Solutions to EA-2(F) Examination
Fall, 2019

Question 1

IRC section 430(h)(2)(C)(iv) requires the use of stabilized interest rates for purposes of determining the minimum funding requirement under IRC 430, when the segment rates are being used. However, IRC section 404(o)(6) states that for the purpose of determining the maximum deductible contribution under IRC section 404, the stabilized interest rates are to be ignored. The statement is false.

Answer is B.

Question 2

IRC section 430(h)(4) requires that when there are optional forms of benefit offered by a plan, then the actuary must make an assumption as to the probability that future benefit payments under the plan will be paid in the form(s) allowed under the terms of the plan. As past experience is not a guarantee of future experience, there is no requirement that the actuary change the assumption for the 2020 plan year to reflect a probility of a lump sum election to be 25%. The statement is false.

Answer is B.

Question 3

Both the 2019 and 2020 AFTAPs are under 60%, so the plan must cease benefit accruals for 2020 under IRC section 436. However, Treasury regulation 1.430(d)-1(c)(1)(iii)(D) requires that the plan be amended to cease benefit accruals in order for the accruals to be disregarded for purposes of the target normal cost. This plan has not been amended to cease benefit accruals, so the accruals (had the AFTAP been at least 60%) would need to be considered for purposes of the 2020 target normal cost. That would result in a non-zero target normal cost. The statement is false.

Answer is B.

Question 4

The funding target is equal to the present value of the benefit accrued as of the first day of the year. In this question, the increase in the 1/1/2020 funding target for Smith is based on the present value of the increased benefit of $20 per month per year of service. Smith is age 42 on 1/1/2020, with 10 years of service.

1/1/2020 increase in accrued benefit = $20 × 10 years of service = $200

Smith is more than 20 years from retirement in this question, so the segment 3 interest rate of 6% is used to discount all benefits. The commutation functions used are found in the tables of supplementary factors provided with the examination, for a female participant using 6% interest. Note that no pre-retirement decrements is assumed based upon the general conditions of the exam. In addition, the normal form of benefit is assumed to be a life annuity, per the general conditions.

The increase in the 1/1/2020 funding target is:

$$\$200 \times 12 \times \frac{N_{65}^{(12)}}{D_{65}} \div 1.06^{23} = \$2{,}400 \times \frac{256{,}348}{21{,}612} \times 0.261797 = \$7{,}453$$

Answer is C.

Question 5

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. All of these items have been provided for the 2020 plan year, other than the amortization of the new base to be created due to the plan amendment. That $150,000 amortization base is amortized over 15 years, and is added to the amortization charges.

$$1/1/2020 \text{ amortization charges} = \$60{,}000 + \frac{\$150{,}000}{\ddot{a}_{\overline{15}|7\%}} = \$75{,}392$$

There is a credit balance if the credits (prior credit balance, contributions, and amortization credits) exceed the charges (normal cost and amortization charges). The credit balance 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).

The contribution for 2020 is contributed on 3/1/2021, so it receives no interest (contributions made after the end of the plan year but within the minimum funding period are deemed to have been made on the last day of the plan year).

Credit balance as of 12/31/2020

$$= [(\$37{,}000 + \$75{,}000 - \$21{,}000 - \$75{,}392) \times 1.07] + \$105{,}000 = \$121{,}701$$

Answer is D.

Question 6

The minimum required contribution under the Projected Unit Credit cost method is equal to the normal cost plus the amortization of the various charge bases less the amortization of the various credit bases. This is increased with interest using the valuation interest rate to the end of the plan year (12/31/2020).

The accrued liability under the Projected Unit Credit cost method is equal to the present value of the "projected" accrued benefit based upon accrual service through the first day of the plan year. The "projected" accrued benefit is determined using projected 3-year average salary, using the assumed salary scale. The normal cost is equal to the present value of the "projected" accrual for the current year, using that same projected salary.

Smith is age 60 with 22 years of past service as of the 1/1/2020 valuation date. The assumed retirement age is 65 (exam general conditions), so salary will be projected for 3, 4, and 5 years.

Final 3-year average salary at 3% = \$65,000 × $\frac{1.03^3 + 1.03^4 + 1.03^5}{3}$ = \$73,179

Final 3-year average salary at 2.5% = \$65,000 × $\frac{1.025^3 + 1.025^4 + 1.025^5}{3}$ = \$71,762

The decrease in the projected salary due to the change in the salary scale assumption is:

\$73,179 – \$71,762 = \$1,417

Decrease in the "Projected" accrued benefit as of 1/1/2020 = 1.1% × \$1,417 × 22 years = \$342.91
Decrease in the "Projected" 2020 accrual = 1.1% × \$1,417 × 1 year = \$15.59

The commutation functions used to determine present values are found in the tables of supplementary factors provided with the examination, for a male participant using 7% interest. The normal form of benefit is assumed to be a life annuity, per the exam general conditions.

Normal cost decrease as of 1/1/2020 = \$15.59 × $\frac{N_{65}^{(12)}}{D_{60}}$ = \$15.59 × $\frac{118{,}961}{16{,}577}$ = \$112

Accrued liability decrease as of 1/1/2020 = \$342.91 × $\frac{N_{65}^{(12)}}{D_{60}}$ = \$342.91 × $\frac{118{,}961}{16{,}577}$ = \$2,461

The decrease in the accrued liability becomes a new credit amortization base, and it is amortized over a 15-year period at the 7% valuation interest rate.

The amortization of the new base is:

$$\frac{\$2{,}461}{\ddot{a}_{\overline{15}|7\%}} = \$253$$

\$X = (\$112 + \$253) × 1.07 = \$390

Answer is C.

Question 7

I. IRC section 430(i)(1)(B)(ii) states that when a plan is at-risk, the actuary must assume that all participants elect to receive the most valuable form of benefit – that is, the benefit which gives the largest present value. This is not necessarily the normal form of benefit. The statement is false.

II. Treasury regulation 1.430(i)-1(c)(3)(ii)(A) states that the special retirement age assumptions that must be used in an at-risk plan do not affect the termination of employment assumptions prior to the assumed retirement age. The statement is true.

III. IRC section 430(i)(1)(B)(i) provides that for participants who could retire in the current plan year or any of the next 10 plan years, those participants shall be assumed to retire at that earliest retirement age (and for those with an earliest age in the current year, they are assumed to retire at the end of the current year). This retirement age assumption does not apply to participants whose earliest retirement age is more than 10 years after the current year. The statement is false.

Answer is C.

Question 8

The 2019 contribution must be discounted using the 2019 plan effective rate of 6% from the date of contribution to 1/1/2019 in order to find the value as of the valuation date.

Discounted value of 2019 contribution = $\$150{,}000/1.06^{6/12} = \$145{,}693$

There is an excess contribution because the discounted value of the 2019 contribution exceeds the minimum required contribution.

2019 excess contribution = \$145,693 – \$100,000 = \$45,693

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

Generally, 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 1/1/2019 prefunding balance is increased with interest using the 2019 actual asset rate of return (see IRC section 430(f)(8)).

1/1/2020 prefunding balance = (\$100,000 × 1.01) + (\$45,693 × 1.06) = \$149,435

Answer is D.

Question 9

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 2019 minimum required contribution, so that election is taken into account first. The deemed election in statement III, with regard to the 2020 AFTAP certification must be taken into account before any election to use the prefunding balance to pay for the 2020 minimum required contribution, so the election in statement III is taken into account before the election in statement II.

Answer is B.

Question 10

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

Age 62: 40%
Age 65: 100% × 60% (probability of NOT retiring at age 62) = 60%

Smith is age 59 as of 1/1/2020.

Normal cost assuming retirement age 62:

Final salary = $\$95{,}000 \times 1.035^3 = \$105{,}328$

2020 accrual reduced to age 62 = 1.3% × \$105,328 × 0.85 = \$1,163.87

$$\text{Normal cost} = \$1{,}163.87 \times \frac{N_{62}^{(12)}}{D_{62}} \div 1.06^3 = \$1{,}163.87 \times \frac{307{,}180}{25{,}634} \times 0.839619 = \$11{,}710$$

The commutation functions used are found in the tables of supplementary factors provided with the examination, for a male participant using 6% interest. Note that the normal form of benefit is assumed to be a life annuity, per the exam general conditions.

Normal cost assuming retirement age 65:

Final salary = $\$95{,}000 \times 1.035^6 = \$116{,}779$

2020 accrual at age 65 = 1.3% × \$116,779 = \$1,518.13

$$\text{Normal cost} = \$1{,}518.13 \times \frac{N_{65}^{(12)}}{D_{65}} \div 1.06^6 = \$1{,}518.13 \times \frac{237{,}129}{21{,}046} \times 0.704961 = \$12{,}058$$

1/1/2020 normal cost = (\$11,710 × 40%) + (\$12,058 × 60%) = \$11,919

Answer is B.

Question 11

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

The adjusted fair market value from a particular valuation date is the fair market value on that date, adjusted for all contributions, benefit payments and administrative expenses that occurred between that valuation date and the current valuation date, and further adjusted for expected earnings based upon the actuary's best estimate of the asset rate of return for the year. If this expected rate of return is larger than the segment 3 interest rate, then that segment 3 interest rate is used. In this question, the segment 3 interest rate for 2019 of 6% is used to determine the expected earnings for that year (the assumed rate of return for 2019 of 7.5% is larger).

The expected earnings for 2019 are:

$$[600{,}000 \times .06] - [(30{,}000 + 7{,}500) \times (1.06^{6/12} - 1)] + [15{,}000 \times (1.06^{3/12} - 1)] = 35{,}111$$

Note that the benefit payments and administrative expenses occurred on 7/1, so there is ½ of a year of expected earnings associated with those transactions. There is also a 2019 contribution of $15,000 deposited on 10/1/2019, so there is ¼ of a year of expected earnings associated with that contribution.

There is also a receivable contribution (for 2019) of $40,000 made on 9/15/2020. There are no expected earnings with regard to this contribution, but it must be included in the actuarial value of assets for the 1/1/2020 valuation as it is a receivable for 2019. It is discounted with interest at the 2019 plan effective rate of 5% for 8½ months, from the date contributed to 1/1/2020.

1/1/2020 present value of 2019 receivable contribution = $40{,}000 \times v_{5\%}^{8.5/12} = 38{,}641$

1/1/2019 adjusted fair market value (adjusted to 1/1/2020)
= 600,000 – 30,000 – 7,500 + 15,000 + 35,111 + 38,641 = 651,252

1/1/2020 fair market value (including 2019 receivable contribution)
= 500,500 + 38,641 = 539,141

1/1/2020 actuarial value = (651,252 + 539,141)/2 = 595,197

Under IRC section 430(g)(3)(B)(iii), the actuarial value cannot be more than 110% of the market value of the assets (including receivable contributions). 110% of $539,141 is equal to $593,055.

The 1/1/2020 actuarial value of assets is equal to $593,055.

Answer is B.

Question 12

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 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 were hired at age 40 (with 25 years of service to age 65), and are currently age 50 as of the 1/1/2020 valuation date. The commutation functions used are found in the tables of supplementary factors provided with the examination, for a <u>male</u> participant using 6% interest.

For the 10 participants:

$$\text{PVFB} = 10 \times \$50 \times 12 \times 25 \text{ years} \times \ddot{a}_{65}^{(12)} \times v^{15} = 10 \times \$15{,}000 \times \frac{N_{65}^{(12)}}{D_{65}} \times 0.417265$$

$$= 10 \times \$15{,}000 \times \frac{237{,}129}{21{,}046} \times 0.417265 = \$705{,}210$$

The temporary annuity is an annuity due for the 15 total years to retirement (from age 50 to 65).

$$\text{NC} = [\text{PVFB} - (\text{AVA} - \text{CB})] / \ddot{a}_{\overline{15}|} = [\$705{,}210 - (\$400{,}000 - \$75{,}000)] / 10.294984 = \$36{,}932$$

Answer is C.

Question 13

Treasury regulation 1.430(a)-1(d)(1) states that the waiver amortization base is amortized using the segment rates for the year in which the contribution is waived. So, for a contribution waived in 2019, the 2019 sgements rates would be used to determine the waiver amortization installment. The statement is true.

Answer is A.

Question 14

The minimum required contribution under the Unit Credit cost method is equal to the normal cost plus the amortization charges of the various bases less the amortization credits of the various bases. All of these items have been provided for the 2020 plan year.

There is a funding deficiency if the charges (normal cost and amortization charges) exceed the credits (prior credit balance, contributions, and amortization credits). The funding deficiency 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).

The contribution for 2020 is contributed on 12/31/2020, so it receives no interest. Note that the amortization charges provided are the net charges (charges less credits).

Funding deficiency as of 12/31/2020

$$= [(\$1{,}000{,}000 + \$500{,}000 - \$250{,}000) \times 1.07] - \$1{,}000{,}000 = \$337{,}500$$

The excise tax on a funding deficiency for a multiemployer plan under IRC section 4971(a)(2) is equal to 5% of the funding deficiency. Note that IRC section 4971(g) provides for special rules for plans in critical or endangered status, which do not apply to this plan.

$X = 5% × $337,500 = $16,875

Answer is A.

Question 15

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. IRC section 404(o)(4)(A) states that for plans with 100 or fewer participants in a plan year, any increase in benefits attributable to plan amendments in the past two years for highly compensated employees (HCEs) are to be ignored for purposes of the cushion amount. This plan has 75 participants in 2020, all of whom are HCEs, so the funding target before the amendment must be used for purposes of the cushion amount. The amendment is taken into account for purposes of the target normal cost and the funding target.

Cushion amount = (50% × 400,000) + 60,000 = 260,000

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

250,000 + 475,000 + 260,000 – 600,000 = 385,000

Answer is B.

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 385,000 is increased using the 3% effective interest rate to 12/31/2020, the result is 396,550. This is in the same answer range.

Question 16

The four quarterly due dates for the 2020 plan year are 4/15/2020, 7/15/2020, 10/15/2020, and 1/15/2021.

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 2020 minimum required contribution = 90% × $610,000 = $549,000

2019 minimum required contribution = $520,000

The quarterly contribution due for each quarter of 2020 is equal to 25% of $520,000 (because 90% of the 2020 minimum required contribution is more than the 2019 minimum):

25% × $520,000 = $130,000

The $150,000 contribution made on 4/1/2020 is enough to satisfy all of the 4/15/2020 and part of the 7/15/2020 quarterly contribution requirements. The amount of the 7/15/2020 quarterly that is not paid for by the 4/1/2020 contribution can be determined by applying the quarterly contributions chronologically to the $150,000 contribution.

Adjusting the $150,000 contribution with interest at the plan effective rate of 6.5% to 4/15/2020:

$150,000 × $1.065^{0.5/12}$ = $150,394

Remaining contribution after 4/15/2020 quarterly applied = $150,394 – $130,000 = $20,394

Adjusting with interest at the plan effective rate of 6.5% to 7/15/2020: $20,394 × $1.065^{3/12}$ = $20,718

7/15/2020 quarterly contribution still due = $130,000 – $20,718 = $109,282

The prefunding balance has been elected to be used to pay for the remaining quarterly contributions, until it is exhausted. It is increased from the first day of the plan year to the 7/15/2020 quarterly due date using the 2020 plan effective rate.

Prefunding balance as of 7/15/2020 = $200,000 × $1.065^{6.5/12}$ = $206,940

Remaining prefunding balance after 7/15/2020 quarterly applied = $206,940 – $109,282 = $97,658

Adjusting with interest at the plan effective rate of 6.5% to 10/15/2020: $97,658 × $1.065^{3/12}$ = $99,208

$X = 10/15/2020 quarterly contribution still due = $130,000 – $99,208 = $30,792

Answer is A.

Question 17

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 2020 minimum required contribution = 90% × $8,000 = $7,200

2019 minimum required contribution = $6,000

The quarterly contribution due for each quarter of 2020 is equal to 25% of $6,000 (because 90% of the 2020 minimum required contribution is more than the 2019 minimum):

25% × $6,000 = $1,500

Answer is C.

Note: Quarterly contributions are required only if the Funding Target Attainment Percentage (FTAP) for the prior year was less than 100%. The FTAP is equal to the ratio of the actuarial value of assets reduced by the funding balances to the funding target. The FTAP as of 1/1/2019 is:

FTAP = ($154,000 – $3,000)/$153,000 = 98.69%

Quarterly contributions are therefore required for 2020. Note that if the 2019 FTAP had been at least 100% then the answer to this question would have been $0.

Question 18

The accrued liability under the Projected Unit Credit cost method is equal to the present value of the "projected" accrued benefit based upon accrual service through the first day of the plan year. The "projected" accrued benefit is determined using projected 3-year average salary, using the assumed salary scale. When there are various assumed retirement ages, each present value must include the value if the participant retired at each assumed age, multiplied by the probability of retiring at that age. In this question, the assumed retirement ages are 62 and 65. The assumed probability of retiring at each age is:

Age 62: 20%
Age 65: 80% × 100% (probability of NOT retiring at age 62) = 80%

Smith is age 60 with 5 years of service as of 1/1/2020. For assumed retirement age of 62, the 3-year average salary will be the average of the 2019 salary and projected salary for 2020 and 2021. For assumed retirement age of 65, the 3-year average salary will be the average of the projected salary for 2022, 2023 and 2024.

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

Age 62 assumed retirement

Projected final average salary = \$52,000 × $\frac{1+1.03+1.03^2}{3}$ = \$53,575.60

1/1/2020 "projected" accrued benefit (with early retirement reduction)
= 1% × \$53,575.60 × 5 years of service × 0.85 = \$2,277

1/1/2020 accrued liability = \$2,277 × $\frac{N_{62}^{(12)}}{D_{60}}$ = \$2,277 × $\frac{157,588}{16,577}$ = \$21,646

Age 65 assumed retirement

Projected final average salary = \$52,000 × $\frac{1.03^3+1.03^4+1.03^5}{3}$ = \$58,543.50

1/1/2020 "projected" accrued benefit = 1% × \$58,543.50 × 5 years of service = \$2,927

1/1/2020 accrued liability = \$2,927 × $\frac{N_{65}^{(12)}}{D_{60}}$ = \$2,927 × $\frac{118,967}{16,577}$ = \$21,006

\$X = (20% × \$21,646) + (80% × \$21,006) = \$21,134

Answer is C.

Question 19

This statement is from Treasury regulation 1.430(j)-1(d)(1)(i) and is a true statement.

Answer is A.

Question 20

The four quarterly due dates for the 2020 plan year are 4/15/2020, 7/15/2020, 10/15/2020, and 1/15/2021.

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 2020 minimum required contribution = 90% × $1,000,000 = $900,000

2019 minimum required contribution = $800,000

The quarterly contribution due for each quarter of 2020 is equal to 25% of $800,000 (because 90% of the 2020 minimum required contribution is more than the 2019 minimum):

25% × $800,000 = $200,000

The first three quarterly contributions are made timely, and must be discounted using the plan effective rate of 5% to 1/1/2020, to find their value for purposes of paying for the 2020 minimum required contribution.

Value of contributions on 1/1/2020 = $200,000/$1.05^{3.5/12}$ + $200,000/$1.05^{6.5/12}$ + $200,000/$1.05^{9.5/12}$
= $197,174 + $194,784 + $192,422 = $584,380

Remaining 2020 minimum required contribution due = $1,000,000 – $584,380 = $415,620

As the final contribution for 2020 is not made until 9/15/2021, the 1/15/2021 required quarterly contribution is late by 8 months. An additional 5 percentage points (for a total 10% rate) must be used to discount the contribution for those 8 months (and then discounted using 5% for the remaining period).

The present value of the $200,000 contribution late quarterly contribution, made on 9/15/2021, as of 1/1/2020 is:

$\$200{,}000 \times v_{10\%}^{8/12} \times v_{5\%}^{12.5/12} = \$200{,}000 \times 0.938436 \times 0.950447 = \$178{,}387$

Remaining 2020 minimum required contribution due = $415,620 – $178,387 = $237,233

Final contribution on 9/15/2021 = $200,000 + ($237,233 × $1.05^{20.5/12}$) = $457,854

As there is no prefunding balance, this is $X, the smallest amount needed to satisfy the minimum funding standard for 2020.

Answer is D.

Question 21

Note that normal retirement date is assumed to be age 65 in this question, per the exam general conditions.

I. The eligibility for receiving post retirement benefits is increased from age 60 to age 62, so it should be expected that more participants will wait until age 62 to retire (who would have previously retired at ages 60 or 61). The reduction in the retirement rates at ages 60 and 61 is reasonable.

II. As stated above, more participants would be expected to wait to retire at age 62, so the increase in retirement rates at age 62 is reasonable.

III. The amendment to allow for actuarial increases in the benefit post retirement is more favorable to participants retiring after normal retirement age, so it is reasonable to assume that some participants will retire after age 65. As a result, it is reasonable to reduce the 100% assumption of retirement at age 65, and extend the retirement rate table to later ages.

All three statements describe reasonable changes to the assumed retirement age.

Answer is D.

Question 22

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. All of these items have been provided for the 2020 plan year, other than the amortization of the new base to be created due to the assumption change. That amortization base is equal to the difference between the accrued liability after the assumption change and the accrued liability before the assumption change. It is a charge base because the new accrued liability exceeds the old accrued liability.

New amortization base = \$1,100,000 – \$1,000,000 = \$100,000

This is amortized over 15 years, and is added to the amortization charges.

1/1/2020 new amortization charge = $\frac{\$100,000}{\ddot{a}_{\overline{15}|6\%}} = \$9,713$

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 (12/31/2020).

\$X = (\$250,000 + \$200,000 – \$140,000 + \$9,713 – \$20,000) × 1.06 = \$317,696

Answer is B.

Question 23

Treasury regulation 1.430(d)-1(f)(4)(iii)(B) states that when a plan offers an optional form of payment subject to the rules of IRC section 417(e)(3), such as a lump sum, then for funding purposes, the funding mortality table must be replaced by the IRC section 417(e)(3) applicable mortality table for post-retirement purposes. However, the funding segment interest rates are still used. This is the case when the lump sum is determined using the applicable interest rate and mortality table, as in this question. The statement is **false** because it is the applicable mortality table that is substituted for the funding mortality table, and the interest rates are not affected.

Answer is B.

Question 24

Generally, under IRC section 431(b)(2)(B)(ii) requires that the increase in the liabilities under a plan amendment for a multiemployer plan is amortized over a period of 15 years. However, IRC section 431(b)(7)(G) states that when the benefits are not payable as a life annuity but over a period of less than 15 years, then the amortization base is amortized over the period of time the benefits are actually paid. In this question, that is 3 years. The statement is false.

Answer is B.

Question 25

IRC section 430(f)(8) provides that the prior year prefunding balance is adjusted based upon the rate of return for the prior year of the market value of assets (not actuarial value of assets). The statement is false.

Answer is B.

Question 26

Additions to the prefunding balance may be elected through the minimum funding due date (see Treasury regulation 1.430(f)-1(f)(2)(i)), which is 9/15/2021 (not the Form 5500 due date of 10/15/2021). The statement is false.

Answer is B.

Question 27

IRC section 430(j)(3)(A) requires that quarterly contributions be made for a plan year if there is a funding shortfall for the prior year. In this question the 1/1/2019 actuarial value of assets exceeds the 1/1/2019 funding target, so there is no funding shortfall in 2019 (the funding shortfall under IRC section 430(c)(4) is equal to the excess of the funding target over the actuarial value of assets, reduced by the funding balances). As a result there is no quarterly contribution requirement for 2020. The statement is false.

Answer is B.

Question 28

IRC section 430(j)(4)(E)(ii)(I) defines the base amount for a quarter to be 3 times the adjusted disbursements for the 12 month period ending on the last day of the quarter. The statement is true.

Answer is A.

Question 29

The funding target is equal to the present value of the benefit accrued as of the first day of the year. Smith is 20 years from retirement in this question, so the segment 3 interest rate of 7% is used to discount all benefits. 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 no pre-retirement decrements is assumed based upon the general conditions of the exam.

The 1/1/2020 funding target (assuming Smith elects a single life annuity) is:

$$\$3{,}500 \times 12 \times \frac{N_{65}^{(12)}}{D_{65}} \div 1.07^{20} = \$42{,}000 \times \frac{118{,}961}{11{,}432} \times 0.258419 = \$112{,}942$$

Treasury regulation 1.430(d)-1(f)(4)(iii)(B) states that when a plan offers an optional form of payment subject to the rules of IRC section 417(e)(3), such as a lump sum, then for funding purposes, the funding mortality table must be replaced by the IRC section 417(e)(3) applicable mortality table. However, the funding segment interest rates are still used. This is the case when the lump sum is determined using the applicable interest rate and mortality table, as in this question. So for funding, the applicable mortality table and 7% interest (the funding interest rate) are used.

The 1/1/2020 funding target (assuming Smith elects a lump sum) is:

$\$3{,}500 \times 12 \times 10.68 \div 1.07^{20} = \$42{,}000 \times 10.68 \times 0.258419 = \$115{,}916$

$\$X = (\$112{,}942 \times 50\%) + (\$115{,}916 \times 50\%) = \$114{,}429$

Answer is B.

Question 30

The normal cost under the Projected Unit Credit cost method is equal to the present value of the increase in the "projected" accrued benefit for the plan year. The "projected" accrued benefit is determined using projected 3-year average salary, using the assumed salary scale.

Smith is age 60 as of the 1/1/2020 valuation date. The assumed retirement age is 65 (exam general conditions), so salary will be projected for 3, 4, and 5 years.

$$\text{Final 3-year average salary at 3\%} = \$30{,}000 \times \frac{1.03^3 + 1.03^4 + 1.03^5}{3} = \$33{,}775$$

The commutation functions used to determine present values are found in the tables of supplementary factors provided with the examination, for a male participant using 5% interest. Note that no pre-retirement decrements is assumed based upon the general conditions of the exam. The normal form of benefit is assumed to be a life annuity, per the exam general conditions.

$$\text{Normal cost as of 1/1/2020} = 2\% \times \$33{,}775 \times \frac{N_{65}^{(12)}}{D_{65}} \div 1.05^5$$

$$= \$675.50 \times \frac{477{,}826}{38{,}972} \times 0.783526 = \$6{,}489$$

Answer is B.

Question 31

When the asset valuation method is the market value of assets, receivable contributions for the prior plan year must be added to the market value, discounted with interest using the plan effective rate for the plan year for which the contribution is made. The 9/1/2020 contribution for 2019 of \$200,000 must be discounted for 8 months using the 2019 plan effective rate of 5.5%.

$X = \$750{,}000 + (\$200{,}000/1.055^{8/12}) = \$942{,}987$

Answer is B.

Question 32

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.

This 2019 waived deficiency is amortized under IRC section 430(e) over a period of 5 years, beginning with 2020. The amortization is based upon the 2019 segment rates (the year in which the deficiency was waived). The segment 1 rate applies to the first 4 payments (from 1/1/2020 through 1/1/2023) and the segment 2 rate applies to the final payment on 1/1/2024. Note the use of an annuity-immediate because the first payment is on 1/1/2020, one year after the waived deficiency is created.

$$\text{Amortization of 2019 waived deficiency} = \frac{\$70{,}000}{a^{-}_{\overline{4}|5\%} + v^{5}_{6\%}} = \$16{,}305$$

The outstanding balance of the 2019 shortfall amortization base as of 1/1/2020 can be determined using the 6-year amortization factor for 2020 (there are 6 years left to pay off the 2019 shortfall base). The factor can be found in the table of selected amortization factors (for the segment rates 5%, 6%, 7%), provided with the exam.

Outstanding balance of 2019 shortfall amortization base as of 1/1/2020 = \$36,328 × 5.2932 = \$192,291

Similarly, the outstanding balance of the 2019 waived deficiency can be found using the same table of factors (using a 5-year amortization factor as there are still 5 payments remaining as of 1/1/2020). Note that the present value of future payments can be determined using an annuity due factor as the first payment will be made on 1/1/2020.

Outstanding balance of 2019 waived deficiency as of 1/1/2020 = \$16,305 × 4.5460 = \$74,123

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

$\text{Funding shortfall}_{1/1/2020}$ = \$340,000 – \$150,000 = \$190,000

The 2020 shortfall base is equal to the funding shortfall less the sum of the outstanding balances of the prior shortfall base and waived deficiency base. The 2020 shortfall base is amortized over 7 years.

2020 shortfall amortization base = \$190,000 – (\$192,291 + \$74,123) = (\$76,414)

Amortization of 2020 shortfall base = (\$76,414)/5.9982 = (\$12,739)

2020 **minimum required contribution** = \$50,000 + \$36,328 + \$16,305 – \$12,739 = \$89,894

Answer is B.

Question 33

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

The 2019 receivable contribution made on 7/1/2020 must be discounted to 1/1/2020 using the 2019 plan effective rate and added to the 1/1/2020 market value of assets.

1/1/2020 market value of assets = \$12,000,000 + (\$600,000/$1.06^{6/12}$) = \$12,582,772

The funding shortfall for 2020 is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the funding balances).

The funding shortfall as of 1/1/2020 is:

\$11,300,000 – (\$12,582,772 – \$270,000 – \$520,000) = \$0

Note that the funding shortfall cannot be less than \$0.

IRC section 430(c)(6) provides that when the funding shortfall is zero, then all prior shortfall amortization bases are deemed fully amortized. In addition, IRC section 430(c)(5) provides that when the actuarial value of assets exceeds the funding shortfall (clearly the case in this question), then there is no new shortfall amortization base determined for the current year. As a result, there are no shortfall amortization bases in 2020.

IRC section 430(a)(2) states that when the actuarial value of the assets (reduced by the funding balances) exceeds the funding target, then the target normal cost is reduced by that excess.

1/1/2020 minimum required contribution
= \$1,800,000 – [(\$12,582,772 – \$270,000 – \$520,000) – \$11,300,000] = \$1,307,228

\$X = \$1,307,228 – \$270,000 = \$1,037,228

Answer is C.

Question 34

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 as of 1/1/2020 (with 10 years of past service), 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 female participant using 4% and 5% interest.

Final salary is equal to 2019 salary as the salary scale cannot be used to project future salary increases for purposes of the funding target.

$$\$X = \text{Funding target} = 1.20\% \times \$115{,}000 \times 10 \text{ years of service} \times \left[\frac{N^{(12)}_{65@4\%} - N^{(12)}_{70@4\%}}{D_{65@4\%}} v^{15}_{4\%} + \frac{N^{(12)}_{70@5\%}}{D_{65@5\%}} v^{15}_{5\%} \right]$$

$$= \$13{,}800 \times \left[\frac{1{,}063{,}280 - 730{,}079}{74{,}544} (0.555265) + \frac{344{,}066}{40{,}020} (0.481017) \right] = \$91{,}320$$

If instead of using the actual 2019 salary, the expected salary from 2018 (increased for one year with the 3% salary scale) is used, the expected 2019 salary is \$103,000 (\$100,000 × 1.03).

$$\$Y = \text{Funding target} = 1.20\% \times \$103{,}000 \times 10 \text{ years of service} \times \left[\frac{N^{(12)}_{65@4\%} - N^{(12)}_{70@4\%}}{D_{65@4\%}} v^{15}_{4\%} + \frac{N^{(12)}_{70@5\%}}{D_{65@5\%}} v^{15}_{5\%} \right]$$

$$= \$12{,}360 \times \left[\frac{1{,}063{,}280 - 730{,}079}{74{,}544} (0.555265) + \frac{344{,}066}{40{,}020} (0.481017) \right] = \$81{,}791$$

$\$X - \$Y = \$91{,}320 - \$81{,}791 = \$9{,}529$

Note that this also could have been determined directly from the actual funding target by multiplying the actual funding target by the ratio of the differences in salary to actual 2019 salary:

$$\$91{,}320 \times \frac{\$115{,}000 - \$103{,}000}{\$115{,}000} = \$9{,}529$$

Answer is B.

Question 35

The accrued liability under the Projected Unit Credit cost method is equal to the present value of the "projected" accrued benefit as of the first day of the plan year. The "projected" accrued benefit is determined with projected 3-year average salary, using the assumed salary scale.

Smith is age 59 with 17 years of service as of the 1/1/2020 valuation date. The assumed retirement age is 65 (exam general conditions), so salary will be projected for 4, 5, and 6 years.

Smith's expected 2019 salary = \$62,000 × 1.03 = \$63,860

Excess of 2019 actual salary over expected salary = \$64,500 – \$63,860 = \$640

\$X will be equal to the present value of the 1/1/2020 "projected" accrued benefit using the excess 2019 salary.

$$\text{Final 3-year average excess salary at 3\%} = \$640 \times \frac{1.03^4 + 1.03^5 + 1.03^6}{3} = \$742.15$$

The commutation functions used to determine present values are found in the tables of supplementary factors provided with the examination, for a <u>male</u> participant using 7% interest. Note that no pre-retirement decrements is assumed based upon the general conditions of the exam. The normal form of benefit is assumed to be a life annuity, per the exam general conditions.

$$\$X = 1\% \times \$742.15 \times 17 \text{ years of service} \times \frac{N_{65}^{(12)}}{D_{65}} \div 1.07^6 = \$126.17 \times \frac{118{,}961}{11{,}432} \times 0.666342 = \$875$$

Answer is C.

Question 36

The 5-year extension of the amortization period under IRC section 431(d) for bases established on or before 1/1/2020 requires a reamortization of the outstanding balance of the bases as of 1/1/2020, with an additional 5 years added to the remaining period. Note that the 2019 actuarial gain or loss and the 1/1/2020 decrease in liabilty due to the plan amendment of $1,600,000 are established on 1/1/2020 and are not included in the extension of amortization period. The extension only applies to charge bases, so the given actuarial gain base (a credit base) is not affected. Finally, the special amortization base under IRC section 431(b)(8)(A) also cannot be extended.

It is not necessary to calculate $X and $Y as defined in this question, because the bases that cannot be extended will have the same amortizations and therefore balance out. It is only necessary to look at the two bases that are extended, the charge base due to the plan amendment and the actuarial loss base. The difference in their amortizations before and after the extension will be the answer to this question.

Charge base due to plan amendment

Amortization as of 1/1/2019 = $\frac{\$1{,}500{,}000}{\ddot{a}_{\overline{2}|}} = \$775{,}362$

Outstanding balance as of 1/1/2020 = $\$775{,}362 \times \ddot{a}_{\overline{1}|} = \$775{,}362$

New amortization as of 1/1/2020 = $\frac{\$775{,}362}{\ddot{a}_{\overline{6}|}} = \$152{,}026$

Actuarial Loss

Amortization as of 1/1/2019 = $\frac{\$1{,}100{,}000}{\ddot{a}_{\overline{15}|}} = \$112{,}873$

Outstanding balance as of 1/1/2020 = $\$112{,}873 \times \ddot{a}_{\overline{14}|} = \$1{,}056{,}226$

New amortization as of 1/1/2020 = $\frac{\$1{,}056{,}226}{\ddot{a}_{\overline{19}|}} = \$95{,}508$

$X – $Y = ($775,362 – $152,026) + ($112,873 – $95,508) = $640,701

Answer is B.

Question 37

Smith is 60 years old with 15 years of service as of the 1/1/2020 valuation date. The service requirement in order to receive the supplemental benefit is 15 years, so the supplemental benefit would be paid at the early retirement age of 62.

Treasury regulation 1.430(d)-1(c)(1)(ii) provides rules for allocating a benefit that is not earned as a function of years of service with regard to the funding target. In this case, Smith will have 17 years of service at age 62. Therefore, 15/17 of the $400 per month supplemental benefit is used as the supplemental benefit for the funding target.

Supplemental benefit for funding target = $400 × 15/17 = $352.94

The funding target is equal to the present value of the $352.94 with regard to the supplemental benefit. The supplemental benefit is assumed to be paid beginning at age 62 (with a probability of 50%), and ending at age 65. With Smith currently age 60, only the segment 1 interest rate of 5% is used (all benefit payments will be made within 5 years from the 1/1/2020 valuation date). The commutation functions used are found in the tables of supplementary factors provided with the examination, for a male participant using 5% interest.

$$\text{Supplemental benefit funding target} = 50\% \times \$352.94 \times 12\, \ddot{a}^{(12)}_{62:\overline{3}|5\%} \times v^2_{5\%}$$

$$= \$2{,}117.64 \times \left[\frac{N^{(12)}_{62@5\%} - N^{(12)}_{65@5\%}}{D_{62@5\%}}\right] \times 0.907029$$

$$= \$2{,}117.64 \times \left[\frac{605{,}592 - 477{,}826}{46{,}137}\right] \times 0.907029 = \$5{,}319$$

$X = $5,319

Answer is D.

Question 38

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 2020 are 2016 through 2019. The plan was at-risk in 2016 and 2017, so there is a loading factor to apply in 2020.

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

Load = (4% × $1,000,000) + ($700 × 550) = $425,000

At-risk funding target with load = $1,240,000 + $425,000 = $1,665,000

IRC section 430(i)(5) provides for a transition to the at-risk year when a plan was not at-risk in the immediately prior year. The plan was not at-risk in 2019, so for 2020, the funding target is equal to 20% of the at-risk funding target (with load) plus 80% of the not at-risk funding target.

$X = ($1,665,000 × 20%) + ($1,000,000 × 80%) = $1,133,000

Answer is C.

Question 39

The credit balance as of 1/1/2020 is not provided in this question, so the balance equation as of 1/1/2020 must be used to determine the credit balance. The balance equation is:

Unfunded liability = Outstanding balance of amortization bases – Credit balance

In an immediate gain method, such as unit credit, the unfunded liability is equal to the difference between the accrued liability and the actuarial value of the assets.

$\text{Unfunded liability}_{1/1/2020} = \$2{,}000{,}000 - \$1{,}500{,}000 = \$500{,}000$

1/1/2020 net outstanding balance of bases = \$925,000 – \$300,000 – \$50,000 = \$575,000

Note that the 2019 gain of \$50,000 is not included in the given outstanding balance of the credit bases, so it was subtracted as a separate item.

Substituting into the balance equation:

$\$500{,}000 = \$575{,}000 - \text{Credit balance}_{1/1/2020} \quad \rightarrow \quad \text{Credit balance}_{1/1/2020} = \$75{,}000$

The 2019 experience gain is amortized over a period of 15 years (IRC section 431(b)(3)(B)(iii)).

$\$50{,}000 / \ddot{a}_{\overline{15}|} = \$5{,}131$

There is a credit balance if the credits (prior credit balance, contributions, and amortization credits) exceed the charges (normal cost and amortization charges). The credit balance 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).

The contribution for 2020 is contributed on 2/1/2020, so it receives 11 months of interest.

Credit balance as of 12/31/2020

$= (\$75{,}000 \times 1.07) + (\$86{,}500 \times 1.07^{11/12}) - [(\$40{,}000 + \$100{,}000 - \$60{,}000 - \$5{,}131) \times 1.07]$

$= \$92{,}175$

Answer is D.

Question 40

When the employer elects to use a funding balance to offset the minimum required contribution, it is also used to pay for the quarterly contribution requirement, as long as the election is made by the quarterly due date (which it is in this question).

The 1/1/2020 prefunding balance is increased using the 2020 plan effective rate to the first quarterly due date of 4/15/2020:

$\$75{,}000 \times 1.065^{3.5/12} = \$76{,}390$

This is enough to pay for the $50,000 contribution required on 4/15/2020. The remainder of the prefunding balance is:

$\$76{,}390 - \$50{,}000 = \$26{,}390$

The remaining prefunding balance is increased using the 2020 plan effective rate to the second quarterly due date of 7/15/2020:

$\$26{,}390 \times 1.065^{3/12} = \$26{,}809$

This is not enough to pay for the entire 7/15/2020 quarterly contribution requirement. The remaining required quarterly contribution is:

$\$50{,}000 - \$26{,}809 = \$23{,}191$

This is the smallest amount needed to be paid on 7/15/2020 in order to satisfy the quarterly contribution requirement on that date.

$\$X = \$23{,}191$

Answer is B.

Question 41

Treasury regulation 1.430(d)-1(d)(1)(i) requires that a plan amendment that is adopted as of the valuation date and effective before the end of the plan year must be used in the valuation unless prohibited under IRC section 436. IRC section 436(c) states that a plan amendment cannot take effect if either the AFTAP is less than 80% or the AFTAP (reflecting the plan amendment in the funding target) is less than 80%. It is given in the question that the AFTAP (including the plan amendment) is 85%. The AFTAP without regard to the plan amendment would have to be greater than 85%. The amendment is therefore allowed to be reflected in the 2020 valuation.

The statement is true.

Answer is A.

Question 42

The accrued liability under the Entry Age Normal funding method is equal to the accumulated value of the prior normal costs (as of the 1/1/2020 valuation date). The prior normal costs are based upon the projected benefit at assumed retirement age (65 in this question, per the general conditions of the exam), and are assumed to begin at hire age. Smith will have 18 years of service at age 65.

Projected benefit = \$150 × 18 years of service = \$2,700

The present value of future benefits (PVFB) must be determined at entry age (age at hire). Smith was hired at age 47. 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 female participant using 7% interest.

$$PVFB_{47} = \$2{,}700 \times 12 \times \frac{N_{65}^{(12)}}{D_{65}} \times v^{18} = \$32{,}400 \times \frac{128{,}063}{11{,}739} \times 0.295864 = \$104{,}575$$

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

$$NC = PVFB_{47} / \ddot{a}_{\overline{18}|.07} = \$104{,}575/10.76322 = \$9{,}716$$

The accrued liability is equal to the accumulation of the past normal costs through Smith's current age on 1/1/2020 (15 years of accumulation from age 47 to 62).

$$AL = NC \times \ddot{s}_{\overline{15}|.07} = \$9{,}716 \times 26.88805 = \$261{,}244$$

Answer is C.

Question 43

A Social Security level income option 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 2020, the actuary has not certified the AFTAP as of 4/1/2020. The AFTAP at that time is deemed to be 75% (ten percentage points less than the 2019 certified AFTAP). 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).

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

$$= \frac{\$300{,}000 - \$7{,}000 - \$10{,}000}{\text{Presumed funding target}}$$

→ Presumed funding target = $377,333

If both the prefunding balance and funding standard carryover balance are reduced to zero, then the presumed AFTAP would be:

$$\frac{\$300{,}000}{\$377{,}333} = 79.5\%$$

No funding balances are required to be reduced because any reduction would not increase the presumed AFTAP to 80%, and the restriction on accelerated benefits would still apply. The statement is false.

Answer is B.

Question 44

The accrued liability under the Projected Unit Credit cost method is equal to the present value of the "projected" accrued benefit based upon accrual service through the first day of the plan year. The "projected" accrued benefit is determined using the assumed salary scale. In this question, there is nothing to project, as the accrued benefit is a flat dollar amount independent of salary.

Smith is age 50 with 25 years of service as of 1/1/2020. The commutation functions used are found in the tables of supplementary factors provided with the examination, for a male participant using 6% interest.

1/1/2020 accrued benefit = \$160 × 25 years of service = \$4,000

1/1/2020 reduced accrued benefit (with early retirement reduction) = \$4,000 × 0.80 = \$3,200

1/1/2020 accrued liability (before amendment) = $\$3{,}200 \times 12 \times \frac{N_{60}^{(12)}}{D_{50}} = \$38{,}400 \times \frac{362{,}032}{53{,}487} = \$259{,}914$

Under the plan amendment, the accrued benefit payable at age 60 is not reduced, and an additional benefit of \$32 per month per year of service is provided from age 60 to age 65.

Additional benefit for Smith as of 1/1/2020 = \$32 × 25 years of service = \$800

1/1/2020 accrued liability (after amendment) = $(\$4{,}000 \times 12 \times \frac{N_{60}^{(12)}}{D_{50}}) + (\$800 \times 12 \times \frac{N_{60}^{(12)} - N_{65}^{(12)}}{D_{50}})$

$= (\$48{,}000 \times \frac{362{,}032}{53{,}487}) + (\$9{,}600 \times \frac{362{,}032 - 237{,}129}{53{,}487}) = \$347{,}311$

\$X = \$347,311 – \$259,914 = \$87,397

Answer is D.

Question 45

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

The funding shortfall for 2020 is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the funding balances).

The funding shortfall as of 1/1/2020 is:

$1,860,000 – ($1,900,000 – $20,000) = $0

Note that the funding shortfall cannot be less than $0.

IRC section 430(c)(6) provides that when the funding shortfall is zero, then all prior shortfall amortization bases are deemed fully amortized. In addition, IRC section 430(c)(5) provides that when the actuarial value of assets exceeds the funding shortfall (clearly the case in this question), then there is no new shortfall amortization base determined for the current year. As a result, there are no shortfall amortization bases in 2020.

IRC section 430(a)(2) states that when the actuarial value of the assets (reduced by the funding balances) exceeds the funding target, then the target normal cost is reduced by that excess.

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

1/1/2020 target normal cost = $100,000 + $10,000 – $7,000 = $103,000

1/1/2020 minimum required contribution = $103,000 – [($1,900,000 – $20,000) – $1,860,000]
= $83,000

Answer is C.

Question 46

In a cash balance plan, the target normal cost is equal to the present value of the pay credit for the year. In this question, the 2020 pay credit for Smith, as of 12/31/2020, is $5,000. In order to determine the present value for funding purposes, the pay credit must be accumulated to the assumed retirement age (65 in this question, based upon the general conditions of the exam) using the interest crediting rate (5% in this question). That accumulated value is then discounted using the funding interest rate. Smith is age 46 on 1/1/2020, so the lump sum would be paid in 19 years. The segment 2 rate of 6% is used for funding (segment 2 rates are used for payments made 6 to 20 years from the valuation date). Note that the interest accumulation is for 18 years (from 12/31/2020) and then discounted for 19 years (to the valuation date of 1/1/2020).

1/1/2020 target normal cost = $\$5{,}000 \times 1.05^{18} \div 1.06^{19} = \$3{,}977$

Answer is C.

Question 47

IRC section 430(h)(3)(C)(iv) requires that when a substitute mortality table is used, <u>all</u> plans of the employer must use the substitute table. The statement is false.

Answer is B.

Question 48

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 4-year smoothing period.

The adjustment to the 1/1/2020 market value of assets is equal to ¾ of the gain/loss during 2019, plus/minus ½ (two-fourths) of the gain/loss during 2018, plus/minus ¼ of the gain/loss during 2017. Losses are added, and gains are subtracted.

The asset gain/loss has been provided for each year other than 2019. The asset gain/loss for 2019 is equal to the difference between the actual market value of assets as of 1/1/2020 ($9,000,000) and the expected value of assets. The expected value is determined by calculating the expected 2019 earnings using the valuation interest rate of 7%. Note that as benefit payments, expenses and contributions all are paid on 7/1/2019, everything receives a half year of expected earnings (simple or compound interest can be used – simple interest is used in this solution).

Expected $AVA_{1/1/2020}$
= ($10,000,000 × 1.07) + ($1,500,000 × 1.035) – ($200,000 × 1.035) – ($40,000 × 1.035)
= $12,004,100

The actual assets as of 1/1/2020 are $9,000,000, so there is a 2019 asset loss of $3,004,100 ($12,004,100 – $9,000,000).

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.

$AVA_{1/1/2020}$ = $9,000,000 + (¾ × $3,004,100) – (½ × $400,000) – (¼ × $200,000)
= $11,003,075, but not more than $10,800,000 ($9,000,000 × 120%)

The actuarial value of assets as of 1/1/2020 is $10,800,000.

Answer is D.

Question 49

The 2019 contribution must be discounted using the 2019 plan effective rate of 5% from the date of contribution to 1/1/2019 in order to find the value as of the valuation date.

Discounted value of 2019 contribution = $26,000/1.05 = $24,762

There is an excess contribution because the discounted value of the 2019 contribution exceeds the minimum required contribution.

2019 excess contribution = $24,762 – $18,000 = $6,762

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

In addition, the employer has elected to use $18,000 of the funding standard carryover balance to help pay for the minimum required contribution, which results in an additional excess contribution of $18,000.

Generally, 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)). However, Treasury regulation 1.430(f)-1(b)(3)(iii) requires that to the extent that part of the excess contribution came from an election to use a funding balance to pay for the minimum required contribution, that part of the excess contribution is increased using the asset rate of return for the year instead of the plan effective rate. So, the $18,000 excess contribution due to the election to use the carryover balance is increased using the 2019 asset return rate of 7%, and the $6,762 actual excess contribution is increased using the plan effective rate of 5%. The 1/1/2019 prefunding balance is increased with interest using the 2019 actual asset rate of return (see IRC section 430(f)(8)).

1/1/2020 prefunding balance = ($3,000 × 1.07) + ($6,762 × 1.05) + ($18,000 × 1.07) = $29,570

Answer is D.

Question 50

The minimum required contribution is equal to the target normal cost plus the amortization of the shortfall amortization bases. The target normal cost is equal to the present value of the increase in the accrued benefit during 2020 (an accrual of $100 without regard to the plan amendment, and $130 taking into account the plan amendment). The funding target is equal to the present value of the benefit accrued as of the first day of the year (a benefit of $100 per year of service before 2020 without regard to the plan amendment, and $130 per year of service before 2020 taking into account the plan amendment).

Smith, with 15 years of service as of 1/1/2020, is age 60, 5 years from normal retirement age 65 (assumed per the general conditions of the exam), so the segment 2 interest rate of 4% is used to discount retirement benefits paid from age 65 through age 80, and the segment 3 interest rate of 5% is used to discount benefits paid at age 80 and later. The commutation functions used are found in the tables of supplementary factors provided with the examination, for a <u>female</u> participant using 4% and 5% interest.

<u>Target normal cost and funding target without regard to the plan amendment</u>:

$$\text{Target normal cost} = \$100 \times 12 \times \left[\frac{N^{(12)}_{65@4\%} - N^{(12)}_{80@4\%}}{D_{60@4\%}} + \frac{N^{(12)}_{80@5\%}}{D_{60@5\%}} \right]$$

$$= \$1{,}200 \times \left[\frac{1{,}063{,}280 - 274{,}967}{92{,}707} + \frac{120{,}828}{52{,}210} \right]$$

$$= \$12{,}981$$

$$\text{Funding target} = \$100 \times 15 \text{ years of service} \times 12 \times \left[\frac{N^{(12)}_{65@4\%} - N^{(12)}_{80@4\%}}{D_{60@4\%}} + \frac{N^{(12)}_{80@5\%}}{D_{60@5\%}} \right]$$

$$= \$18{,}000 \times \left[\frac{1{,}063{,}280 - 274{,}967}{92{,}707} + \frac{120{,}828}{52{,}210} \right]$$

$$= \$194{,}716$$

The funding shortfall without regard to the plan amendment is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the funding balances). The funding shortfall cannot be less than zero.

Funding shortfall = $194,716 – $210,000 = $0

There are no bases prior to 2020, and with a funding shortfall of $0 there is no new base in 2020.

In addition, when the actuarial value of assets reduced by the funding balances exceeds the funding target, the target normal cost is reduced by the amount of the excess (IRC section 430(a)(2)).

Minimum required contribution (before plan amendment) = $12,981 – ($194,716 – $210,000) = $0

Target normal cost and funding target using the plan amendment:

$$\text{Target normal cost} = \$130 \times 12 \times \left[\frac{N^{(12)}_{65@4\%} - N^{(12)}_{80@4\%}}{D_{60@4\%}} + \frac{N^{(12)}_{80@5\%}}{D_{60@5\%}} \right]$$

$$= \$1{,}560 \times \left[\frac{1{,}063{,}280 - 274{,}967}{92{,}707} + \frac{120{,}828}{52{,}210} \right]$$

$$= \$16{,}875$$

$$\text{Funding target} = \$130 \times 15 \text{ years of service} \times 12 \times \left[\frac{N^{(12)}_{65@4\%} - N^{(12)}_{80@4\%}}{D_{60@4\%}} + \frac{N^{(12)}_{80@5\%}}{D_{60@5\%}} \right]$$

$$= \$23{,}400 \times \left[\frac{1{,}063{,}280 - 274{,}967}{92{,}707} + \frac{120{,}828}{52{,}210} \right]$$

$$= \$253{,}131$$

Funding shortfall = \$253,131 – \$210,000 = \$43,131

IRC section 430(c)(5)(A) states that a plan is exempt from creating a new shortfall amortization base only if the plan's assets reduced by the prefunding balance (if the employer elects to use any portion of the prefunding balance to reduce the minimum required contribution) is at least as large as the funding target. In this question, there is no prefunding balance, so the plan is not exempt from creating a new shortfall amortization base in 2020. The shortfall amortization base is amortized over 7 years.

2020 shortfall installment for new base = \$43,131/6.3293 = \$6,814

Note that the 7-year amortization factor of 6.3293 was provided in a table with the exam when the segment rates are (3%, 4%, 5%).

Minimum required contribution (using plan amendment) = \$16,875 + \$6,814 = \$23,689

\$X = \$23,689 – \$0 = \$23,689

Answer is D.

Question 51

IRC section 430(c)(5)(A) states that a plan is exempt from creating a new shortfall amortization base only if the plan's assets reduced by the prefunding balance (if the employer elects to use any portion of the prefunding balance to reduce the minimum required contribution) is at least as large as the funding target. In this question, the employer has not elected to use the funding balances to reduce the minimum required contribution. The actuarial value of assets ($915,000) exceeds the funding target ($900,000), so the plan is exempt from creating a new shortfall amortization base in 2020.

The statement is true.

Answer is A.

Question 52

The 2020 contribution made on 6/30/2021 must be discounted using the 2020 plan effective rate of 6% from 6/30/2021 to 1/1/2020.

Discounted value of 6/30/2021 contribution = ($50,000/$1.06^{18/12}$) = $45,815

The funding deficiency is equal to the difference between the minimum required contribution and the discounted contribution actually made.

2020 funding deficiency = $100,000 – $45,815 = $54,185.

The initial excise tax for failure to satisfy minimum funding under IRC section 4971(a)(1) is equal to 10% of the funding deficiency.

$X = 10% × $54,185 = $5,418.50

Answer is C.

Question 53

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 2019 shortfall amortization base as of 1/1/2020 can be determined using the 6-year amortization factor for 2020 (there are 6 years left to pay off the 2019 shortfall base). The factor can be found in the table of selected amortization factors (for the segment rates 5%, 6%, 7%), provided with the exam.

Outstanding balance of 2019 shortfall amortization base as of 1/1/2020 = \$100,000 × 5.2932 = \$529,320

The funding shortfall is the excess of the funding target over the actuarial value of assets (reduced by the funding balances). Note that the prefunding balance of \$150,000 is reduced by \$50,000 to \$100,000 as required under IRC section 436 in order to avoid the limitation on accelerated distributions. Although this deemed reduction occurs on 4/1/2020, it is retroactive to the beginning of the year.

$\text{Funding shortfall}_{1/1/2020}$ = \$1,300,000 – (\$1,000,000 – \$100,000) = \$400,000

The 2020 shortfall base is equal to the funding shortfall less the outstanding balance of the prior shortfall base. The 2020 shortfall base is amortized over 7 years.

2020 shortfall amortization base = \$400,000 – \$529,320 = (\$129,320)

Amortization of 2020 shortfall base = (\$129,320)/5.9982 = (\$21,560)

2020 minimum required contribution = \$300,000 + \$100,000 – \$21,560 = \$378,440

The **smallest amount that satisfies the minimum funding standard** is equal to the excess of the minimum required contribution over the prefunding balance. This is contributed on 4/15/2020, so it must be increased with interest using the 2020 effective interest rate of 6.25%.

$X = (\$378,440 – \$100,000) × $1.0625^{3.5/12}$ = \$283,407

Answer is D.

Question 54

The 15-year amortization base established in 2011 as part of the funding relief provisions has 6 years left to be amortized in 2020. The 2011 shortfall amortization installment with regard to this base was determined using the 2011 segment rates. That amortization installment has not changed because there have been no installment acceleration amounts.

The outstanding balance as of 1/1/2020 is determined using the 2020 segment rates. The 6-year amortization factor of 5.2932 is provided in a table with the exam when the segment rates are (5%, 6%, 7%).

$X = $200,000 × 5.2932 = $1,058,640

Answer is A.

Question 55

IRC section 430(i)(1)(C) requires a load on the at-risk target normal cost if the plan has been at-risk in at least two of the past 4 years. In the past 4 years (2016 through 2019) the plan was at-risk in 2017 and 2018. So, a load factor must be included. The load is equal to 4% of the target normal cost calculated without the special at-risk assumptions.

The loaded at-risk target normal cost is:

$2,350,000 + (4% × $2,000,000) = $2,430,000

IRC section 430(i)(1)(C) also requires a load on the at-risk funding target if the plan has been at-risk in at least two of the past 4 years. The load is equal to $700 per participant, plus 4% of the funding target calculated without the special at-risk assumptions.

The loaded at-risk funding target is:

$11,750,000 + ($700 × 750) + (4% × $10,000,000) = $12,675,000

IRC section 430(i)(5) provides for a phase-in when the plan has been at-risk for fewer than 5 consecutive years. The plan has been at-risk only in 2017, 2018 and 2020. A new 5-year phase-in begins in 2020, and each of the target normal cost and funding target is equal to 20% of the loaded amount using at-risk assumptions plus 80% of the amount without the at-risk assumptions.

The phased in target normal cost is:

(20% × $2,430,000) + (80% × $2,000,000) = $2,086,000

The phased in funding target is:

(20% × $12,675,000) + (80% × $10,000,000) = $10,535,000

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

Funding shortfall$_{1/1/2020}$ = $10,535,000 – ($9,500,000 – $500,000) = $1,535,000

IRC section 430(c)(5)(A) states that a plan is exempt from creating a new shortfall amortization base only if the plan's assets reduced by the prefunding balance (if the employer elects to use any portion of the prefunding balance to reduce the minimum required contribution) is at least as large as the funding target. In this question, the actuarial value of assets (whether or not reduced by the prefunding balance) is less than the funding target, so the plan is not exempt from creating a new shortfall amortization base in 2020. The 2020 shortfall amortization base is equal to the funding shortfall less the outstanding balance of the prior shortfall base, and is amortized over 7 years.

2020 shortfall amortization base = $1,535,000 – $743,648 = $791,352

2020 shortfall installment for new base = $791,352/5.9982 = $131,932

Note that the 7-year amortization factor of 5.9982 is provided in a table with the exam when the segment rates are (5%, 6%, 7%).

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).

$X = $2,086,000 + $195,000 + $131,932 = $2,412,932

Answer is B.

Question 56

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:

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

Note that the actuarial value of assets is not reduced by the credit balance for purposes of the normal cost calculation under the FIL cost method (although there appears to be no credit balance in this question – the 12/31/2018 credit balance is zero, and it must be assumed that the credit balance as of 1/1/2020 is also zero as there is not enough information to be able to deduce it).

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.

The only item not provided but needed to calculate the normal cost as of 1/1/2020 is the unfunded liability as of 1/1/2020. That can be developed by the information provided from the 2019 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 2019 contribution of $200,000 was contributed on 6/1/2019, so it is given 7 months of interest.

1/1/2020 unfunded liability = $[(\$800{,}000 + \$50{,}000) \times 1.06] - (\$200{,}000 \times 1.06^{7/12}) = \$694{,}085$

$$\text{1/1/2020 normal cost} = \frac{\$10{,}000{,}000 - \$7{,}000{,}000 - \$694{,}085}{\$15{,}000{,}000 / \$1{,}000{,}000} = \$153{,}728$$

Answer is B.

Question 57

Generally, the initial excise tax for a multiemployer plan under IRC section 4971(a)(2) for an accumulated funding deficiency is 5%. However, IRC section 4971(g)(1)(A) provides that for a multiemployer plan in critical status, the initial excise tax for an accumulated funding deficiency is waived. This is not true for a plan in endangered status, as is the case in this question. The 5% excise tax applies, and the statement is true.

Answer is A.

Question 58

Treasury regulation 1.430(d)-1(f)(4)(iii)(B) states that when a plan offers an optional form of payment subject to the rules of IRC section 417(e)(3), such as a lump sum, then for funding purposes, the funding mortality table must be replaced by the IRC section 417(e)(3) applicable mortality table for post-retirement purposes. The statement is true.

Answer is A.