Solutions to EA-2(A) Examination
Fall, 2005

Question 1

Section 3.01(1) of Revenue Procedure 2000-40 indicates automatic approval for a change to the unit credit cost method is not available for a cash balance plan. The statement is false.

Answer is B.

Question 2

A collectively bargained plan must include the ultimate level of benefits provided under a bargaining agreement, even if that level does not take effect until a future year, to the extent that the future increase applies to an individual participant. In this case the $30 level of benefit applies to participants who retire after 2005. Note that for participants who retire during 2005, the $25 level of benefits would be used in the 2005 valuation. See IRC section 412(c)(12).

Answer is A.

Question 3

The normal cost from 2004 can be adjusted using the actual experience to get the 2005 normal cost. In general, under the unit credit cost method, the normal cost increases by the assumed interest rate from one year to the next (since normal cost is just a present value under the this method). However, there is also an increase in the normal retirement benefit, so the normal cost will increase by the same percentage that the unit of benefit increase for 2005 has increased over 2004. Since there are no new entrants and no retirees (all participants are age 46 on 1/1/2005), the normal cost for 2005 can be determined by adjusting the 2004 normal cost.

$\text{Normal cost}_{1/1/2005} = 315{,}000 \times 1.07 \times (35/30) = 393{,}225$

The accrued liability has increased as well due to the increase in the normal retirement benefit. This can be calculated as a percentage of the accrued liability under the old benefit structure.

$\text{Expected accrued liability}_{1/1/2005} = (4{,}000{,}000 + 315{,}000) \times 1.07 = 4{,}617{,}050$
$\text{Accrued liability increase} = 4{,}617{,}050 \times (5/30) = 769{,}508$

The accrued liability increase is a plan amendment amortization base and is amortized over 30 years per IRC section 412(b)(2)(B)(iii).

$$\text{2005 minimum} = (393{,}225 + 100{,}000 + 769{,}508/\ddot{a}_{\overline{30}|}) \times 1.07$$
$$= (393{,}225 + 100{,}000 + 57{,}955) \times 1.07 = 589{,}763$$

Answer is C.

Question 4

The normal cost in the unit credit cost method is equal to the present value of the accrual for the year. Based upon the given benefit formula, the accrual for 2005 is \$40 per month

$$NC_{1/1/2005} = 40 \times 12 \times \ddot{a}^{(12)}_{65(6\%)} \times v^{14}_{6\%} = 40 \times 12 \times 10.65 \times 0.4423 = 2{,}261$$

The accrued liability in the unit credit cost method is equal to the present value of the accrual for prior years.

$$AL_{1/1/2005} = 40 \times 31 \text{ years} \times 12 \times \ddot{a}^{(12)}_{65(6\%)} \times v^{14}_{6\%}$$
$$= 40 \times 31 \text{ years} \times 12 \times 10.65 \times 0.4423 = 70{,}092$$

The initial unfunded liability is being amortized in 2005 for minimum funding. In addition, there is a loss due to the change in the assumed interest rate which must be amortized over 10 years for minimum funding in 2005.

The initial accrued liability is equal to the present value of the accruals due to service prior to the effective date of the plan.

$$\text{Initial } AL_{1/1/2004} = 40 \times 30 \text{ years} \times 12 \times \ddot{a}^{(12)}_{65(7\%)} \times v^{15}_{7\%}$$
$$= 40 \times 30 \text{ years} \times 12 \times 9.87 \times 0.3624 = 51{,}507$$

The outstanding balance of initial unfunded accrued liability on 1/1/2005 is:

$$\text{Outstanding balance}_{1/1/2005} = 51{,}507 \times \frac{\ddot{a}_{\overline{29}|.07}}{\ddot{a}_{\overline{30}|.07}} = 50{,}961$$

The expected accrued liability must be determined in order to find the loss due to the change in interest rate. This is equal to the prior normal cost plus accrued liability, increased with interest at the old 7% interest rate.

$$NC_{1/1/2004} = 40 \times 12 \times \ddot{a}^{(12)}_{65(7\%)} \times v^{15}_{7\%}$$
$$= 40 \times 12 \times 9.87 \times 0.3624 = 1{,}717$$

$$\text{Expected } AL_{1/1/2005} = (51{,}507 + 1{,}717) \times 1.07 = 56{,}950$$

$$\text{Loss due to decrease in interest rate} = AL_{1/1/2005} - \text{Expected } AL_{1/1/2005}$$
$$= 70{,}092 - 56{,}950 = 13{,}142$$

$$\text{2005 minimum} = (2{,}261 + 50{,}961/\ddot{a}_{\overline{29}|.06} + 13{,}142/\ddot{a}_{\overline{10}|.06}) \times 1.06$$
$$= (2{,}261 + 3{,}537 + 1{,}685) \times 1.06 = 7{,}932$$

Answer is B.

Question 5

The 2005 minimum required contribution without regard to the full funding limit is:

2005 minimum = (60,000 + 1,500) × 1.07 = 65,805

The ERISA full funding limitation is equal to the accrued liability plus normal cost, rolled forward with valuation interest to the end of the year, less the smaller of the actuarial or market value of the assets (reduced by the credit balance), rolled forward with valuation interest to the end of the year.

ERISA full funding limit = (500,000 + 60,000 – 515,000) × 1.07 = 48,150

The overall full funding limitation is equal to the greater of the ERISA or the RPA'94 full funding limitation. The RPA'94 full funding limitation is equal to 90% of the current liability (including the expected increase in liability due to the current year accruals), rolled forward with current liability interest to the end of the year (not needed in this question since the current liability provided is as of the last day of the year), less the actuarial value of the assets (unreduced by the credit balance), rolled forward with valuation interest to the end of the year.

RPA'94 full funding limit = (90% × 680,000) – (520,000 × 1.07) = 55,600

The overall full funding limit is 55,600. This is less than the 2005 minimum, resulting in a full funding credit of 10,205 (65,805 – 55,600).

The remaining contribution due is equal to the difference between the existing charges less credits. Note that the contributions made to date are increased with pro-rated interest at the valuation interest rate to the end of the plan year.

Contribution due = 65,805 – (10,205 + [50,000 × 1.07] + 1,000) = 1,100

Answer is B.

Question 6

The smoothed value method described in section 3.15 of Revenue Procedure 2000-40 states that when a 3-year smoothing period is used, the market value of assets as of a valuation date are adjusted by ⅔ of the asset gain or loss from the prior year and ⅓ of the asset gain or loss from the second prior year. Losses are added to and gains are subtracted from the market value of assets.

The asset gain or loss for 2002, 2003 and 2004 can be determined by comparing the expected assets at the end of each year with the actual market value at the end of each year. Note that interest is pro-rated for transactions that occur during the year. The pro-ration can be done using either simple or compound interest (simple interest will be used in this solution). Note that actual earnings are irrelevant to the determination of the expected assets.

$\text{Expected assets}_{12/31/2002} = (5{,}000{,}000 \times 1.07) + ([200{,}000 - 300{,}000] \times 1.035) = 5{,}246{,}500$
$\text{Expected assets}_{12/31/2003} = (4{,}100{,}000 \times 1.07) + ([300{,}000 - 300{,}000] \times 1.035) = 4{,}387{,}000$
$\text{Expected assets}_{12/31/2004} = (3{,}600{,}000 \times 1.07) + ([400{,}000 - 300{,}000] \times 1.035) = 3{,}955{,}500$

2002 asset loss = 5,246,500 – 4,100,000 = 1,146,500
2003 asset loss = 4,387,000 – 3,600,000 = 787,000
2004 asset gain = 4,500,000 – 3,955,500 = 544,500

1/1/2004 smoothed value = 3,600,000 + ⅔(787,000) + ⅓(1,146,500) = 4,506,833
1/1/2005 smoothed value = 4,500,000 - ⅔(544,500) + ⅓(787,000) = 4,399,333

The 2004 smoothed value must be reduced to 4,320,000 since the actuarial value of assets can never exceed 120% of the market value (120% of 3,600,000 = 4,320,000). See the description in section 3.15 of Revenue Procedure 2000-40.

The expected actuarial value of assets as of 1/1/2005 is equal to the 1/1/2004 actuarial value plus the 2004 contribution less the 2004 benefit payments, all increased with appropriate valuation interest to 1/1/2005.

$$\text{Expected actuarial assets}_{1/1/2005} = (4{,}320{,}000 \times 1.07) + ([400{,}000 - 300{,}000] \times 1.035)$$
$$= 4{,}725{,}900$$

The 2004 actuarial value of asset loss is equal to the difference between the expected actuarial assets and the actual actuarial assets.

2004 actuarial value of asset loss = 4,725,900 – 4,399,333 =326,567

Answer is B.

Question 7

I. In general, the only automatic approval allowed by Revenue Procedure 2000-40 concerning a change in the valuation date is to a first day valuation (see section 3.13 of the procedure). The one exception is that for a fully funded terminating plan the valuation date can be changed to the plan termination date (see section 4.02 of the procedure). Since this plan is not terminating, the plan sponsor cannot use an automatic approval to change to a last day valuation.

II. The automatic approval in section 3.14 of Revenue Procedure 2000-40 allows for the plan sponsor to use the automatic approval to change the method of valuing ancillary benefits from the one-year term method to the funding method used to value retirement benefits. Changing to the one-year term method is not an automatic approval.

III. Section 3.05 of Revenue Procedure 2000-40 allows for the plan sponsor to use the automatic approval to change the cost method to the level dollar Individual Aggregate method in most situations. However, there is a requirement under subsection (1) of section 3.05 that the present value of future benefits for inactive participants and beneficiaries be no larger than the actuarial value of assets. Since the present value of benefits for inactive participants ($400,000) exceeds the actuarial value of assets ($350,000), automatic approval cannot be used.

None of the changes under consideration can be made using automatic approval.

Answer is A.

Question 8

The minimum required contribution for 2004 as of 12/31/2004 is:

$$(50{,}000 + \frac{100{,}000}{\ddot{a}_{\overline{30}|.07}}) \times 1.07 = (50{,}000 + 7{,}531) \times 1.07 = 61{,}558$$

$CB_{12/31/2004} = 65{,}000 - 61{,}558 = 3{,}442$

For the 2005 valuation, there is a change in unfunded liability due to the change in the assumed interest rate. In addition, there is an experience gain or loss for 2004 that must be calculated before the change in interest rate is taken into account.

Expected $AL_{1/1/2005} = (AL_{1/1/2004} + NC_{1/1/2004}) \times 1.07 = (100{,}000 + 50{,}000) \times 1.07 = 160{,}500$
Actual $AL_{1/1/2005} = 140{,}000 + 30{,}000 = 170{,}000$

2004 experience loss = 170,000 – 160,500 = 9,500

Note that there is no asset gain or loss since the contribution from 2004 (the first year of the plan) was made on the last day of the plan year.

The outstanding balance of the initial unfunded accrued liability is needed as of 1/1/2005 since it must be re-amortized over the remaining 29 years using the new assumed interest rate.

$$\text{Outstanding balance of initial } AL_{1/1/2005} = 100{,}000 \times \frac{\ddot{a}_{\overline{29}|.07}}{\ddot{a}_{\overline{30}|.07}} = 98{,}941$$

The minimum required contribution for 2005 as of 12/31/2005 is:

$$(40{,}000 + \frac{98{,}941}{\ddot{a}_{\overline{29}|.08}} + \frac{9{,}500}{\ddot{a}_{\overline{5}|.08}} - \frac{30{,}000}{\ddot{a}_{\overline{10}|.08}} - 3{,}442) \times 1.08$$
$$= (40{,}000 + 8{,}210 + 2{,}203 - 4{,}140 - 3{,}442) \times 1.08 = 46{,}257$$

Answer is D.

Question 9

The credit balance is equal to the difference between the accumulated contributions and the minimum required contribution. The contributions can be accumulated through the year using either simple or compound interest. Compound interest will be used in this solution.

Credit balance as of 12/31/2004 = ([140,000 × $1.07^{6/12}$] + [45,000 × $1.07^{2/12}$] + 90,000)
- 200,000 = 80,327

The credit balance must be subtracted from the actuarial value of the assets when determining the normal cost under the Aggregate cost method.

$NC_{12/31/2005}$ = [(PVFB – (Actuarial assets – CB))/(PVFC/Compensation)] × 1.07
= {(1,200,000 – (890,000 – 80,327))/(15,312,500/875,000)] × 1.07
= 23,866

Answer is E.

Question 10

Under the fresh start approach, the deductible limit is determined by amortizing the total unfunded liability over 10 years. In the entry age normal cost method, the unfunded liability is equal to the accrued liability less the actuarial value of the assets. Since there is a contribution of $30,000 included in the assets but not yet deducted, the actuarial value of the assets for purposes of IRC section 404 is $710,000 ($740,000 – $30,000).

IRC section 404 $UL_{1/1/2005}$ = AL – Actuarial assets = 1,000,000 – 710,000 = 290,000

The deductible limit under IRC section 404(a)(1)(A)(iii) is equal to the normal cost plus the limit adjustment (10-year amortization of the unfunded liability). This is:

$$(25{,}000 + \frac{290{,}000}{\ddot{a}_{\overline{10}|}}) \times 1.07 = (25{,}000 + 38{,}588) \times 1.07 = 68{,}039$$

Note that this exceeds the minimum required contribution of $40,000.

The full funding limitation must be determined. The ERISA full funding limitation is equal to the accrued liability plus normal cost, rolled forward with valuation interest to the end of the year, less the smaller of the actuarial or market value of the assets, rolled forward with valuation interest to the end of the year and then reduced by the contribution carryover from 2004. Note that it is important to first increase the assets with interest and only then reduce them by the contribution carryover. See Revenue Ruling 82-125.

ERISA full funding limit = [(1,000,000 + 25,000) × 1.07] – [(740,000 × 1.07) – 30,000]
= 334,950

The overall full funding limitation is equal to the greater of the ERISA or the RPA'94 full funding limitation. The RPA'94 full funding limitation is equal to 90% of the current liability (including the expected increase in liability due to the current year accruals), rolled forward with current liability interest to the end of the year (not needed in this question since the current liability is provided as of the last day of the year), less the actuarial value of the assets, rolled forward with valuation interest to the end of the year and similarly reduced by the contribution carryover.

RPA'94 full funding limit = (90% × 1,306,000) – [(740,000 × 1.07) – 30,000] = 413,600

The overall full funding limit is 413,600. Since this is larger than the deductible limit under IRC section 404(a)(1)(A), the limit of 68,039 applies.

However, the unfunded current liability can be deducted, if greater, under IRC section 404(a)(1)(D). Again, the actuarial assets must be reduced by the contribution carryover.

Unfunded $CL_{12/31/2005}$ = 1,306,000 – [(740,000 × 1.07) – 30,000] = 544,200

Therefore, the deductible limit is 544,200

Answer is D.

Question 11

Using the retirement rates assumed prior to 2005, all retirements were assumed to occur at age 60. Under this assumption, the present value of future benefits can be calculated as follows.

Early retirement adjustment factor at age 60 = 3% × 5 years = 15%

$PVFB_{old} = 12{,}000 \times (1 - 15\%) \times \ddot{a}_{60}^{(12)} = 12{,}000 \times 85\% \times 11.59 = 118{,}218$

Using the retirement rates assumed as of 1/1/2005, 50% of all retirements are assumed to occur at age 60, 40% of all retirements are assumed to occur at age 61 (50% × 80%), and 10% of all retirements are assumed to occur at age 62 (50% × 20%). Under this assumption, the present value of future benefits can be calculated as follows.

Early retirement adjustment factor at age 61 = 3% × 4 years = 12%

There is no early retirement adjustment factor at age 62 since the participant has 30 years of service.

$$\begin{aligned} PVFB_{new} &= (12{,}000 \times (1 - 15\%) \times \ddot{a}_{60}^{(12)} \times 50\%) + (13{,}500 \times (1 - 12\%) \times \ddot{a}_{61}^{(12)} \times v \times 40\%) \\ &\qquad + (15{,}000 \times (1 - 9\%) \times \ddot{a}_{62}^{(12)} \times v^2 \times 10\%) \\ &= (12{,}000 \times 85\% \times 11.59 \times 50\%) + (13{,}500 \times 88\% \times 11.41 \times 0.9346 \times 40\%) \\ &\qquad + (15{,}000 \times 11.23 \times 0.8735 \times 10\%) \\ &= 59{,}109 + 50{,}674 + 14{,}714 = 124{,}497 \end{aligned}$$

Increase in PVFB = 124,497 – 118,218 = 6,279

Answer is C.

Question 12

I. The excise tax for single employer plans for failure to meet minimum funding is 10%. See IRC section 4971(a).

II. There is a 15% excise tax on the amount involved when a prohibited transaction occurs. The excise tax is not necessarily on the prohibited transaction itself (such as in the case of a loan where the excise tax is based upon the interest paid or accrued on account of the loan). It would seem that the statement in this question meant that the excise tax is 15% when a prohibited transaction occurs, which is true. See IRC section 4975(a). In addition, if the prohibited transaction is not corrected, an additional excise tax of 100% could apply. See IRC section 4975(b).

III. The excise tax on reversions to an employer from a qualified plan is generally 20% (see IRC section 4980(a)). However, this is increased to 50% if the employer does not establish a qualified replacement plan (and transfer at least 25% of the excess assets before reversion to this plan) or increase benefits by at least 20%. See IRC section 4980(d).

Statements II and III are true (although statement II could have been worded more accurately).

Answer is C.

Question 13

The additional funding charge applies whenever the Gateway percentage is less than 80% and there are more than 100 participants in the plan on at least one day of the prior year. There were more than 140 participants in 2004, and it is given that the Gateway percentage as of 1/1/2005 is 65%. Therefore, the additional funding charge applies for 2005.

For purposes of determining the additional funding charge, the funded current liability percentage is equal to the ratio of the actuarial value of assets (reduced by the credit balance) to the current liability. As of 1/1/2005, this is:

56% = (1,150,000 – 30,000)/2,000,000

The unfunded current liability for purposes of the additional funding charge is equal to the current liability less the actuarial value of assets (again, reduced by the credit balance).

Unfunded current liability = 2,000,000 – (1,150,000 – 30,000) = 880,000

The unfunded current liability is divided into unfunded old liability, unfunded new liability, and unpredictable contingent event liability. It is given that the unfunded old liability is 50,000. There is no unpredictable contingent event liability since none is given and a general condition of the exam says that there are none unless information is provided. Therefore, the unfunded new liability is the balance of the unfunded current liability, 830,000 (880,000 – 50,000).

The applicable percentage that applies to the unfunded new liability using the given formula is:
Min{30%, 30% - [(56% - 60%) × .4]} = 0.3

The unfunded new liability amount is: $830{,}000 \times 0.3 = 249{,}000$

The unfunded old liability amount is equal to a 2-year amortization of the outstanding balance of the unfunded old liability: $50{,}000 / \ddot{a}_{\overline{2}|.06} = 25{,}728$

The Deficit Reduction Contribution (DRC) is equal to the sum of the unfunded old liability amount, the unfunded new liability amount and the expected increase in current liability for 2005 due to the additional accrual for the year. This is:

DRC = 25,728 + 249,000 + 85,000 = 359,728

This is reduced by the funding standard account items under the funding method (normal cost and amortization charges (credits)):

$$359{,}728 - \left(75{,}000 + \frac{1{,}250{,}000}{\ddot{a}_{\overline{30}|.07}}\right) = 359{,}728 - (75{,}000 + 94{,}143) = 190{,}585$$

The preliminary additional funding charge is this amount increased with interest at the current liability interest rate to the end of the year:

$190{,}585 \times 1.06 = 202{,}020$

This must be pro-rated if the number of participants from the prior year is less than 150 (but more than 100). Since the greatest number of participants in the prior year was 140, the preliminary additional funding charge is pro-rated by 40/50. Note that the number of participants in 2005 is irrelevant.

Additional funding charge for 2005 = $202{,}020 \times 40/50 = 161{,}616$

Answer is C.

Question 14

The experience gain or loss due to the mortality of the retired participants and their beneficiaries is equal to the difference between the actual liability as of 1/1/2005 and the expected liability as of 1/1/2005.

Since Smith died in 2004, no benefits are payable on account of Smith as of 1/1/2005. Since Jones died during 2004, the 50% survivor benefit is payable to Jones' spouse as of 1/1/2005. Brown is still alive as of 1/1/2005.

$$\text{Actual liability}_{1/1/2005} = (50\% \times 20{,}000 \times \ddot{a}_{56}^{(12)}) + (30{,}000 \times \ddot{a}_{61}^{(12)})$$
$$= (50\% \times 20{,}000 \times 11.60) + (30{,}000 \times 10.60)$$
$$= 116{,}000 + 318{,}000 = 434{,}000$$

The expected liability is equal to the liability as of 1/1/2004, reduced by the 1/1/2004 benefit payments, increased with interest to 1/1/2005. Note that there is no adjustment due to the mortality decrement as that is already taken into account in the annuity factors.

$$\text{Expected liability}_{1/1/2005} = [(60{,}000 \times \ddot{a}_{65}^{(12)} - 60{,}000)$$
$$+ (20{,}000(\ddot{a}_{60}^{(12)} + .5\,\ddot{a}_{55}^{(12)} - .5\,\ddot{a}_{60:55}^{(12)}) - 20{,}000)$$
$$+ (30{,}000 \times \ddot{a}_{60}^{(12)} - 30{,}000)] \times 1.07$$
$$= [(60{,}000 \times 9.70 - 60{,}000) + (20{,}000 \times 11.90 - 20{,}000)$$
$$+ (30{,}000 \times 10.80 - 30{,}000)] \times 1.07$$
$$= (522{,}000 + 218{,}000 + 294{,}000) \times 1.07 = 1{,}106{,}380$$

Gain = 1,106,380 – 434,000 = 672,380

Answer is E.

Note that the factor for $\ddot{a}_{60}^{(12)} + .5\,\ddot{a}_{55}^{(12)} - .5\,\ddot{a}_{60:55}^{(12)}$ is given in the data as the joint and 50% survivor factor for the joint lives 60:55.

Question 15

I. A reasonable funding method may not anticipate plan amendments that become effective in future years. See IRS regulation 1.412(c)(3)-1(d)(1). Note that this regulation also indicates that amendments effective after the first day, but during, a plan year also cannot be taken into account. This last statement has been changed by Revenue Ruling 77-2, which allows for such amendments to be taken into account under certain circumstances.

II. Future employees not employed on the plan valuation date may not be considered in the valuation. See IRS regulation 1.412(c)(3)-1(d)(2). Note that it would be allowed to anticipate the future participation of existing employees who have not yet entered the plan on the valuation date.

III. All liabilities, regardless of vesting, must be considered under a reasonable cost method. See IRS regulation 1.412(c)(3)-1(c)(1).

All statements are false.

Answer is A.

Question 16

The experience gain or loss for 2004 must be calculated. This is equal to the difference between the expected unfunded liability and the actual unfunded liability as of 1/1/2005. The expected unfunded liability can be calculated, using the balance equation, as the difference between the outstanding balance of the amortization bases and the credit balance.

$$\text{Expected UAL}_{1/1/2005} = (250{,}000 \times \frac{\ddot{a}_{\overline{27}|}}{\ddot{a}_{\overline{28}|}}) + (50{,}000 \times \frac{\ddot{a}_{\overline{3}|}}{\ddot{a}_{\overline{5}|}}) + (30{,}000 \times \frac{\ddot{a}_{\overline{4}|}}{\ddot{a}_{\overline{5}|}})$$
$$= 246{,}902 + 32{,}002 + 24{,}783 = 303{,}687$$

2004 experience gain = 303,687 – 275,000 = 28,687

The minimum required contribution for 2005 as of 12/31/2005 is:

$$(95{,}000 + \frac{246{,}902}{\ddot{a}_{\overline{27}|}} + \frac{50{,}000}{\ddot{a}_{\overline{5}|}} + \frac{30{,}000}{\ddot{a}_{\overline{5}|}} - \frac{28{,}687}{\ddot{a}_{\overline{5}|}}) \times 1.07$$
$$= (95{,}000 + 19{,}250 + 11{,}397 + 6{,}838 - 6{,}539) \times 1.07 = 134{,}762$$

Answer is A.

Question 17

Smith is age 63 on 1/1/2005, and could die either at age 63 (on 12/31/2005) or age 64 (on 12/31/2006). Note that deaths are assumed to occur at the end of the year.

The death benefit payable to Smith's spouse is equal to 50% of the accrued benefit, reduced (if necessary) for early retirement since the death benefit is payable immediately upon the death of Smith. Note that the early retirement reduction is 4% if Smith dies at age 63, and there is no early retirement reduction if Smith dies at age 64 since death would occur one day before age 65.

The death benefit payable if Smith dies at either age is:

Age 63: \$50 × 41 years of service × 96% × 50% = \$984
Age 64: \$50 × 42 years of service × 50% = \$1,050

The present value of the death benefit is equal to the death benefit at each age multiplied by the life annuity-due one day after the age of death, discounted to current age 63, and multiplied by the probability of death at that age. In addition, since it is assumed that only 85% of participants are married at the time of death, this present value must be reduced by 15%.

$$\begin{aligned}
PV &= (984 \times 12\,\ddot{a}_{64}^{(12)} \times v \times q_{63} \times 85\%) + (1{,}050 \times 12\,\ddot{a}_{65}^{(12)} \times v^2 \times p_{63} \times q_{64} \times 85\%) \\
&= (984 \times 12 \times 9.90 \times 0.9346 \times 0.05 \times 85\%) \\
&\qquad + (1{,}050 \times 12 \times 9.70 \times 0.8734 \times 0.95 \times 0.05 \times 85\%) \\
&= 4{,}643 + 4{,}310 = 8{,}953
\end{aligned}$$

Answer is A.

Question 18

The amortization period for an experience gain or loss in a multiemployer plan is 15 years, and the amortization period for an amortization base due to a change in actuarial assumptions is 30 years. (See IRC section 412(b)(2) and (3).)

Clearly, the minimum required contribution has increased by the $20,000 increase in the normal cost on account of the reduction in the interest rate. In addition, the amortization charges of the bases will decrease. This can be determined by first amortizing the outstanding balance of each base as of 1/1/2005 using the new interest rate over the remaining number of years to amortize the base. The outstanding balance of each base is determined using the old interest rate of 7.5%.

Outstanding balance of 2003 loss as of 1/1/2005 = $10,000 $\times$ $\ddot{a}_{\overline{14}|.075}$ = $91,258

Amortization of 2004 loss at 7.5% interest rate = $300,000/$\ddot{a}_{\overline{15}|.075}$ = $31,615

The increase in the minimum required contribution for 2005 as of 1/1/2005 is:

$20{,}000 + (91{,}258/\ddot{a}_{\overline{14}|.07} - 10{,}000) + (300{,}000/\ddot{a}_{\overline{15}|.07} - 31{,}615) + 100{,}000/\ddot{a}_{\overline{30}|.07}$

$= 20{,}000 - 248 - 831 + 7{,}531 = 26{,}452$

Answer is A.

Question 19

The ERISA full funding limitation is equal to the accrued liability plus normal cost under the entry age normal cost method, less the smaller of the actuarial or market value of the assets (reduced by any credit balance in the funding standard account), rolled forward with valuation interest to the end of the year. Note that Revenue Ruling 81-13 requires the use of accrued liability and normal cost under the entry age normal method when a spread gain method such as attained age normal is being used.

The entry age normal cost is determined as a level dollar amount from hire age, and the accrued liability is the accumulated value of past normal costs (prior to 1/1/2005).

Normal cost under entry age normal = $50 \times 12 \times 31$ years of service $\times 9.20 \times v_{.07}^{31} \div \ddot{a}_{\overline{31}|.07}$

$= 1{,}567$

Accrued liability under entry age normal = $1{,}567 \times \ddot{s}_{\overline{21}|.07} = 75{,}225$

ERISA full funding limit = $(75{,}225 + 1{,}567 - 70{,}000) \times 1.07 = 7{,}267$

The overall full funding limitation is equal to the greater of the ERISA or the RPA'94 full funding limitation. The RPA'94 full funding limitation is equal to 90% of the current liability (including the expected increase in liability due to the current year accruals), rolled forward with current liability interest to the end of the year, less the actuarial value of the assets rolled forward with valuation interest to the end of the year. The RPA'94 current liability is simply the present value of accrued benefits as of the valuation date. Since the 2005 accrual must be included, the present value can be calculated directly as of 12/31/2005.

RPA'94 current liability$_{12/31/2005} = 50 \times 12 \times 22$ years of service $\times 10.90 \times v_{.06}^{9} = 85{,}162$

RPA'94 full funding limit = $(90\% \times 85{,}162) - (70{,}000 \times 1.07) = 1{,}746$

The overall full funding limit is 7,267.

Answer is C.

Question 20

For purposes of determining the additional funding charge, the funded current liability percentage is equal to the ratio of the actuarial value of assets (reduced by the credit balance) to the current liability. As of 1/1/2005, this is:

86.607143% = (10,000,000 – 300,000)/11,200,000

The unfunded current liability for purposes of the additional funding charge is equal to the current liability less the actuarial value of assets (again, reduced by the credit balance).

Unfunded current liability = 11,200,000 – (10,000,000 – 300,000) = 1,500,000

The unfunded current liability is divided into unfunded old liability, unfunded new liability, and unpredictable contingent event liability. Since the plan has never been subject to the additional funding charge prior to 2005, there is no unfunded old liability (the unfunded old liability is always established in 1989). There is no unpredictable contingent event liability since none is given and a general condition of the exam says that there are none unless information is provided. Therefore, the unfunded new liability is the entire unfunded current liability of 1,500,000.

The applicable percentage that applies to the unfunded new liability using the given formula is:
Min{30%, 30% - [(86.607143% - 60%) × .4]} = 0.1935714

The unfunded new liability amount is: 1,500,000 × 0.1935714 = 290,357

The Deficit Reduction Contribution (DRC) is equal to the sum of the unfunded old liability amount, the unfunded new liability amount and the expected increase in current liability for 2005 due to the additional accrual for the year. This is:

DRC = 290,357 + 100,000 = 390,357

This is reduced by the funding standard account items under the funding method (normal cost and amortization charges (credits)):

390,357 – 150,000 = 240,357

The preliminary additional funding charge is this amount increased with interest at the current liability interest rate to the end of the year:

240,357 × 1.06 = 254,778

This must be pro-rated if the number of participants from the prior year is less than 150 (but more than 100). Since there were 200 or more participants in the prior year, no pro-ration is required. The additional funding charge for 2005 is 254,778.

The answer is B.

Question 21

I. In the first year of a plan, the normal cost under the individual level premium method and the aggregate method are only equal if the participants are the same age and enter the plan at the same age. Since that is not the case in this situation, the normal costs will be different under the two methods.

II. In the first year of a plan, the frozen initial liability unfunded liability is equal to the unfunded accrued liability under the entry age normal method. Since each participant has no past service, there is no initial unfunded liability. Therefore, the frozen initial liability method will give the same normal cost as the aggregate method.

III. In the first year of a plan, the entry age normal cost is based upon age at hire, and the individual aggregate normal cost is based upon age as of the valuation date. Since each participant has no past service, the hire age and the valuation date age are the same. Since both methods are individual methods, entry age normal and individual aggregate will give the same normal cost.

Statements II and III are true.

Answer is C.

Note: The above results can be verified by actually calculating the normal cost under each method.

Question 22

This question requires the development of the gain or loss for 2004, since the cost method is unit credit, an immediate gain method. Since the benefit formula is not based upon salary, and the only participant is active in both 2004 and 2005, the only gain or loss could be an asset gain or loss.

Expected $\text{assets}_{1/1/2005} = 9{,}500 \times 1.07 = 10{,}165$

Since the actual assets as of 1/1/2005 in the amount of 8,000 is smaller than the expected assets, there is an asset loss.

2004 loss = 10,165 – 8,000 = 2,165

The normal cost must be determined as of 1/1/2005. Since the participant's age is not known, the normal cost cannot be calculated directly. However, the 2004 funding standard account can be used to determine the 2004 normal cost. Under the unit credit method, when the accrued benefit increase is the same from year to year (as it is with the given unit benefit formula), the normal cost increases with one year's interest (there is no increase for pre-retirement decrements since no decrements are assumed in this question).

In the 2004 funding standard account, the credit balance is equal to the excess of the credits over the charges.

$CB_{12/31/2004} = (2004 \text{ contribution} \times 1.07) - [(NC_{1/1/2004} + 8{,}265/\ddot{a}_{\overline{30}|}) \times 1.07]$

$7{,}289 = (9{,}500 \times 1.07) - [(NC_{1/1/2004} + 622) \times 1.07]$

$NC_{1/1/2004} = 2{,}066$

$NC_{1/1/2005} = 2{,}066 \times 1.07 = 2{,}211$

The deductible limit for 2005 is generally equal to the normal cost plus the limit adjustment. The limit adjustment is equal to the smaller of the 10-year amortization of the initial accrued liability or the unamortized balance of the initial accrued liability. Generally, in the second year of a plan there would be no question that the unamortized balance is considerably larger than the 10-year amortization. However, notice the large credit balance in comparison to the original amortization base. This should be a tip-off that the unamortized balance needs to be checked.

The unamortized balance can be determined in this case by using the IRC section 412 balance equation.

Unfunded balance = Outstanding balance – credit balance

$$= (8{,}265 \times \frac{\ddot{a}_{\overline{29}|}}{\ddot{a}_{\overline{30}|}}) - 7{,}289 = 889$$

The IRC section 404 unfunded liability is equal to the IRC section 412 unfunded liability when there are no undeducted contributions. Therefore, the unamortized balance of the initial base as of 1/1/2005 is 889. Compare this to the 10-year amortization of the base.

$8{,}265/\ddot{a}_{\overline{10}|} = 1{,}100$

The unamortized balance is smaller.

Therefore, the deductible limit for 2005 is:

$(NC_{1/1/2005}$ + Limit adjustment for initial base + 2004 Loss/$\ddot{a}_{\overline{10}|}) \times 1.07$

$= (2{,}211 + 889 + 2{,}165/\ddot{a}_{\overline{10}|}) \times 1.07$

$= (2{,}211 + 889 + 288) \times 1.07 = 3{,}625$

Answer is C.

There are other issues to consider here. First, it is possible that the deductible limit is equal to the minimum funding requirement, if that is greater than the normal cost plus limit adjustment. It should be clear that is not the case since the credit balance is so large.

Second, the deductible limit could be limited by the full funding limit. The ERISA full funding limitation is equal to the accrued liability plus normal cost, less the smaller of the actuarial or market value of the assets, rolled forward with valuation interest to the end of the year. Note that the accrued liability is equal to the sum of the 2004 initial accrued liability and the 2004 normal cost, rolled forward with one year's interest.

$AL_{1/1/2005} = (8{,}265 + 2{,}066) \times 1.07 = 10{,}331$
ERISA $FFL_{12/31/2005} = (10{,}331 + 2{,}211 - 8{,}000) \times 1.07 = 4{,}860$

There is not enough information to determine the RPA'94 full funding limitation, although this is not necessary since the ERISA full funding limitation already does not apply as it exceeds the deductible limit already calculated and the RPA'94 limit can only increase the full funding limit.

One final peculiar issue is that it would appear at first glance that in 2004, the contribution of $9,500 was not deductible. General exam condition 35 indicates that it is assumed that all contributions made in prior tax years have been deducted. Implicit in this general condition is a requirement that the contribution could only be deducted if it were deductible. So the question arises, was the 2004 contribution deductible? It clearly exceeded the normal cost plus 10-year amortization of the initial accrued liability. However, it could have been deductible if it did not exceed the unfunded current liability (see IRC section 404(a)(1)(D)). It must be assumed that is the case in order to solve this question. If it is assumed that the $9,500 contribution was only deductible up to the normal cost plus 10-year amortization of the initial accrued liability, then it will be found that the limit adjustment for 2005 is equal to the 10-year amortization (since the unamortized balance is now higher by the amount of the undeducted contribution). This would result in a larger deductible limit, placing the numerical answer in a different answer range. The intent of this question, although not 100% obvious to me, was that it be assumed that the $9,500 was deductible in 2004.

Question 23

Plans that are split funded determine a normal cost for the side fund (the portion of the assets not invested in the life insurance product). This normal cost excludes the guaranteed cash value of the insurance at retirement age from the benefits being valued. In this case, the guaranteed cash value of the insurance at age 65 for the participant is $150,000.

The sole participant will retire on 1/1/2035. The last year's salary will be paid in 2034, so final pay can be determined by increasing his 2004 salary by 3% for 30 years.

Final pay = $\$75{,}000 \times 1.03^{30} = \$182{,}045$

Lump sum value of retirement benefit = $\$182{,}045 \times 50\% \times \ddot{a}_{65}^{(12)} = \$910{,}225$

Amount to be funded through side fund = $910,225 - $150,000 = $760,225

Normal cost = (PVFB – Actuarial assets)/$\ddot{a}_{\overline{30}|}$

$= (760{,}225v^{30} - 50{,}000)/\ddot{a}_{\overline{30}|}$

$= 3{,}756$

Answer is A.

Question 24

The mortality gain can be determined by comparing the actual accrued liability with the expected accrued liability. It is known that, since 3 retirees died, 2 spouses died and 10 retirees and spouses died during 2004, of the 100 retirees and spouses on 1/1/2004, there remain 85 retirees with spouses, 2 retirees without spouses, and 3 spouses without retirees on 1/1/2005.

The actual accrued liability is equal to the present value of the benefits payable to those who are alive on 1/1/2005.

$$\begin{aligned}\text{Actual liability} &= [(10{,}000\,\ddot{a}_{66} + 5{,}000\,\ddot{a}_{63} - 5{,}000\,\ddot{a}_{66:63}) \times 85] \\ &\quad + (10{,}000\,\ddot{a}_{66} \times 2) + (5{,}000\,\ddot{a}_{63} \times 3) \\ &= 7{,}990{,}000 + 170{,}000 + 136{,}500 = 8{,}296{,}500\end{aligned}$$

Some additional annuity-due factors must be determined before proceeding. Recall from life contingencies:

$$\ddot{a}_x = 1 + vp_x \ddot{a}_{x+1}$$

So,

$$\ddot{a}_{62} = 1 + vp_{62}\ddot{a}_{63} = 1 + (0.9346 \times .99 \times 9.10) = 9.4196$$
$$\ddot{a}_{65} = 1 + vp_{65}\ddot{a}_{66} = 1 + (0.9346 \times .98 \times 8.50) = 8.7850$$
$$\ddot{a}_{65:62} = 1 + vp_{65:62}\ddot{a}_{66:63} = 1 + (0.9346 \times .99 \times .98 \times 7.30) = 7.6191$$

The expected accrued liability is equal to the liability as of 1/1/2004, reduced by the 1/1/2004 benefit payments, increased with interest to 1/1/2005. Note that there is no adjustment due to the mortality decrement as that is already taken into account in the annuity factors.

$$\begin{aligned}\text{Expected liability}_{1/1/2005} &= [(10{,}000\,\ddot{a}_{65} + 5{,}000\,\ddot{a}_{62} - 5{,}000\,\ddot{a}_{65:62}) - 10{,}000] \times 1.07 \times 100 \\ &= 9{,}293{,}218\end{aligned}$$

The 2004 mortality gain is the excess of the expected liability over the actual liability.

Gain = 9,293,218 - 8,296,500 = 996,718

Answer is D.

Question 25

This is a straightforward aggregate funding question. The sole participant will reach retirement age 65 on 1/1/2020. Final salary will be paid during 2019. Therefore, salary must be increased using the salary scale for 15 years from 2004 to 2019.

Final salary = $\$100{,}000 \times 1.03^{15} = \$155{,}797$
Normal retirement benefit = 1.5% × \$155,797 × 20 years of service = \$46,739
Present value of future benefits$_{1/1/2005}$ = $\$46{,}739 \times \ddot{a}_{65}^{(12)} \times v^{15}$
$= \$46{,}739 \times 10.00 \times 0.362446 = \$169{,}404$

The normal cost under the aggregate method is:

$NC_{1/1/2005}$ = (PVFB – Actuarial assets)/$\ddot{a}_{\overline{15}|j}$, where $j = \frac{1.07}{1.03} - 1 = .038835$
$= (169{,}404 - 62{,}000)/11.6448 = 9{,}223$

There are no unfunded liabilities under the aggregate method. The minimum required contribution for 2005 (subject to the full funding limitation) is: $9{,}223 \times 1.07 = 9{,}869$

The full funding limitation must be determined. Since no information is given concerning current liability (nor information allowing the calculation of current liability), only the ERISA full funding limit is necessary per general examination condition 42. The ERISA full funding limitation is equal to the accrued liability plus normal cost under the entry age normal cost method, less the smaller of the actuarial or market value of the assets (reduced by any credit balance in the funding standard account), rolled forward with valuation interest to the end of the year. Note that Revenue Ruling 81-13 requires the use of accrued liability and normal cost under the entry age normal method when a spread gain method such as aggregate is being used.

The entry age normal cost is determined as a level percent of salary from hire age, and the accrued liability is the accumulated value of past normal costs (prior to 1/1/2005).

Normal cost under entry age normal at age 45
$= 1.5\% \times \$155{,}797 \times 20 \text{ years of service} \times 10.00 \times v_{.07}^{20} \div \ddot{a}_{\overline{20}|.038835} = 8{,}467$
Normal cost under entry age normal at age 50 = $8{,}467 \times 1.03^5 = 9{,}816$
Accrued liability under entry age normal at age 50 = $9{,}816 \times \ddot{s}_{\overline{5}|.038835} = 55{,}103$
ERISA full funding limit = $(55{,}103 + 9{,}816 - 62{,}000) \times 1.07 = 3{,}123$

The minimum required contribution for 2005 is equal to the full funding limitation of \$3,123.

Answer is A.

Question 26

The quarterly contribution requirement is equal to 25% of the smaller of the minimum funding requirement as of the last day of the prior year, or 90% of the minimum funding requirement as of the first day of the current year. These minimums are without regard to any credit balance in the funding standard account. The minimum funding requirement for 2004 and 2005 must be developed.

The plan was effective in 2003. Under the unit credit cost method, the normal cost is equal to the present value of the benefit accrual for the year, and the accrued liability is equal to the present value of the prior benefit accruals.

$NC_{1/1/2003} = \$100 \times 12 \times \ddot{a}_{65}^{(12)} \times v^{17} = \$100 \times 12 \times 10.00 \times 0.3166 = 3{,}799$

$AL_{1/1/2003} = \$100 \times 12 \times 10 \text{ years of service} \times \ddot{a}_{65}^{(12)} \times v^{17}$

$= \$100 \times 12 \times 10 \text{ years of service} \times 10.00 \times 0.3166 = 37{,}992$

The normal cost in each subsequent year is just the prior year's normal cost increased by 7% (since the accrual is the same each year and the present value factor decreases due to one fewer year to retirement).

$NC_{1/1/2004} = 3{,}799 \times 1.07 = 4{,}065$

$NC_{1/1/2005} = 4{,}065 \times 1.07 = 4{,}350$

The minimum funding requirement for 2004 and 2005 (without regard to any credit balance) is:

$Minimum_{12/31/2004} = (4{,}065 + 37{,}992/\ddot{a}_{\overline{30}|}) \times 1.07 = (4{,}065 + 2{,}861) \times 1.07 = 7{,}411$

$Minimum_{1/1/2005} = 4{,}350 + 2{,}861 = 7{,}211$

The 2005 quarterly contribution requirement is: $7{,}211 \times 90\% \times 25\% = 1{,}622$

The quarterly contributions are due on 4/15/2005, 7/15/2005, 10/15/2005, and 1/15/2006. See IRC section 412(m)(3)(B).

The credit balance can be used to satisfy the quarterly contribution requirement (see Revenue Notice 89-52, Q&A 12). Since there have been no gains or losses, the difference between the expected assets and the actual assets must be equal to the credit balance. Only contributions in excess of the minimum could account for the actual assets being larger than what was expected.

$$\begin{aligned}\text{Expected assets}_{1/1/2005} &= (\text{2003 normal cost plus amortization charge} \times 1.07^2) \\ &\quad + (\text{2004 normal cost plus amortization charge} \times 1.07) \\ &= ((3{,}799 + 2{,}861) \times 1.07^2) + ((4{,}065 + 2{,}861) \times 1.07) \\ &= 15{,}036\end{aligned}$$

$CB_{12/31/2004}$ = Actual assets – Expected assets = 17,560 – 15,036 = 2,524

The credit balance is increased with interest to the first quarterly due date of 4/15/2005.

$CB_{4/15/2005} = 2{,}524 \times 1.07^{3.5/12} = 2{,}574$

This is enough to satisfy the quarterly contribution requirement of 1,622 on 4/15/2005, leaving a credit balance of 952 (2,574 – 1,622). The remaining credit balance is accumulated with interest to the next quarterly due date of 7/15/2005.

$CB_{7/15/2005} = 952 \times 1.07^{3/12} = 968$

The additional contribution that must be made on 7/15/2005 in order to fully satisfy the quarterly contribution requirement is \$654 (1,622 – 968).

Answer is B.

Question 27

The deductible limit for 2004 is equal to the normal cost plus the 10-year amortization of the initial actuarial liability, increased with interest to the end of the year. Note that interest is given to the end of the year **regardless** of the actual timing of the contribution being deducted.

$$\text{2004 deductible limit} = (50{,}000 + 345{,}000/\ddot{a}_{\overline{10}|}) \times 1.07$$
$$= (50{,}000 + 45{,}907) \times 1.07 = 102{,}620$$

The minimum required contribution for 2004 is:

$$\text{2004 minimum} = (50{,}000 + 345{,}000/\ddot{a}_{\overline{30}|}) \times 1.07$$
$$= (50{,}000 + 25{,}983) \times 1.07 = 81{,}302$$

The credit balance in the funding standard account as of 12/31/2004 is equal to the difference between the credits (accumulated contribution) and the charges (minimum funding requirement).

$$CB_{12/31/2004} = (102{,}620 \times 1.035) - 81{,}302 = 24{,}910$$

Note that the contribution is accumulated with pro-rated interest. The interest can be either simple interest (as is being used in this solution) or compound interest.

The experience gain or loss for 2004 must be determined. This is equal to the difference between the expected unfunded liability and the actual unfunded liability.

$$eUAL_{1/1/2005} = [(AL_{1/1/2004} + NC_{1/1/2004}) \times 1.07] - (\text{2004 contribution} \times 1.035)$$
$$= [(345{,}000 + 50{,}000) \times 1.07] - (102{,}620 \times 1.035) = 316{,}438$$

Since the actual unfunded liability of 265,000 is less than the expected unfunded liability, there is an experience gain.

$$\text{2004 gain} = 316{,}428 - 265{,}000 = 51{,}438$$

The minimum required contribution for 2005 as of 12/31/2005 is:

$$\text{2005 minimum} = (50{,}000 + 345{,}000/\ddot{a}_{\overline{30}|} - 51{,}438/\ddot{a}_{\overline{5}|} - 24{,}910) \times 1.07$$
$$= (50{,}000 + 25{,}983 - 11{,}725 - 24{,}910) \times 1.07 = 42{,}102$$

Answer is B.

Question 28

The 2004 asset gain or loss is equal to the difference between the expected assets and the actual assets as of 1/1/2005. Since 2004 was the first year of the plan and the contribution for 2004 was deposited on 1/1/2004, the expected asset value is:

$\text{Expected assets}_{1/1/2005} = 100{,}000 \times 1.07 = 107{,}000$

The actual assets can be determined by looking at the development of the total 2004 experience gain or loss. The development of the required contributions for 2004 and 2005 is necessary to determine the values needed.

The minimum required contribution for 2004 as of 12/31/2004 is:

$$\text{2004 minimum} = (60{,}000 + 400{,}000/\ddot{a}_{\overline{30}|}) \times 1.07$$
$$= (60{,}000 + 30{,}126) \times 1.07 = 96{,}435$$

The credit balance as of 12/31/2004 is equal to the difference between the accumulated contribution for 2004 and the minimum required contribution.

$CB_{12/31/2004} = (100{,}000 \times 1.07) - 96{,}435 = 10{,}565$

The minimum required contribution for 2005 as of 1/1/2005 is:

$$70{,}000 = 60{,}000 + 400{,}000/\ddot{a}_{\overline{30}|} + [\text{2004 (gain)/loss}]/\ddot{a}_{\overline{5}|} - 10{,}565$$

$\text{2004 (gain)/loss} = (41{,}946)$

$$\text{Expected UAL}_{1/1/2005} = (\text{AL}_{1/1/2004} + \text{NC}_{1/1/2004}) \times 1.07 - (\text{1/1/2004 contribution} \times 1.07)$$
$$= (400{,}000 + 60{,}000) \times 1.07 - (100{,}000 \times 1.07) = 385{,}200$$

$\text{Actual UAL}_{1/1/2005} = \text{AL}_{1/1/2005} - \text{Actual assets}_{1/1/2005} = 460{,}000 - \text{Actual assets}_{1/1/2005}$

The 2004 gain is equal to the excess of the expected UAL and the actual UAL.

$385{,}200 - (460{,}000 - \text{Actual assets}_{1/1/2005}) = 41{,}946$
$\text{Actual assets}_{1/1/2005} = 116{,}746$

$\text{2004 asset gain} = \text{Actual assets}_{1/1/2005} - \text{Expected assets}_{1/1/2005} = 116{,}746 - 107{,}000 = 9{,}746$

Answer is A.

Question 29

A new 10-year amortization base must be set up due to the change in asset valuation method.

Average of book and market value = (640,000 + 425,000)/2 = 532,500
Market value = 425,000
120% of market value = 1.2 × 425,000 = 510,000

The asset value under the old method would have been $425,000, and under the new method is $510,000. The assets increase by $85,000 due to the method change. This decreases unfunded liabilities, resulting in a new $85,000 credit base.

The only other amortization base is the initial unfunded liability. The balance equation can be used to determine the unfunded liability.

Unfunded liability = Outstanding balance – Credit balance

$$= (400{,}000 \times \frac{\ddot{a}_{\overline{20}|}}{\ddot{a}_{\overline{30}|}}) - 85{,}000 - 45{,}000$$

$$= 341{,}493 - 85{,}000 - 45{,}000 = 211{,}493$$

The normal cost under frozen initial liability is calculated using the following formula:

$$NC = \frac{\text{PVFB - Actuarial assets - Unfunded liability}}{\text{Present value of future salary/Annual salary}}$$

$$NC_{1/1/2005} = \frac{2{,}000{,}000 - 510{,}000 - 211{,}493}{4{,}200{,}000/600{,}000} = 182{,}644$$

The deductible limit under IRC section 404(a)(1)(A)(iii) is equal to the normal cost plus/minus the 10-year amortization of each amortization base, all increased with interest to the end of the year.

2005 deductible limit = $(182{,}644 + 400{,}000/\ddot{a}_{\overline{10}|} - 85{,}000/\ddot{a}_{\overline{10}|}) \times 1.07$

$= (182{,}644 + 53{,}225 - 11{,}310) \times 1.07 = 240{,}278$

Answer is C.

Note that the minimum funding requirement is deductible, if larger. However, since there is a large credit balance of $45,000, it should be clear by examination that this will produce a smaller result than has been already calculated. In addition, the full funding limit should be considered. There is not enough information available to calculate the full funding limit, so it should be ignored per general exam conditions.

Question 30

The quarterly contribution requirement is equal to 25% of the smaller of the minimum funding requirement as of the last day of the prior year, or 90% of the minimum funding requirement as of the first day of the current year. These minimums are without regard to any credit balance in the funding standard account. The minimums include additional funding charges (discounted to the beginning of the year for the current year using current liability interest), and the 2004 minimum must include any late quarterly contribution interest charge for 2004. The minimum funding requirement for 2004 and 2005 must be developed.

2004 minimum (on 12/31/2004) = 95,000 + 12,000 + 4,300 = 111,500

2005 minimum (on 1/1/2005) = (111,000 ÷ 1.07) + (18,000 ÷ 1.06) = 120,719

The 2005 quarterly contribution requirement is: $120{,}719 \times 90\% \times 25\% = 27{,}162$

Answer is D.

Question 31

The effect of the additional 6% of salary above what was originally reported is that each participant's benefit is 6% larger than expected. As a result, the normal cost is 6% larger, and the accrued liability for active participants is 6% larger. Note that there is no change for inactive participants. The increase in the accrued liability means a corresponding increase in the 2004 experience loss (the actual liability is larger by that amount).

Revised normal cost = 52,500 × 1.06 = 55,650
Increase in 2004 experience loss = 830,000 × .06 = 49,800

Corrected 2005 minimum as of 12/31/2005

$$= (55{,}650 + 107{,}100 + 49{,}800/\ddot{a}_{\overline{5}|} - 50{,}000) \times 1.07$$

$$= (55{,}650 + 107{,}100 + 11{,}351 - 50{,}000) \times 1.07$$

$$= 132{,}788$$

Answer is C.

Question 32

Smith will have 30 years of service upon attainment of age 55, so Smith will be eligible to elect early retirement at age 55 or wait until age 65. Under the assumed retirement rates that are given, Smith has a 50% chance of retiring at age 55 and a 50% chance of waiting until age 65.

Jones will not complete 30 years of service until reaching age 65, so Jones will not be eligible to elect early retirement. It is assumed that Jones will retire at age 65.

Under the entry age normal method, the normal cost is determined as a level dollar amount (since the benefit formula is a non-salary based formula) from hire age, and the accrued liability is the accumulated value of the past normal costs.

The present value of Smith's benefit at hire is equal to the sum of the present values of his respective benefits should he retire at either of the two possible retirement ages (55 and 65), each reduced to 50% of their value to account for the probability of retirement at that age.

Smith normal retirement benefit = \$35 × 40 years of service = \$1,400
Smith early retirement benefit = \$35 × 30 years of service = \$1,050
Jones normal retirement benefit = \$35 × 30 years of service = \$1,050

Determination of Smith's normal cost and accrued liability

$$PVFB_{25} = [(1{,}400 \times 12 \times \ddot{a}_{65}^{(12)} \times v^{40}) \times 50\%] + ([(1{,}050 \times 12 \times \ddot{a}_{55}^{(12)}) + (500 \times 12 \times \ddot{a}_{55:\overline{10}|}^{(12)})] \times v^{30} \times 50\%)$$
$$= 17{,}552$$

$$NC = PVFB_{25}/(0.5\,\ddot{a}_{\overline{40}|} + 0.5\,\ddot{a}_{\overline{30}|}) = 1{,}275$$

$$AL = NC\,\ddot{s}_{\overline{15}|} = 34{,}282$$

Determination of Jones' normal cost and accrued liability

$$PVFB_{35} = 1{,}050 \times 12 \times \ddot{a}_{65}^{(12)} \times v^{30} = 16{,}056$$

$$NC = PVFB_{35}/\ddot{a}_{\overline{30}|} = 1{,}209$$

$$AL = NC\,\ddot{s}_{\overline{5}|} = 7{,}439$$

Total AL = 34,282 + 7,439 = 41,721

Answer is B.

Question 33

The minimum required contribution for 2004 as of 12/31/2004 is:

$$\text{2004 minimum} = (39{,}000 + 1{,}200{,}000/\ddot{a}_{\overline{30}|}) \times 1.07$$
$$= (39{,}000 + 90{,}377) \times 1.07 = 138{,}433$$

The credit balance as of 12/31/2004 is equal to the difference between the accumulated contribution for 2004 and the minimum required contribution. Since the contribution was deposited after the end of the 2004 year, there is no interest accumulation on account of the contribution.

$CB_{12/31/2004} = 145{,}000 - 138{,}433 = 6{,}567$

The experience gain or loss for 2004 must be determined. This is equal to the difference between the expected unfunded liability and the actual unfunded liability. Since the only asset in the plan as of 1/1/2005 is the receivable contribution for 2004, there is clearly no asset gain or loss. Therefore, the expected accrued liability can be compared to the actual accrued liability in order to determine the experience gain or loss. Note that the entry age normal accrued liability is used for this purpose since the gain or loss is always determined before any impact of a cost method change (see section 8.01 of Revenue Ruling 81-213).

$$eAL_{1/1/2005} = (AL_{1/1/2004} + NC_{1/1/2004}) \times 1.07$$
$$= (1{,}200{,}000 + 39{,}000) \times 1.07 = 1{,}325{,}730$$

Since the actual accrued liability of 1,380,000 is more than the expected accrued liability, there is an experience loss.

$\text{2004 loss} = 1{,}380{,}000 - 1{,}325{,}730 = 54{,}270$

The amortization base due to the change in cost method is equal to the difference between the accrued liabilities of each method. Since the new method (unit credit) produces a smaller accrued liability, there is a gain due to the method change, to be amortized over 10 years.

$\text{Method change gain} = 1{,}380{,}000 - 1{,}225{,}000 = 155{,}000$

The minimum required contribution for 2005 as of 12/31/2005 is:

$$\text{2005 minimum} = (48{,}000 + 1{,}200{,}000/\ddot{a}_{\overline{30}|} + 54{,}270/\ddot{a}_{\overline{5}|} - 155{,}000/\ddot{a}_{\overline{10}|} - 6{,}567) \times 1.07$$
$$= (48{,}000 + 90{,}377 + 12{,}370 - 20{,}625 - 6{,}567) \times 1.07 = 132{,}204$$

Answer is C.

Question 34

I. Section 4.04(6) of Revenue Procedure 2000-40 requires that a change in valuation software requiring approval was not made in the prior year in order to receive automatic approval.

II. Section 4.04(5) of Revenue Procedure 2000-40 requires that in order to receive automatic approval for a change in valuation software, the net charge to the funding standard account for the prior year must be within 2% of the prior year's actual net charge.

III. Section 4.04(8) of Revenue Procedure 2000-40 requires that a new amortization base be created reflecting the software change, to be amortized in the same manner as experience gains or loss are amortized, unless there is simultaneously a change in actuarial assumptions, in which case the new amortization base is to be treated as part of the change in assumptions.

Statements I and III are true.

Answer is B.

Question 35

The deductible limit for the taxable year ending on 6/30/2005 is equal to the normal cost plus the limit adjustment (see IRC section 404(a)(1)(A)(iii)). In this question, the limit adjustment is $0. Since the valuation date is 6 months before the fiscal year end, this is increased with only 6 months of interest (which can be pro-rated using either simple or compound interest). See IRS regulation 1.404(a)-14(f)(3).

Normal cost plus limit adjustment = 225,000 × 1.035 = 232,875

The full funding limitation must be determined. The ERISA full funding limitation is equal to the accrued liability plus normal cost, rolled forward with valuation interest to the end of the **plan** year (per Revenue Ruling 82-125), less the smaller of the actuarial or market value of the assets, rolled forward with valuation interest to the end of the year and then reduced by the contribution carryover from 6/30/2004. Note that it is important to first increase the assets with interest and only then reduce them by the contribution carryover. Again, see Revenue Ruling 82-125. The assets do not need to be reduced by the $110,000 contribution for 2005 since they are not already included. General exam condition number 27 indicates that the assets given are those developed for IRC section 412, which would not include contributions made for the current year.

ERISA full funding limit = [(1,460,000 + 225,000) × 1.07] – [(1,720,000 × 1.07) – 275,000]
= 237,550

The current liability is not provided, so the RPA'94 full funding limit cannot be determined. In any case, this is irrelevant because the ERISA full funding limitation already exceeds the otherwise deductible limit, and the RPA'94 limit can only increase the full funding limit. As a result, $232,875 can be deducted for the fiscal year ending on 6/30/2005. (Further note that the unfunded current liability cannot be determined, so this possible deduction limit can be ignored per exam general condition 43.)

The total contribution available for deduction is equal to the sum of the carryover from the prior tax year and the new contribution made on 4/30/2005. This is $385,000 ($275,000 + $110,000).

Contribution carryover$_{6/30/2005}$ = $385,000 - $232,875 = $152,125

Answer is B.

Question 36

The experience gain or loss for 2004 must be determined. Note that the gain or loss is always determined before any impact of a cost method change (see section 8.01 of Revenue Ruling 81-213). The gain or loss is equal to the difference between the expected unfunded liability and the actual unfunded liability. The expected unfunded liability can be determined by using the balance equation. The only existing bases before 2005 are the given assumption change base (being amortized over 10 years from 1/1/1999) and the given plan amendment base (being amortized over 30 years from 1/1/2001).

$$\begin{aligned} eUAL_{1/1/2005} &= \text{Outstanding balance} - \text{Credit balance} \\ &= 50{,}000\,\ddot{a}_{\overline{4}|} + 30{,}000\,\ddot{a}_{\overline{26}|} - 40{,}000 \\ &= 181{,}216 + 379{,}607 - 40{,}000 = 520{,}823 \end{aligned}$$

The actual unfunded accrued liability is based upon the entry age normal accrued liability.

$$\text{Actual } UAL_{1/1/2005} = 1{,}300{,}000 - 600{,}000 = 700{,}000$$

Since the actual accrued liability of 700,000 is more than the expected accrued liability, there is an experience loss.

$$\text{2004 loss} = 700{,}000 - 520{,}823 = 179{,}177$$

The amortization base due to the change in cost method is equal to the difference between the accrued liabilities of each method. Since the new method (unit credit) produces a smaller accrued liability, there is a gain due to the method change, to be amortized over 10 years.

$$\text{Method change gain} = 1{,}300{,}000 - 1{,}100{,}000 = 200{,}000$$

The minimum required contribution for 2005 as of 12/31/2005 is:

$$\begin{aligned} \text{2005 minimum} &= (87{,}000 + 50{,}000 + 30{,}000 + 179{,}177/\ddot{a}_{\overline{5}|} - 200{,}000/\ddot{a}_{\overline{10}|} - 40{,}000) \times 1.07 \\ &= (87{,}000 + 50{,}000 + 30{,}000 + 40{,}841 - 26{,}613 - 40{,}000) \times 1.07 = 151{,}114 \end{aligned}$$

Answer is D.

Question 37

The experience gain or loss for 2004 must be determined. Note that the gain or loss is always determined before any impact of a cost method change (see section 8.01 of Revenue Ruling 81-213). The gain or loss is equal to the difference between the expected unfunded liability and the actual unfunded liability. The expected unfunded liability can be determined by using the balance equation. The only existing bases before 2005 are the given initial base (being amortized over 30 years from 1/1/1995) and the given assumption change base (being amortized over 30 years from 1/1/2000). Note that assumption change bases are amortized over 30 years for multiemployer plans, not the usual 10 years for single employer plans.

$$\begin{aligned} eUAL_{1/1/2005} &= \text{Outstanding balance} - \text{Credit balance} \\ &= 50{,}000\,\ddot{a}_{\overline{20}|} + 20{,}000\,\ddot{a}_{\overline{25}|} - 40{,}000 \\ &= 566{,}780 + 249{,}387 - 40{,}000 = 776{,}167 \end{aligned}$$

The actual unfunded accrued liability is based upon the entry age normal accrued liability. Since the actual accrued liability of 1,000,000 is more than the expected accrued liability, there is an experience loss.

$$2004 \text{ loss} = 1{,}000{,}000 - 776{,}167 = 223{,}833$$

The loss is amortized over 15 years for multiemployer plans, not the usual 5 years for single employer plans.

The amortization base due to the change in cost method is equal to the difference between the accrued liabilities of each method. Since the new method (unit credit) produces a smaller accrued liability, there is a gain due to the method change, to be amortized over 10 years.

$$\text{Method change gain} = 1{,}000{,}000 - 650{,}000 = 350{,}000$$

The minimum required contribution for 2005 as of 12/31/2005 is:

$$\begin{aligned} 2005 \text{ minimum} &= (80{,}000 + 50{,}000 + 20{,}000 + 223{,}833/\ddot{a}_{\overline{15}|} - 350{,}000/\ddot{a}_{\overline{10}|} - 40{,}000) \times 1.07 \\ &= (80{,}000 + 50{,}000 + 20{,}000 + 22{,}968 - 46{,}572 - 40{,}000) \times 1.07 = 92{,}444 \end{aligned}$$

Answer is C.

Question 38

The normal cost under the aggregate method is:

$NC = (PVFB - \text{Actuarial assets})/\ddot{a}_{\overline{n}|}$

In 2004, the first year of the plan, there are no assets, and the sole plan participant is age 50 (15 years before retirement age 65).

The normal cost under the aggregate method is:

$NC_{1/1/2004} = PVFB/\ddot{a}_{\overline{15}|} = 350{,}000/9.7455 = 35{,}914$

The minimum funding requirement for 2004 is equal to the end of year normal cost:

$2004 \text{ minimum} = 35{,}914 \times 1.07 = 38{,}428$

The credits in the 2004 funding standard account are the 2004 contribution of $20,000 (including one year's interest since it was deposited on the first day of 2004) and a $10,000 waived funding deficiency. The 2004 funding deficiency is equal to the difference between the minimum funding requirement and the credits to the funding standard account.

$2004 \text{ funding deficiency} = 38{,}428 - [(20{,}000 \times 1.07) + 10{,}000] = 7{,}028$

The assets earned 20% during 2004.

$\text{Assets}_{1/1/2005} = 20{,}000 \times 1.2 = 24{,}000$

For purposes of the actuarial value of assets used in the aggregate cost method determination of normal cost, the prior funding deficiency is added to the assets. In addition, the outstanding balance of any amortization bases must be added to the assets. The waived funding deficiency from 2004 is the only amortization base, and the entire 10,000 is outstanding.

$\text{Adjusted actuarial value of assets}_{1/1/2005} = 24{,}000 + 7{,}028 + 10{,}000 = 41{,}028$

The normal cost for 2005 as of 1/1/2005 is:

$NC_{1/1/2005} = (PVFB - \text{Actuarial assets})/\ddot{a}_{\overline{14}|} = (365{,}000 - 41{,}028)/9.3577 = 34{,}621$

Answer is A.

Question 39

This question really just requires knowledge of the amortization periods of various types of bases. An assumption change base is amortized over 10 years (there are 2 years remaining to amortize the outstanding balance of the 1/1/1997 base), a funding method change base is amortized over 10 years (there are 8 years remaining to amortize the outstanding balance of the 1/1/2003 base), and an experience loss base is amortized over 5 years (there are 5 years remaining to amortize the outstanding balance of the 1/1/2005 base).

$$\text{2005 minimum} = (25{,}000 + 40{,}000/\ddot{a}_{\overline{2}|} + 100{,}000/\ddot{a}_{\overline{8}|} + 50{,}000/\ddot{a}_{\overline{5}|} - 5{,}000) \times 1.07$$
$$= (25{,}000 + 20{,}676 + 15{,}651 + 11{,}397 - 5{,}000) \times 1.07 = 72{,}465$$

Answer is D.

Question 40

The normal cost under the aggregate method (amortized from attained age on 1/1/2005 to retirement age) for the initial 2005 plan year is:

$$NC_{12/31/2005} = (PVFB_{31}/\ddot{a}_{\overline{34}|}) \times 1.07 = (1{,}000 \times 44 \text{ years of service} \times a_{65} \times v^{34}/\ddot{a}_{\overline{34}|}) \times 1.07$$
$$= 3{,}169$$

The aggregate method has no amortization bases, so the minimum required contribution is equal to the normal cost. X = 3,169.

The normal cost under the entry age normal method (amortized from entry age based on the hire date of 1/1/1995 to retirement age) for the initial 2005 plan year is:

$$NC_{1/1/2005} = PVFB_{21}/\ddot{a}_{\overline{44}|} = 1{,}000 \times 44 \text{ years of service} \times a_{65} \times v^{44}/\ddot{a}_{\overline{44}|} = 1{,}428$$

The accrued liability under the entry age normal method is equal to the accumulated value at attained age of the prior normal costs.

$$AL_{1/1/2005} = 1{,}428 \times \ddot{s}_{\overline{10}|} = 21{,}111$$

The minimum required contribution under the entry age normal method is equal to the normal cost plus a 30-year amortization of the initial unfunded liability. This is:

$Y = (1{,}428 + 21{,}111/\ddot{a}_{\overline{30}|}) \times 1.07 = (1{,}428 + 1{,}590) \times 1.07 = 3{,}229$

The attained age normal cost method has an initial unfunded liability equal to the accrued liability under the unit credit cost method. This is equal to the present value of the benefits accrued on account of service prior to the plan effective date of 1/1/2005.

Unit credit $AL_{1/1/2005} = 1{,}000 \times 10$ years of service $\times a_{65} \times v^{34} = 9{,}260$

The normal cost under the attained age normal method (amortized from attained age on 1/1/2005 to retirement age) for the initial 2005 plan year is:

$NC_{1/1/2005} = (PVFB_{31} - AL)/\ddot{a}_{\overline{34}|} = (1{,}000 \times 44$ years of service $\times a_{65} \times v^{34} - 9{,}260)/\ddot{a}_{\overline{34}|}$

$= 2{,}289$

The minimum required contribution under the attained age normal method is equal to the normal cost plus a 30-year amortization of the initial unfunded liability. This is:

$Z = (2{,}289 + 9{,}260/\ddot{a}_{\overline{30}|}) \times 1.07 = (2{,}289 + 697) \times 1.07 = 3{,}195$

$Y > Z > X$

Answer is B.

Question 41

The balance equation can be used to determine the expected unfunded liability as of 1/1/2005.

Unfunded liability = Outstanding balance – Credit balance – Reconciliation account

The reconciliation account has \$0 as of 1/1/2004. However, there is an additional funding charge in 2004 that is added to the reconciliation account, creating a reconciliation account balance of \$40,000 on 12/31/2004.

$$\text{Unfunded liability}_{1/1/2005} = 400{,}000 \times \frac{\ddot{a}_{\overline{26}|}}{\ddot{a}_{\overline{30}|}} - 12{,}000 - 40{,}000$$

$$= 381{,}199 - 12{,}000 - 40{,}000 = 329{,}199$$

$$\text{Actual unfunded accrued liability}_{1/1/2005} = \text{AL} - \text{Actuarial assets}$$

$$= 2{,}200{,}000 - 1{,}800{,}000 = 400{,}000$$

The 2004 gain or loss is equal to the difference between the expected unfunded liability and the actual unfunded liability. There is a loss since the actual liability exceeds the expected liability.

2004 Loss = 400,000 – 329,199 = 70,801

The deductible limit is equal to the greater of the minimum funding requirement or the normal cost plus the limit adjustment (generally the 10-year amortization of the bases). Since the initial unfunded liability is amortized over 20 years for the minimum, and there is a sizable \$12,000 credit balance, the normal cost plus limit adjustment is clearly the larger of the two.

The deductible limit for 2005 is:

$$(65{,}000 + 400{,}000/\ddot{a}_{\overline{10}|} + 70{,}801/\ddot{a}_{\overline{10}|}) \times 1.07 = (65{,}000 + 53{,}225 + 9{,}421) \times 1.07 = 136{,}581$$

Answer is E.

Note that the full funding limitation should be considered. There is only enough information to calculate the ERISA full funding limit. The ERISA full funding limitation is equal to the accrued liability plus normal cost less the smaller of the actuarial or market value of the assets, rolled forward with valuation interest to the end of the year

ERISA FFL = (2,200,000 + 65,000 – 1,800,000) × 1.07 = 497,550

The full funding limitation clearly does not apply.

Question 42

This is a basic unit credit valuation question. The normal cost under the unit credit method is equal to the present value of the benefit accrual for the year. The initial unfunded accrued liability is equal to the present value of the accrued benefit due to service from years prior to the plan effective date. This initial unfunded liability is amortized over 30 years for minimum funding purposes. When there is an assumed salary increase, the benefits for purposes of the normal cost and accrued liability are based upon projected salary.

The initial accrued liability has been given as of the plan effective date of 1/1/2004. Since the sole participant has 8 years of past service and the benefit formula provides for the same percentage of average salary accrual each year, one-eighth of this accrued liability must be equal to the normal cost.

$NC_{1/1/2004} = 45{,}136 \div 8 = 5{,}642$

$$\text{2004 minimum required contribution} = (5{,}642 + 45{,}136/\ddot{a}_{\overline{30}|}) \times 1.07$$
$$= (5{,}642 + 3{,}399) \times 1.07 = 9{,}674$$

The credit balance as of the end of 2004 is equal to the difference between the credits in the funding standard account (in this case the contribution paid on 12/31/2004) and the minimum required contribution.

$CB_{12/31/2004} = 11{,}500 - 9{,}674 = 1{,}826$

The 2004 gain or loss is equal to the difference between the expected unfunded liability and the actual unfunded liability. Since 2004 was the first year of the plan and the only contribution was made on the last day of the year, there is no asset gain or loss. Therefore, the expected liability can be compared to the actual liability. The expected liability is equal to the accumulated value of the 1/1/2004 accrued liability and normal cost.

Expected $AL_{1/1/2005} = (45{,}136 + 5{,}642) \times 1.07 = 54{,}332$

The only gain or loss is due to the fact that the compensation increase was 0% rather than the expected 4%. The impact of the lack of compensation increase is that the projected benefit is now 4% smaller than expected (as final average compensation is now 4% smaller than expected). This is reflected in the actual AL.

Actual $AL_{1/1/2005} = 54{,}332 \div 1.04 = 52{,}242$

There is a gain since the expected liability exceeds the actual liability.

2004 Gain = 54,332 – 52,242 = 2,090

The gain is amortized over 5 years for minimum funding.

Generally, the normal cost under the unit credit method increases at the same rate as the assumed interest rate, since each year the participants are one year closer to retirement, and the normal cost is simply a present value. However, since there is a gain due to the lack of a 4% increase in the salary from 2003 to 2004, the normal cost will both increase by one year's interest discount and decrease by the lack of a 4% salary increase.

$NC_{1/1/2005} = 5{,}642 \times 1.07 \div 1.04 = 5{,}805$

$$\text{1/1/2005 minimum required contribution} = 5{,}805 + 45{,}136/\ddot{a}_{\overline{30}|} - 2{,}090/\ddot{a}_{\overline{5}|} - 1{,}826$$
$$= 5{,}805 + 3{,}399 - 476 - 1{,}826 = 6{,}902$$

Answer is B.

Question 43

It is a little surprising to find this question on an EA-2A exam since it is part of the EA-2B syllabus. The conversion of mandatory employee contributions to equivalent accrued benefits is covered in IRC section 411(c). The accumulated employee contributions at retirement are converted to an annuity using IRC section 417(e)(3) assumptions.

AB attributable to mandatory contributions = 20,000 ÷ 8.50 = 2,353

The employer provided benefit is equal to the difference between the total accrued benefit and the accrued benefit derived from mandatory employee contributions.

Employer-provided accrued benefit = 4,000 – 2,353 = 1,647

Answer is C.

Question 44

The contribution for 2004 exceeded the 2004 deductible limit by $50,000 ($150,000 - $100,000). There is a $50,000 contribution carryover from 2004.

The ERISA full funding limitation is equal to the accrued liability plus normal cost, rolled forward with valuation interest to the end of the year, less the smaller of the actuarial or market value of the assets, rolled forward with valuation interest to the end of the year and then reduced by the contribution carryover from 2004. Note that it is important to first increase the assets with interest and only then reduce them by the contribution carryover. See Revenue Ruling 82-125.

ERISA full funding limit = $[(1{,}000{,}000 + 75{,}000) \times 1.07] - [(900{,}000 \times 1.07) - 50{,}000]$
$= 237{,}250$

The overall full funding limitation is equal to the greater of the ERISA or the RPA'94 full funding limitation. The RPA'94 full funding limitation is equal to 90% of the current liability (including the expected increase in liability due to the current year accruals), rolled forward with current liability interest to the end of the year (not needed in this question since the current liability is provided as of the last day of the year), less the actuarial value of the assets, rolled forward with valuation interest to the end of the year and similarly reduced by the contribution carryover.

RPA'94 full funding limit = $(90\% \times 1{,}250{,}000) - [(900{,}000 \times 1.07) - 50{,}000] = 212{,}000$

The overall full funding limit is 237,250.

Answer is C.

Question 45

There is a loss due to the fact that Smith's salary increased, since there is no assumed salary increase. The 2004 loss is equal to the increase in the accrued liability as of 1/1/2005 attributed to the additional $10,000 of salary. The accrued liability under the unit credit method is equal to the present value of the accrued benefit attributable to past service. Smith has 15 years of past service prior to 2005.

Loss for Smith = 1% × $10,000 × 15 years of past service × $\ddot{a}_{65}^{(12)} \times v^{15}$
= 1% × $10,000 × 15 years of past service × 8.50 × 0.36245
= $4,621

There is also a loss due to the fact that Jones' salary increased, and that Jones retired early at age 55 with a subsidized early retirement benefit. The 2004 loss is equal to the excess of the actual liability over the expected accrued liability (assuming a retirement age of 65 and the prior year's salary).

Expected AL for Jones = 1% × $75,000 × 20 years of past service × $\ddot{a}_{65}^{(12)} \times v^{10}$
= 1% × $75,000 × 20 years of past service × 8.50 × 0.50835
= $64,815

Actual retirement benefit for Jones
= 1% × $80,000 × 20 years of past service × 50% early retirement reduction
= $8,000

Actual AL for Jones = $8,000 × $\ddot{a}_{55}^{(12)}$ = $8,000 × 10.50 = $84,000

Loss for Jones = $84,000 - $64,815 = $19,185

Total 2004 loss = $4,621 + $19,185 = $23,806

Answer is D.

Question 46

The 2005 minimum required contribution increases due to the plan amendment through an increased normal cost, and the amortization of the new amortization base that is equal to the increase in the accrued liability due to the plan amendment (amortized over 30 years). Under the unit credit cost method, the normal cost is equal to the present value of the current year accrual, and the accrued liability is equal to the present value of the prior year accruals. The benefit formula has been amended to increase the retirement benefit by \$5 per month per year of service. As a result, both the current and past year accruals have increased by 20% (\$5/\$25). The normal cost and accrued liabilities increase by the same 20%.

2005 normal cost increase as of 1/1/2005 = 20% × \$350,000 = \$70,000
2005 accrued liability increase as of 1/1/2005 = 20% × \$6,500,000 = \$1,300,000

Increase in 2005 minimum required contribution as of 12/31/2005

$= (70{,}000 + 1{,}300{,}000/\ddot{a}_{\overline{30}|}) \times 1.07$

$= (70{,}000 + 97{,}909) \times 1.07$

$= 179{,}663$

Answer is D.