTAP to 100% (taking into account the expected increase in the funding target due to 2022 benefit accruals). IRC section 430(j)(4)(D) states that the liquidity shortfall is limited to that amount ($325,000). However, the liquidity shortfall is already less than $325,000, so it remains at $226,600.

The contribution of $X due on 4/15/2022 is equal to the greater of the quarterly contribution required ($130,000) or the liquidity shortfall ($226,600). This is $226,600.

Answer is C.

Question 57

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, for plans that do not base their benefits on compensation, future expected increases in the funding target if future increases in benefits (based on expected future plan amendments) were taken into account. For this purpose, the average annual increase in benefits due to plan amendments increasing benefits over the past 6 years is used. There have been no plan amendments, so the expected future increase in this question is $0.

Note that the target normal cost and funding target used for the deductible limit are determined using non-stabilized interest rates.

Cushion amount = 50% × 15,000,000 = 7,500,000

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

$$1{,}400{,}000 + 15{,}000{,}000 + 7{,}500{,}000 - 10{,}000{,}000 = 13{,}900{,}000$$

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 13,900,000 is increased using the 4% effective interest rate (without stabilization) to 12/31/2022, the result is 14,456,000. This is in the same answer range.

Question 58

I. Generally, when a substitute mortality table is used for only one gender because of a lack of credible mortality information with regard to the other gender, the substitute table can no longer be used once credible mortality data is available for the gender that previously lacked the credible data. However, the substitute table can continue to be used if there is also a substitute table available for the other gender (the one that now has credible mortality data). See Treasury regulation 1.430(h)(3)-2(c)(6)(ii)(A). The statement is false.

II. A plan's substitute mortality table cannot be used beginning in the second year following the year in which there is a significant change in the number of individuals covered by the plan. So if there is a significant change in individuals covered by the plan during 2021, then 2023 (not 2022) is the first year in which the substitute table cannot be used. See Treasury regulation 1.430(h)(3)-2(c)(6)(ii)(C). The statement is false.

III. Treasury regulation 1.430(h)(3)-2(c)(6)(iii)(A) states that there is a significant change in the number of individuals covered by a substitute mortality table for a plan year if the number covered is less than 80% or more than 120% of the average number of individuals on which the experience study supporting the substitute table was based. The statement is false.

Answer is A.

Question 59

I. Revenue Procedure 2017-56, Section 3.01(1) allows for automatic approval for the change of the actuarial value of asset method to a method that uses fair market value, provided that the plan has not changed the asset method in any of the prior four years. The statement is true.

II. Revenue Procedure 2017-56, Section 3.01(2) allows for automatic approval for the change of the actuarial value of asset method to a method that uses an average value as allowed under Revenue Notice 2009-22, provided that the plan has not changed the asset method in any of the prior four years. The average must include the fair market value of the assets on the valuation date as well as prior dates within the 24 month period prior to the current valuation date. The time period between valuation dates during the 24-month period must be in equal increments. That is the case with the choice of 6, 12, 18, and 24 months before the valuation date. In addition, the actuarial value of assets cannot be less than 90% or more than 110% of the fair market value. All of these conditions are met in this statement, so the statement is true.

III. Revenue Procedure 2017-56, Section 3.02(1) allows for automatic approval for the change of the valuation date to the first day of the plan year, provided that the plan has not changed the valuation date in any of the prior four years. The statement is true.

Answer is D.

Question 60

IRC section 431(d)(1) provides for an automatic extension of the amortization periods of existing charge bases under certain circumstances, such as when the plan, without the extension, would have an accumulated funding deficiency in the current year, or any of the next 9 years. This automatic extension is for a period of 5 years, not 10 years. (There is an alternative rule, which is not automatic, under IRC section 431(d)(2), in which the extension can be extended to 10 years, with an approved application to the IRS.)

The statement is false.

Answer is B.