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FALL 1989 EA-2 EXAM SOLUTIONS

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These solutions use beginning of year amortization payments in setting up the Minimum Funding Standards Account. These solutions were prepared based on the law as in effect at June 30, 1989.

These solutions have been compared with those produced by other technical actuaries, and they represent my best understanding of the correct way to solve these problems. As usual, it seems easy to get an answer in the correct range as long as you are not actually taking the exam!

For problems involving the deductible limit you should use the following sequence of steps:

1. Calculate the normal cost plus limit adjustments with interest to the earlier of the end of the plan year or the end of the tax year.
2. Calculate the Full Funding Limitation under Section 404 with interest to the end of the plan year. If this is less than the result of step one, then you can skip to step four.
3. Calculate the absolute minimum amount necessary to produce a non-negative credit balance in the Minimum Funding Standards Account. This amount should never be based on the Alternative MFSA. This amount may be increased by the amount of any "includible employer contribution."
4. The maximum deductible limit is the greater of (1) and (3), but not greater than (2).
5. If the Unfunded Current Liability exceeds the final deductible limit and the plan has more than 100 participants, then the final deductible limit will be the UCL. This UCL limit is only available to non-multiemployer plans.

Revision History:

06/18/02 Clarified "step 5" for problems 2, 7, 10, and 21
07/06/00 Removed problem 17 reference to old Schedule B AMFSA instructions
11/23/98 Corrected problem 26, page 2
11/06/93 Corrected answer range letters for problems 13, and 21
11/14/92 Reflected corrected text in solutions to problems 2, 7, 10, 21
11/14/92 Corrected text on this page for solutions to 404 problems
09/27/92 Corrected problem 29, page 1

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Problem 1 - Page 1

In this problem you can not check the Full Funding Limitation, since you are not given the Entry Age Normal accrued liability. Since the prior cost method was an aggregate type cost method, you do not have to set up any gain/loss amortization bases at 01/01/89.

Revenue Procedure 85-29 contains the rules for setting up a new amortization base when there is a change in cost method. Section 4.01 of Revenue Procedure 85-29 specifies that certain bases must be maintained regardless of the funding method that is used. These bases include waivers, shortfall gains and losses, switchback from AMFSA, and transition to satisfy the reasonable funding methods regulation.

Normally there are no amortization bases maintained under the Aggregate method. However, based on the requirements of Revenue Procedure 85-29, the waiver base does have to be maintained under the Aggregate method.

For waivers granted prior to 1988, a 15 year amortization period should be used (use 5 years for waivers after 1987). One of the general conditions of the exam states that the interest rate used to calculate the amortization of a waiver should be based on the valuation interest rate. In this problem you are told to calculate the amortization based on 7% interest.

The calculation of the normal cost must satisfy the formulas that are applicable to all reasonable funding methods (1.412(c)(3)-1):

$$\begin{aligned} \text{PV Future Normal costs} &= \text{PV Future Benefits} - \text{Actuarial Assets} \\ &\quad - \text{O/S 412 amortization bases} + \text{credit balance} \end{aligned}$$

For cost methods with Unfunded Actuarial Liabilities, this can be restated as $\text{UAL} = \text{O/S 412 bases} - \text{credit balance}$. To set up the MFSA for 1989, you have to calculate the normal cost:

$$\begin{aligned} \text{O/S 412 bases} &= 40,000 \left(\ddot{a}_{\overline{13}|.07} / \ddot{a}_{\overline{15}|.07} \right) \\ &= 36,705 \end{aligned}$$

$$\begin{aligned} \text{PVNC} &= \text{PVFB} - \text{AAV} - \text{O/S bases} + \text{CB} \\ &= 1,500,000 - 320,000 - 36,705 + 20,000 \\ &= 1,163,295 \end{aligned}$$

$$\text{PVE/E} = 5,500,000 \div 687,500 = 8.0000$$

$$\text{NC} = 1,163,295 \div 8.0000 = 145,412 \text{ at } 01/01/89$$

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Problem 1 - Page 2

Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Normal cost	145,412	Credit balance	20,000
Waiver amort	4,104	Actual cont 12/31	x
Interest	10,466	Interest	1,400
	<hr/>		<hr/>
	159,982		x+21,400

The minimum contribution required under IRC Section 412 is one that results in a zero credit balance:

$$159,982 = 21,400 + x$$

$$x = 138,582$$

answer is B

Problem 2 - Page 1

For problems involving the deductible limit you should use the following sequence of steps:

1. Calculate the normal cost plus limit adjustments with interest to the earlier of the end of the plan year or the end of the tax year.
2. Calculate the absolute minimum amount necessary to produce a non-negative credit balance in the Minimum Funding Standards Account. This amount should never be based on the Alternative MFSA. This amount may be increased by the amount of any "includible employer contribution."
3. Calculate the Full Funding Limitation under Section 404 with interest to the end of the plan year.
4. The maximum deductible limit is the greater of (1) and (2), but not greater than (3).
5. If the Unfunded Current Liability exceeds the final deductible limit and the plan has more than 100 participants, then the final deductible limit will be the UCL.

In this problem you can not check the Full Funding Limitation, since you are not given the market value of assets. Since the plan was just set up at 01/01/88, it is unlikely that the FFL would apply. Since EAN is an individual cost method, you must calculate the experience G/L during 1988. The G/L base is calculated as the difference between the actual and the expected unfunded liabilities.

The expected UAL at 01/01/89 is calculated using the standard formula:

$$\begin{aligned}
 {}_e\text{UAL}_1 &= (1+i)(\text{UAL}_0 + \text{NC}_0) - (\text{Contribution} + \text{interest}) \\
 {}_e\text{UAL}_1 &= 1.07 (300,000 + 50,000) - 55,000 \\
 &= 323,000
 \end{aligned}$$

The experience gain for 1988 is equal to the UAL minus the ${}_e\text{UAL}$:

$$\begin{aligned}
 \text{UAL} &= 400,000 - 55,000 = 345,000 \\
 \text{LOSS} &= 345,000 - 323,000 = 22,000
 \end{aligned}$$

Section 404 deductible limit calculations

$$\begin{aligned}
 &\text{Normal cost plus Limit adjustments based on IAL 300,000 and G/L} \\
 &= 1.08 (60,000 + (300,000 + 22,000) \div \ddot{a}_{\overline{10}|1.08}) \\
 &= 1.08 (60,000 + 44,433) \\
 &= 112,788
 \end{aligned}$$

One easy way to miss the problem is to assume that this is the final answer. This is simply too little work for an answer! One key item is that the 1988 contribution of 55,000 only barely covers the normal cost plus interest. You must work through the MFSA for 1988 and 1989 to calculate the minimum funding requirement and compare it to the normal cost plus limit adjustments.

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Problem 2 - Page 2

Section 412 minimum contribution calculations

The amortization of the IAL under Section 412 is based on 30 years:

$$300,000 \div \ddot{a}_{\overline{30}|.08} = 24,674$$

Minimum Funding Standards Account for 1988

<u>Charges</u>		<u>Credits</u>	
Normal cost	50,000	Credit balance	0
IAL amort	24,674	Contrib 12/31	55,000
Interest	5,974	Interest	0
	<hr/>		<hr/>
	80,648		55,000

At 12/31/88, there is a funding deficiency of 25,648. Since you are not told that a waiver was granted, you must simply feed this into the 1989 MFSA, and assume it is paid off at the beginning of the year. One new item for the 1989 MFSA is the amortization of the actuarial loss:

$$G/L \text{ amortization payment} = 22,000 \div \ddot{a}_{\overline{5}|.08} = 5,102$$

The amortization is based on 5 years since this gain occurred after 1987. For gain and loss amortization bases set up in valuations before 01/01/88, a fifteen year amortization period must be used.

Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Debit balance	25,648	Credit balance	0
Normal cost	60,000		
Loss amort	5,102		
IAL amort	24,674	Min cont 12/31	x
Interest	9,234	Interest	0
	<hr/>		<hr/>
	124,658		x

The minimum contribution required under IRC Section 412 is 124,658. Going back to the steps outlined at the start of this problem, the final deductible limit becomes 124,658.

answer is D

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Problem 3

This is tricky Section 415 benefit calculation problem. The first step is to calculate the basic plan benefits. Next, the 415 limits must be applied. Since this participant was born prior to 1938, the limits for a Social Security Retirement Age of 65 are used. The dollar maximum of 94,023 at age 65 does not have to be adjusted.

The overall 415 limit is defined as the lesser of 94,023 or 100% of 3 year FAE. The application of the 415 limits can not reduce the benefit below 10,000. The dollar maximum must be reduced pro-rata for less than 10 years of participation service. The other two limits would be reduced pro-rata for less than 10 years of service from hire. Since the plan was set up at 01/01/86, Smith has three years of participation at 01/01/89.

	Accrued Benefit as of 01/01/89
Years of service	5
\$90 * service * 12	5,400
100% 3 yr FAE	9,000
Pro-rate for years of service < 10	4,500 = 9,000 * (5/10)
94,023 maximum	94,023
Years of participation	3
Pro-rate for years of participation < 10	28,207 = 94,023 * (3/10)
10,000 minimum	10,000
Pro-rate for years of service < 10	5,000 = 10,000 * (5/10)
Lesser of plan ben, or greater of (415 floor and lesser of 415 dollar or FAE3 maximums)	5,000

If you wanted to simply say the answer was 5,400, you should realize that is TOO easy.

answer is D

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Problem 4

This is a typical PBGC guaranteed benefits question. It tests your knowledge of the five year phase-in of guaranteed benefits, and the 30 year phase-in for substantial owners. Both participants are fully vested, which simplifies the guaranteed benefit calculation. Guaranteed benefits are based on the vested benefits of the plan participants.

The change in plan benefits at 01/01/85 is subject to phase-ins at the DOPT of 12/31/88. The new benefits have been in effect for four full years at DOPT. Smith is a substantial owner who is subject to the 30 year phase in rules. Brown is subject to the 5 year phase in rules. For the 30 year phase in, the original plan has been in effect for 5 full years, from 01/01/84 to 01/01/89.

In calculating the guaranteed benefit, remember that changes in vesting schedule, normal retirement age, and normal form of annuity payment are all considered as changes in benefit amount that are subject to the phase in rules.

	SMITH	BROWN
Past service at DOPT	5	7
Benefit - 01/01/84 plan	5(18) = 90/mo	7(18) 126/mo
Benefit - 01/01/85 plan	5(30) = 150/mo	7(30) 210/mo
Guaranteeable benefit increase	60/mo	84/mo
Guaranteed Portion - original	90/mo * (5/30) = 15/mo	126/mo
Guaranteed Portion - increase	60/mo * (4/30) = 8/mo	greater of \$80 or 80%*84/mo = 80/mo (can not exceed total increase)
Total guaranteed benefit	23/mo	206/mo

The total monthly guaranteed benefit is $23 + 206 = 229$ /mo

answer is B

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Problem 5

Under the Rolling Five Method, the calculation of withdrawal liability is relatively simple. Employer A's share of the 12/31/88 UVB is based on the ratio of employer A's contributions in the prior five years to the total contributions in the prior five years:

$$\begin{aligned} & 9,600,000 * \frac{(11,000 + 10,000 + 9,000 + 8,000 + 7,000)}{(500,000 + 550,000 + 600,000 + 650,000 + 700,000)} \\ = & 9,600,000 * \frac{5 * 9,000}{5 * 600,000} = 144,000 \end{aligned}$$

After determining Employer A's share of the UVB, the de minimis amount must be calculated. Then a deductible is calculated based on the amount of the de minimis and the amount of allocated UVB. The final withdrawal liability is calculated as the allocated UVB less the deductible.

The mandatory de minimis is the lesser of 50,000 or 3/4% of the plan's total UVB (.0075 * 9,600,000 = 72,000). The deductible is the de minimis amount reduced by the excess of the allocated UVB over 100,000. The deductible is 50,000 less the excess of 44,000 or 6,000. The final employer withdrawal liability is 144,000 - 6,000 = 138,000.

answer is D

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Problem 6 - Page 1

Since the problem states that the DB plan benefit will be reduced if the Section 415 limits are exceeded, you must calculate the DC fraction under Section 415(e)(3) first. The maximum DB plan fraction will then equal one minus the DC fraction. Then you can "back into" the projected benefit under the DB plan that will produce the DB fraction.

The DC fraction represents the ratio of the annual additions to a participant's account to the theoretical maximum annual additions. After the passage of TEFRA, the limit on the sum of the DB and DC fractions was changed from 1.40 to 1.00. This change required applying the 1.25 and 1.40 factors in the calculation of the denominator. If the participant had been hired prior to 1985, the computation of the DC fraction would take into account years of service prior to the effective date of the plan (see IRC Section 415(e)(3)(B)).

Calculation of Theoretical Maximum Addition

Plan Year Ending	Annual Comp	25% of Comp	1.40 x 25%	DC \$ limit	1.25 x \$	Lesser of 1.25, 1.40	Annual Addition 15% pay
12/31/85	50,000	12,500	17,500	30,000	37,500	17,500	7,500
12/31/86	50,000	12,500	17,500	30,000	37,500	17,500	7,500
12/31/87	60,000	15,000	21,000	30,000	37,500	21,000	9,000
12/31/88	60,000	15,000	21,000	30,000	37,500	21,000	9,000
12/31/89	70,000	17,500	24,500	30,000	37,500	24,500	10,500
						101,500	43,500
DC fraction = 43,500 ÷ 101,500							
= .4286							

If you are alert, you realize that the numerator will consist of the sum of 15% of pay, and the denominator will be the sum of 1.40 * 25% of pay. This gives the DC fraction as $.15 / .35 = .4286$ without extra calculations.

In general, there is no reason to calculate a projected DC fraction, because you can not project increases in the 415 limits. If you project current pay based on a salary scale, the projected DC fraction will be higher than today's DC fraction. The only exception to this is when the DC plan has been terminated, and you know that all future annual additions will be zero.

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Problem 6 - Page 2

The maximum allowable DB fraction is $1 - .4286$, which is $.5714$. You should be wary of a calculation that shows a DB fraction that exceeds 80%. This is not possible, since the largest possible DB fraction under Section 415(e)(2) is $1/1.25 = .8000$, which results from a projected benefit equal to the DB plan dollar maximum. If the 100% FAE3 limit applied, then the DB fraction is $1/1.40 = .7143$.

Now you must calculate the DB plan fraction in order to determine the maximum projected benefit for valuation purposes. Smith is age 59 at 01/01/89, and will attain normal retirement age of 65 at 01/01/95. Smith's total service at retirement is ten years based on the 01/01/85 date of hire. With an effective date of 01/01/79, Smith's participation service under this plan will also be ten years at retirement. The 415 limits do not have to be reduced for service less than ten years.

1988 pay corresponds to age 59 = 50,000

1989 pay corresponds to age 60 = 70,000

1992 pay corresponds to age 63 = 81,034 = $70,000(1.05)^3$

1993 pay corresponds to age 64 = 85,085 = $70,000(1.05)^4$

1994 pay corresponds to age 65 = 89,340 = $70,000(1.05)^5$

3 year final average pay = 85,153

Projected plan benefit prior to limitations = 85,153

100% FAE3 Section 415 limit = 85,153

Social Security Retirement Age = 65 since born prior to 1938

Section 415 dollar limit during 1989 = 98,064 at age 65

PB = final projected benefit

DB fraction = 57.14% = $PB \div [\text{lesser of } 1.25(98,064) \text{ or } 1.40(85,153)]$

PB = 57.14% (lesser of 122,580 or 119,214)

= 68,119

This benefit also satisfies the 415 limits for a DB plan without a DC plan, so the final benefit is 68,119.

answer is D

Problem 7 - Page 1

For problems involving the deductible limit you should use the following sequence of steps:

1. Calculate the normal cost plus limit adjustments with interest to the earlier of the end of the plan year or the end of the tax year.
2. Calculate the absolute minimum amount necessary to produce a non-negative credit balance in the Minimum Funding Standards Account. This amount should never be based on the Alternative MFSA. This amount may be increased by the amount of any "includible employer contribution."
3. Calculate the Full Funding Limitation under Section 404 with interest to the end of the plan year.
4. The maximum deductible limit is the greater of (1) and (2), but not greater than (3).
5. If the Unfunded Current Liability exceeds the final deductible limit and the plan has more than 100 participants, then the final deductible limit will be the UCL.

In this problem the Full Funding Limitation will not apply, since the UAL equals 415,000. You are told that there have been no experience gains or losses. The only difficulty is that you must derive the Initial accrued liability.

Section 404 deductible limit calculations

In general, the UAL = O/S 412 bases minus the credit balance:

$$\begin{aligned}
 01/01/89 \text{ UAL} &= \text{IAL} \left(\ddot{a}_{\overline{27}|.08} \div \ddot{a}_{\overline{30}|.08} \right) - 5,000 \\
 01/01/86 \text{ IAL} &= \left(\ddot{a}_{\overline{30}|.08} \div \ddot{a}_{\overline{27}|.08} \right) (5,000 + 415,000) \\
 \text{IAL} &= 1.0295 * 420,000 = 432,391
 \end{aligned}$$

Normal cost plus Limit adjustments based on IAL 300,000 and G/L

$$\begin{aligned}
 &= 1.08 \left(35,000 + 432,391 \div \ddot{a}_{\overline{10}|.08} \right) \\
 &= 1.08 \left(35,000 + 59,666 \right) \\
 &= 102,239
 \end{aligned}$$

One easy way to miss the problem is to assume that this is the final answer. This is simply too little work for an answer! You must check the MFSA for 1989 to calculate the minimum funding requirement and compare it to the normal cost plus limit adjustments. In addition, we have not looked at the information given on the Current Liability at 12/31/89.

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Problem 7 - Page 2

This plan has more than 100 employees, so the Unfunded Current Liability can be the deductible limit if it exceeds 102,239:

$$12/31/89 \text{ UCL} = 367,000 - 1.08(229,000) \\ = 119,680$$

The only thing left is to check the minimum funding requirement to be sure it is not greater.

Section 412 minimum contribution calculations

The amortization of the IAL under Section 412 is based on 30 years:

$$432,391 \div \ddot{a}_{\overline{30}|.08} = 35,563$$

Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Normal cost	35,000	Credit balance	5,000
IAL amort	35,563	Contrib 12/31	x
Interest	5,645	Interest	400
	<hr/>		<hr/>
	76,208		x+5,400

The minimum contribution required under IRC Section 412 is one that results in a zero credit balance:

$$76,208 = 5,400 + x$$

$$x = 70,808$$

Going back to the steps outlined at the start of this problem, the final deductible limit is the greater of 102,239 under IRC Section 404, 70,808 under IRC Section 412, and the Unfunded Current Liability of 119,680.

answer is D

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Problem 8

Revenue Ruling 81-212 contains acceptable methods used to allocate Minimum Funding Standards Account items when a plan is spun off into two or more plans. This problem tests the method used to allocate the credit balance upon spinoff. Revenue Ruling 86-47 contains different rules which must be used when the market value of assets exceeds the present value of benefits on a termination basis (before the plan is spun off), and when one of the spun off plans has a zero UAL.

At the date of spinoff, the present value of benefits on a termination basis is used to allocate the market value of assets to the spun off plans. The method requires you to allocate the excess of the market value of assets over the credit balance on the same basis to the spun off plans. Then the difference between the two allocated values gives the credit balance.

The market value of 285,000 must be allocated first. The original plan has 240,000 of liabilities in priority categories one through four and 200,000 of liabilities in priority category five. The market value can be allocated to the spun off plans based on 100% of the priority categories one through four, and 22.5% of priority category five:

	<u>Plan A</u>	<u>Plan B</u>	<u>Plan C</u>
100% of PC1 through PC4	240,000	80,000	160,000
22.5% of PC5 liability	45,000	11,250	33,750
Allocated market value	285,000	91,250	193,750

The market value less the credit balance must be allocated next. The market value less the credit balance of 60,000 is 225,000. This amount can be allocated to the spun off plans based on 93.75% of the liability for priority categories one through four:

	<u>Plan A</u>	<u>Plan B</u>	<u>Plan C</u>
93.75% of PC1 through PC4	225,000	75,000	150,000
Allocated market value	285,000	91,250	193,750
Allocated MVA - credit balance	225,000	75,000	150,000
Credit balance	60,000	16,250	43,750

answer is E

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Problem 9

Section 411(c)(2) of the IRC defines the calculation of the employee provided accrued benefit. Prior to the passage of OBRA '89, 120% of the Federal mid-term rate was used to accumulate the employee contributions plus interest (EECWI) from 01/01/88 to normal retirement age. The resulting EECWI was converted to an annual annuity by dividing by a factor of 10. For a normal form other than a life annuity, factors in Revenue Ruling 76-47 were used to adjust the resulting benefit. The employee provided benefit could not exceed the greater of the total accrued benefit, or ten percent of the employee contributions without any interest.

The first step is to calculate the total accrued benefit at termination:

$$\begin{aligned} \text{FAE3} &= (50,000 + 60,000 + 70,000) \div 3 \\ &= 60,000 \end{aligned}$$

$$\begin{aligned} \text{Accrued benefit} &= 3 \text{ yrs} * 2\% * 60,000 \\ &= 3,600 \end{aligned}$$

The next step is to calculate each year's employee contributions, and then the amount of the employee provided accrued benefit:

<u>AS OF</u>	<u>4% EEC</u>	<u>EECWI</u>
12/31/87	2,000	2,000
12/31/88	2,400	4,612 = 2,000(1.1061) + 2,400
12/31/89	2,800	7,925 = 4,612(1.1111) + 2,800

Smith is age 65 at 01/01/90, so the employee provided accrued benefit is 10%(7,925) = 793 per year. The employer provided accrued benefit is 3,600 - 793 = 2,807. The 415 limitation of (3/10)(98,000) does not apply.

answer is D

Problem 10 - Page 1

For problems involving the deductible limit you should use the following sequence of steps:

1. Calculate the normal cost plus limit adjustments with interest to the earlier of the end of the plan year or the end of the tax year.
2. Calculate the absolute minimum amount necessary to produce a non-negative credit balance in the Minimum Funding Standards Account. This amount should never be based on the Alternative MFSA. This amount may be increased by the amount of any "includible employer contribution."
3. Calculate the Full Funding Limitation under Section 404 with interest to the end of the plan year.
4. The maximum deductible limit is the greater of (1) and (2), but not greater than (3).
5. If the Unfunded Current Liability exceeds the final deductible limit and the plan has more than 100 participants, then the final deductible limit will be the UCL.

In this problem you can not check the Full Funding Limitation, since you are not given the market value of assets. Since the plan was just set up at 01/01/88, it is unlikely that the FFL would apply. Since EAN is an individual cost method, you should calculate experience G/L each year. In this problem, you are simply given the experience loss for 1988.

The quick and possibly dangerous way to work this problem is to consider the differences in the amortization payments between the maximum and minimum contributions:

$$1988 \text{ Maximum} = 1.07 \left(\text{EANC} + 500,000 \div \ddot{a}_{\overline{10}|.07} \right)$$

$$1988 \text{ Minimum} = 1.07 \left(\text{EANC} + 500,000 \div \ddot{a}_{\overline{30}|.07} \right)$$

It is clear that the 12/31/88 credit balance is equal to the difference in the end-of-year amortization payments:

$$\begin{aligned} 12/31/88 \text{ CB} &= 1.07 * \left(500,000 \div \ddot{a}_{\overline{10}|.07} - 500,000 \div \ddot{a}_{\overline{30}|.07} \right) \\ &= 71,189 - 40,293 = 30,896 \end{aligned}$$

For 1989, you have to amortize the new layers of UAL created by the assumption change and the experience loss:

$$1989 \text{ Maximum} = 1.07 \left(\text{EANC} + \frac{500,000}{\ddot{a}_{\overline{10}|.07}} + \frac{50,000}{\ddot{a}_{\overline{10}|.07}} + \frac{60,000}{\ddot{a}_{\overline{10}|.07}} \right)$$

$$1989 \text{ "Minimum"} = 1.07 \left(\text{EANC} + \frac{500,000}{\ddot{a}_{\overline{30}|.07}} + \frac{50,000}{\ddot{a}_{\overline{5}|.07}} + \frac{60,000}{\ddot{a}_{\overline{10}|.07}} \right)$$

$$\begin{aligned} 12/31/89 \text{ CB} &= 1.07 * \left(50,000 \div \ddot{a}_{\overline{10}|.07} - 50,000 \div \ddot{a}_{\overline{5}|.07} \right) \\ &\quad + 30,896 + 1.07 * (30,896) \end{aligned}$$

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Problem 10 - Page 2

$$12/31/89 \text{ CB} = 7,119 - 12,195 + 30,896 + 33,059$$

$$= 58,879$$

answer is D

The potential danger in this approach is that the amortization payment under 412 for the loss base exceeds the amortization under 404. As long as the difference is less than the amount of the credit balance, you should be safe. This means that the minimum funding requirement under 412 is less than the deductible limit.

The remainder of this solution will show the slower, safer method. The 12/31/88 credit balance calculation is identical to what was shown above.

1989 Section 404 deductible limit calculations

Normal cost plus Limit adjustments based on IAL, G/L and ASSUMP

$$= 1.07 \left(\text{EANC} + \frac{500,000}{\ddot{a}_{10|1.07}} + \frac{50,000}{\ddot{a}_{10|1.07}} + \frac{60,000}{\ddot{a}_{10|1.07}} \right)$$

$$= 1.07 (\text{EANC}) + 71,189 + 7,119 + 8,543$$

$$= 1.07 (\text{EANC}) + 86,851$$

Section 412 minimum contribution calculations

Now calculate the minimum funding requirement under IRC Section 412

Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Normal cost	1.07(EANC)	Credit balance	30,896
IAL amort	37,657		
Loss amort	11,397		
Assump amort	7,984	Min cont 12/31	x
Interest	3,993	Interest	2,163
	<hr/>		<hr/>
	1.07(EANC) + 61,031		x + 33,059

The minimum contribution required under IRC Section 412 is 27,972 plus 1.07(EANC). This is less than the deductible limit of 86,851 plus 1.07(EANC). Now you can replace "x" with the deductible limit as the actual contribution and calculate the credit balance at 12/31/89:

$$\text{CB} = [x + 33,059] - [1.07(\text{EANC}) + 61,031]$$

$$\text{CB} = [1.07(\text{EANC}) + 86,851 + 33,059] - [1.07(\text{EANC}) + 61,031]$$

$$= 58,879$$

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Problem 11

This question tests your knowledge of the "reasonable funding methods" regulation at 1.412(c)(3)-1. The three statements are based on paragraph (c)(3) which defines the plan population that must be included in a valuation under a reasonable funding method. In general, all current participants, former participants, and all other individuals currently entitled to benefits under the plan must be included. There are limited exceptions to the general rule that allow a valuation to exclude some participants who otherwise would have to be included.

- I. This is true because paragraph (c)(3)(ii) allows current plan participants to be excluded who do not meet the minimum age and service requirements of IRC Section 410.
- II. This is false. Paragraph (c)(3)(i) does not require that ANY participants be excluded from the population. Paragraph (d)(2) allows inclusion of current employees who have not yet become participants.
- III. This is false. Nonvested employees are former participants, and based on the general rule in paragraph (c)(3)(i), they should be included in the valuation population. Paragraph (c)(3)(iii) allows some former participants to be excluded even though their prior service would be preserved under the "rule of parity" if they are rehired.

answer is B

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Problem 12 - Page 1

Revenue Ruling 81-212 contains acceptable methods used to allocate Minimum Funding Standards Account items when a plan is spun off into two or more plans. Revenue Ruling 86-47 contains different rules which must be used when the market value of assets exceeds the present value of benefits on a termination basis (before the plan is spun off), and when one of the spun off plans has a zero UAL.

Revenue Ruling 81-212 specifies that when a spinoff satisfies the de minimis rule, none of the MFSA items are allocated to the smaller spun-off plan. Instead, that plan's MFSA must be set up as if it were a newly established plan. The larger plan's MFSA should treat the effect of the spinoff as an experience gain.

For Plan A before the spinoff, the equation of balance gives

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} \\ &= 250,000 = \text{OSB} - 90,000 \\ \text{O/S 412 bases} &= 340,000 \end{aligned}$$

Plan B gets all of the amortization bases that were previously held by Plan A. In addition, a new base must be set up to force the equation of balance to be true for Plan B.

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} \\ \text{UAL} + \text{CB} &= \text{O/S 412 bases} \\ 199,000 + 90,000 &= 340,000 + \text{new base} \\ \text{new base} &= 289,000 - 340,000 \\ &= -51,000 \end{aligned}$$

Note that this base equals the UAL for Plan C. The amortization period for the new base is 5 years, since it is treated as an experience gain. The amortization for the IAL base was 30 years at 01/01/80. Since no other experience G/L have occurred, the 340,000 base represents the outstanding portion of the initial IAL. It should be amortized over 30 - (89 - 80), or 21 years:

$$\text{amortization for IAL base} = 340,000 \div \ddot{a}_{\overline{21}|.08} = 31,429$$

$$\text{amortization for Gain base} = 51,000 \div \ddot{a}_{\overline{5}|.08} = 11,827$$

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Problem 12 - Page 2

Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Normal cost	145,000	Credit balance	90,000
IAL amort	31,429	Gain amort	11,827
Interest	14,114	Min contrib 12/31	x
		Interest	8,146
	<hr/>		<hr/>
	190,543		109,973+x

The minimum contribution required under 412 is one that results in a zero credit balance:

$$190,543 = 109,973 + x$$

$$x = 80,570$$

answer is B

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Problem 13

This tests your knowledge of the "equation of balance". One key item is that the gain for 1986 should be amortized over 15 years from 01/01/87, since this is before the PPA '87 change in the amortization period. There are 22 years left in the original 30 year amortization period for the initial accrued liability. There are 13 years left for amortization of the gain. You have to use the theoretical equation of balance to derive the amount of the amortization for the gain base:

$$UAL = O/S \text{ 412 bases} - CB$$

$$UAL = O/S \text{ 412 bases} + DB$$

$$UAL - DB = O/S \text{ 412 bases} = 275,000 - 5,000 = 270,000$$

$$270,000 = 300,000 (\ddot{a}_{22|0.08} \div \ddot{a}_{30|0.08}) - X (\ddot{a}_{13|0.08} \div \ddot{a}_{15|0.08})$$

$$270,000 = \ddot{a}_{22|0.08} (300,000 \div \ddot{a}_{30|0.08}) - \ddot{a}_{13|0.08} (X \div \ddot{a}_{15|0.08})$$

$$\ddot{a}_{13|0.08} (X \div \ddot{a}_{15|0.08}) = \ddot{a}_{22|0.08} (300,000 \div \ddot{a}_{30|0.08}) - 270,000$$

$$8.5361 (X \div \ddot{a}_{15|0.08}) = 11.0168 (24,674) - 270,000$$

$$X \div \ddot{a}_{15|0.08} = [11.0168 (24,674) - 270,000] \div 8.5361 \\ = 215$$

Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Debit balance	5,000	Credit balance	0
Normal cost	15,000	Min contrib 12/31	x
IAL amort	24,674	Gain amort	215
Interest	3,574	Interest	17
	48,248		232+x

The minimum contribution required under 412 is one that results in a zero credit balance:

$$48,248 = 232 + x$$

$$x = 48,016$$

answer is D

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Problem 14

This question tests your knowledge of the handling of carryover contributions. The actuarial and market values of assets given in problems are those used under IRC Section 412. As specified in the regulations at 1.404(a)-14(d)(2)(i), the assets must be reduced by the amount of any non-deducted contributions. The reason is that the AAV of 500,000 in this problem includes the 5,000 carryover contribution. Even though that amount was not deducted, it would usually be considered as an employer contribution for the plan year under IRC Section 412.

$$\begin{aligned} \text{IRC 404 AAV} &= 500,000 - 15,000 \\ &= 485,000 \\ \text{IRC 404 PVNC} &= 950,000 - 485,000 \\ &= 465,000 \\ \text{PVE/E} &= 3,500,000 \div 260,000 \\ &= 13.4615 \\ \text{IRC 404 NC} &= 465,000 \div 13.4615 \\ &= 34,543 \end{aligned}$$

$$\text{Normal cost} + \text{Limit adjustments} = 1.08 (34,543) = 37,306$$

The deductible limit should be compared against the minimum funding requirement under IRC Section 412, but you have no information to calculate that contribution. One easy way to miss this question is to assume that you are done. The fact that you are given some Entry Age Normal valuation results should alert you. The Full Funding Limitation must be checked, and with any aggregate method, you must use the Entry Age Normal method to calculate the FFL.

Revenue Ruling 82-125 clarifies the handling of the Full Funding Limitation for the deductible limit when carryover contributions are present. The Full Funding Limitation is always adjusted with interest to the end of the year. Any carryover contribution should not receive interest for the FFL, and it should be subtracted from the assets (excluding the carryover) adjusted with interest to the end of the year.

$$\begin{aligned} \text{IRC 404 FFL} &= 1.08 (25,000 + 485,000) \\ &- [1.08 (\text{lesser of } 490,000 \text{ and } 500,000) - 15,000] \\ &= 36,600 \end{aligned}$$

Since the Full Funding Limitation is lower than the Normal cost plus limit adjustments, the deductible limit is 36,600.

answer is C

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Problem 15 - Page 1

Since the problem states that the DB plan benefit will be reduced if the Section 415 limits are exceeded, you must calculate the DC fraction under Section 415(e)(3) first. The maximum DB plan fraction will then equal one minus the DC fraction. Then you can "back into" the projected benefit under the DB plan that will produce the DB fraction.

The DC fraction represents the ratio of the annual additions to a participant's account to the theoretical maximum annual additions. If the participant had been hired prior to 1988, the computation of the DC fraction would take into account years of service prior to the effective date of the plan (see IRC Section 415(e)(3)(B)). The annual additions include both the employer and employee contributions, for a total of 10% of pay.

Calculation of Theoretical Maximum Addition

Plan Year Ending	Annual Comp	25% of Comp	1.40 x 25%	DC \$ limit	1.25 x \$	Lesser of 1.25, 1.40	Annual Addition 10% pay
12/31/88	55,000	13,750	19,250	30,000	37,500	19,250	5,500
12/31/89	58,300	14,575	20,405	30,000	37,500	20,405	5,830
						39,655	11,330

DC fraction = $11,330 \div 39,655 = .2857$

If you are alert, you realize that the numerator will consist of the sum of 10% of pay, and the denominator will be the sum of $1.40 * 25\%$ of pay. This gives the DC fraction as $.10/.35 = .2857$ without extra calculations.

In general, there is no reason to calculate a projected DC fraction, because you can not project increases in the 415 limits. If you project current pay based on a salary scale, the projected DC fraction will be higher than today's DC fraction. The only exception to this is when the DC plan has been terminated, and you know that all future annual additions will be zero.

The maximum allowable DB fraction is $1 - .2857$, which is $.7143$. You should be wary of a calculation that shows a DB fraction that exceeds 80%. This is not possible, since the largest possible DB fraction under Section 415(e)(2) is $1/1.25 = .8000$, which results from a projected benefit equal to the DB plan dollar maximum. If the 100% FAE3 limit applied, then the DB fraction is $1/1.40 = .7143$.

Now you must calculate the DB plan fraction in order to determine the maximum projected benefit for valuation purposes. Smith is age 59 at 01/01/89, and will attain assumed retirement age of 62 at 01/01/92. Smith's total service at retirement is four years based on the 01/01/88 date of hire. With an effective date of 01/01/89, Smith's participation service under this plan will be three years at retirement. The 415 limits will have to be reduced for service less than ten years.

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Problem 15 - Page 2

1988 pay corresponds to age 58 = 55,000
1989 pay corresponds to age 59 = 58,300 = 55,000(1.06)
1990 pay corresponds to age 60 = 61,798 = 55,000(1.06)²
1991 pay corresponds to age 61 = 65,506 = 55,000(1.06)³
3 year final average pay = 61,868

Projected plan benefit prior to limitations = 65,506

100% FAE3 Section 415 limit = 61,868

Social Security Retirement Age = 65 since born prior to 1938
Section 415 dollar limit during 1989 = 98,064 at age 65
= 98,064(.80) at age 62
= 78,451

For purposes of IRC Section 415(e), the items in the denominator are reduced based on years of service, not based on years of participation. This change was made by TAMRA (1988). Smith's reduction in the 415 limits is 4/10:

PB = final projected benefit
DB fraction = 71.43%
= PB ÷ [lesser of 125%(dollar lim) or 140%(FAE3 limit)]
= PB ÷ [lesser of 1.25(78,451)(.4) or 1.40(61,868)(.4)]
PB = 71.43% (lesser of 39,226 or 34,646)
= 24,748

Many people missed this problem when they took the exam because they thought this was the correct answer. The trick here is that you never checked to see what the plan benefit would be reduced to if there was no DC plan. Prior to the change made by TAMRA, the benefit under IRC Section 415(e) was always less than the benefit necessary to satisfy the rest of Section 415.

In the absence of the DC plan, the 415 limit for the DB plan would be

PB = [lesser of (78,451)(.3) or (61,868)(.4)]
= (lesser of 23,535 or 24,747)
= 23,535

This benefit satisfies the requirements of Section 415 in the absence of the DC plan. This benefit also satisfies the requirements of Section 415(e) for the combination of the DB and DC plans.

answer is C

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Problem 16

For plans with employee contributions, you must know the formula for the amount of any asset reversion to the employees upon plan termination. This formula is specified in the PBGC regulations, and OBRA '87 mandates its use:

$$\text{Employee portion} = \text{Residual assets} * PC2 / (PC2 + PC3 + PC4 + PC5 + PC6)$$

Note that amounts are put in the numerator and denominator for employees who received lump sums or irrevocable commitments in the prior 3 years. The residual assets of 23,500 equal the market value of 160,000 reduced by the plan termination liabilities of 116,000 + 20,500.

The employee portion is $23,500 * (83,000 + 10,000) / (136,500 - 8,000)$.
Smith's share of the residual assets is $23,500 * (83,000 / 128,500)$,
or 15,179.

answer is B

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Problem 17 - Page 1

This problem uses an end of year valuation date, which is typical when the Alternative Minimum Funding Standards Account (AMFSA) is used. Under the Entry Age Normal valuation method, you must calculate the experience G/L each year. For the 1988 MFSA, there is no initial Accrued Liability, which is unusual.

Minimum Funding Standards Account for 1988

<u>Charges</u>		<u>Credits</u>	
Normal cost	12/31 110,000	Credit balance	0
IAL amort	12/31 0	Min cont 3/15/89	110,000
	110,000		110,000

The next step is to calculate the AMFSA contribution for 1989. The operation of the AMFSA is clearer under the 12/82 proposed regulation than it is in 412(g). The AMFSA can only be used by plans under the Entry Age Normal method. The charges to the AMFSA include:

- (i) the lesser of the EANC or the unit credit normal cost, plus
- (ii) the excess (if any) of the UC AL over the market value of assets

When it becomes necessary to switch back to the regular MFSA, there will be a debit balance in that account. This is offset by a credit under 412(b)(3)(D), and that amount is set up as a 412 base under 412(b)(2)(D) and amortized over 5 years.

The lesser of the two Normal Costs is 80,000 under Unit Credit. The excess of the Unit Credit accrued liability over the MVA is 2,000.

Alternative Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Normal cost	12/31 80,000	Credit balance	0
UC AL - MVA	12/31 2,000	Min contrib 03/15/90	x
	82,000		x

The contribution paid for 1989 under the AMFSA is 82,000 at 03/15/90. When the AMFSA is used, the regular MFSA must be maintained. The next step is to set up the regular MFSA for 1989. For the 01/01/89 valuation, you must calculate the expected UAL and compare it to the actual. The expected UAL at 01/01/89 is calculated using the standard formula. With an end of the year valuation date, the Normal cost and the contribution both get a full year's interest from 12/31/88 to 12/31/89.

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Problem 17 - Page 2

The reason the contribution gets a full year's interest is that it is deemed contributed at 12/31/88 because it was contributed within 2½ months after the end of the plan year. The contribution will receive a full year's interest in the MFSA, so it must also get a full year's interest in the write-down of the UAL. If this is not done consistently, the "equation of balance" can't hold true.

$$\begin{aligned}
 {}_eUAL_1 &= (1+i)(UAL_0 + NC_0) - (\text{Contribution} + \text{interest}) \\
 {}_eUAL_1 &= 1.07(0 + 110,000) - 1.07(110,000) \\
 &= -0-
 \end{aligned}$$

The experience loss for 1988 is equal to the UAL minus the ${}_eUAL$:

$$\begin{aligned}
 UAL &= 120,000 - 115,000 = 5,000 \\
 \text{LOSS} &= 5,000 - 0 = 5,000
 \end{aligned}$$

The loss amortization is based on a five year period. Since the base is set up at 12/31/89, you should use an annuity due to calculate the end of year amortization payment. Yes, this is confusing:

$$\begin{aligned}
 \text{Loss amortization} &= 5,000 \div \ddot{a}_{\overline{5}|.07} \\
 &= 1,140
 \end{aligned}$$

Minimum Funding Standards Account for 1989

<u>Charges</u>			<u>Credits</u>	
Normal cost	12/31	90,000	Credit balance	0
LOSS amort	12/31	1,140	AMFSA contrib 3/90	82,000
		91,140		82,000

As expected, there is a debit balance of 9,140 at 12/31/89 in the MFSA. You are told that the regular MFSA will be used for 1990 allowing for the switch back from the AMFSA. The 9,140 is set up as a new amortization base, and the end of year amortization payment over 5 years is

$$9,140 \div a_{\overline{5}|.07} = 9,140 \div 4.1002 = 2,229$$

It is necessary to use an end of year amortization factor because the switch back base is calculated at 01/01/90, and the question asks for the amortization payment at 12/31/90.

answer is C

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Problem 18

For any plan, the Top Heavy determination date is the last day of the preceding plan year. An exception to this is first plan year, when the determination date is the last day of the first plan year.

It is necessary to add the present value of accrued benefits and the account balances as of that date for all participants and the key employees. These amounts should include distributions within the five years preceding the determination date. If the ratio of key employee values to total values exceeds 60%, the plan is Top Heavy. If the ratio exceeds 90%, the plan is super Top Heavy.

- I. This statement is true. 12/31/87 is the determination date for this plan year. Top Heavy ratio is $220,000 \div (220,000 + 140,000) = 61.1\%$.
- II. This statement is true. 12/31/87 is the determination date for this plan year. Top Heavy ratio is $220,000 \div (220,000 + 140,000) = 61.1\%$.
- III. This statement is false. 12/31/88 is the determination date for this plan year. Top Heavy ratio is $240,000 \div (240,000 + 30,000) = 88.9\%$.

answer is A

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Problem 19

When the interest rate changes, there are two effects on the MFSA. One is that there is a new base equal to the change in the UAL that must be amortized over 10 years (post PPA '87). The second effect is that any existing MFSA amortization amounts must be recalculated. The new amounts equal the outstanding base divided by an annuity at the new interest rate for the number of years remaining in the amortization period.

You can calculate the outstanding amount of the IAL base using the equation of balance at 12/31/88 under the old interest rate:

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} \\ &= 450,000 = \text{OSB} - 2,000 \\ \text{O/S 412 bases} &= 452,000 \end{aligned}$$

$$\begin{aligned} \text{new base} &= 325,000 - 450,000 \\ &= -125,000 \end{aligned}$$

The amortization for the IAL base was 30 years at 01/01/85. Since no other changes have occurred, the 452,000 base represents the outstanding portion of the initial IAL. It should be amortized over 30 - (89 - 85), or 26 years.

$$\text{amortization for IAL base} = 452,000 \div \ddot{a}_{\overline{26}|.08} = 38,716$$

$$\text{amortization for Assump base} = 125,000 \div \ddot{a}_{\overline{10}|.08} = 17,249$$

Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Normal cost	35,000	Credit balance	2,000
IAL amort	38,716	Assump amort	17,249
		12/31 contrib	80,000
Interest	5,897	Interest	1,540
	79,613		100,789

The credit balance at 12/31/89 is 100,789 - 79,613 = 21,176.

answer is E

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Problem 20

This is a tricky Section 415 benefit calculation problem. The first step is to calculate the basic plan benefits. Next, the 415 limits must be applied. Since these participants were born prior to 1938, the limits for a Social Security Retirement Age of 65 are used. The dollar maximum of 98,064 at age 65 does not have to be adjusted.

The overall 415 limit is defined as the lesser of 98,064 or 100% of 3 year FAE. The application of the 415 limits can not reduce the benefit below 10,000. The dollar maximum must be reduced pro-rata for less than 10 years of participation service. The other two limits would be reduced pro-rata for less than 10 years of service from hire. Since the plan was set up at 01/01/84, both employees have five years of participation at 01/01/89.

	01/01/89 Accrued Benefit	
	Smith	Brown
01/01/89 Age	58	53
01/01/89 Service	20	13
Benefit accrual (past service)	3%(15)+2%(5) = 55%	3%(13) = 39%
3 year FAE	122,000	93,000
P.U.C. Accrued benefit (before 415)	67,100	36,270
100% 3 yr FAE 415 maximum	122,000	93,000
Pro-rate for years of service < 10	122,000	93,000
98,064 415 maximum	98,064	98,064
Years of participation	5	5
Pro-rate for years of participation < 10	49,032	49,032
10,000 415 floor	10,000	10,000
Pro-rate for years of service < 10	10,000	10,000
Lesser of plan ben, or greater of 415 floor and lesser of (415 dollar and FAE maximums)	49,032	36,270
Present value factor	$10(1.07)^{-7}$	$10(1.07)^{-12}$
P.U.C. Accrued liability	305,347	161,043

Total accrued liability is 466,390

answer is A

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Problem 21 - Page 1

For problems involving the deductible limit you should use the following sequence of steps:

1. Calculate the normal cost plus limit adjustments with interest to the earlier of the end of the plan year or the end of the tax year.
2. Calculate the absolute minimum amount necessary to produce a non-negative credit balance in the Minimum Funding Standards Account. This amount should never be based on the Alternative MFSA. This amount may be increased by the amount of any "includible employer contribution."
3. Calculate the Full Funding Limitation under Section 404 with interest to the end of the plan year.
4. The maximum deductible limit is the greater of (1) and (2), but not greater than (3).
5. If the Unfunded Current Liability exceeds the final deductible limit and the plan has more than 100 participants, then the final deductible limit will be the UCL.

You are told that there have been no experience gains or losses before 1988. Under the ILP method, the only sources of UAL (and 404 amortization bases) are experience losses and assumption changes. You must derive the 1988 experience G/L based on the "equation of balance" between the unfunded accrued liability and the credit balance. The gain or loss base that is set up under 404 is the same as that calculated under 412 (see regulations at 1.404(a)-14(g)(1)).

The calculation of the normal cost must satisfy the formulas that are applicable to all reasonable funding methods (1.412(c)(3)-1):

$$\begin{aligned} \text{PV Future Normal costs} &= \text{PV Future Benefits} - \text{Actuarial Assets} \\ &\quad - \text{O/S 412 amortization bases} + \text{credit balance} \end{aligned}$$

$$\begin{aligned} \text{PVNC} &= \text{PVFB} - \text{AAV} - \text{O/S bases} + \text{CB} \\ &= \\ &= 4,000 * \ddot{a}_{42:23}|.08 \quad (\text{employee age 42 at 01/01/89}) \\ &= 4,000 * 11.2007 = 44,803 \\ &= 61,000 - 16,300 - (1988 \text{ G/L}) + 0 \end{aligned}$$

$$1988 \text{ G/L} = -103 \quad (\text{gain})$$

Section 404 deductible limit calculations

Normal cost plus Limit adjustments based on 1988 gain:

$$\begin{aligned} &= 1.08 (4,000 - 103 \div \ddot{a}_{10}|.08) \\ &= 1.08 (4,000 - 14) \\ &= 4,305 \end{aligned}$$

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Problem 21 - Page 2

One easy way to miss the problem is to assume that this is the final answer. A key point is that the calculated UAL is negative. This means that the Full Funding Limitation may apply. You must set up the MFSA for 1989 to calculate the minimum funding requirement and compare it to the normal cost plus limit adjustments.

In addition, you have not looked at the information given on the Current Liability at 12/31/89. This plan has less than 100 employees, so the Unfunded Current Liability can NOT be the deductible limit. However, the new FFL based on the Current Liability may apply.

The Full Funding Limitation is always adjusted with interest to the end of the year. One tricky aspect is that the current liability is given at the end of the year. You must be careful not to credit interest on the end-of-year current liability.

$$\begin{aligned} \text{old FFL} &= 1.08 (AL + NC - \text{lesser MVA, AAV}) \\ &= 1.08 (61,000 - 44,803 + 4,000 - 16,300) \\ &= 1.08 (3,897) = 4,209 \end{aligned}$$

$$\begin{aligned} \text{new FFL} &= 1.08 (1.5 [12/31 \text{ current liab}] / 1.08 - \text{lesser MVA, AAV}) \\ &= 1.08 (1.5 * 14,300 / 1.08 - 16,300) \\ &= 1.5 * 14,300 - 1.08 * 16,300 \\ &= 3,846 \end{aligned}$$

It appears that the FFL does apply in this problem. The next step is to calculate the minimum funding requirement under IRC Section 412.

Section 412 minimum contribution calculations

The amortization of the gain under Section 412 is based on 5 years:

$$103 \div \frac{1}{5} = 206$$

Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Normal cost	4,000	Credit balance	-0-
		Gain amort	24
		Contrib 12/31	x
Interest	320	Interest	2
	4,320		x+26

The minimum contribution required under IRC Section 412 is one that results in a zero credit balance:

$$4,320 = 26 + x \qquad x = 4,294$$

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Problem 21 - Page 3

It is necessary to check the Full Funding Limitation for purposes of 412. Based on the 12/82 proposed regulation, the Accumulated Funding Deficiency based on no contribution and no credit balance must be calculated. This gives an AFD equal to 4,294.

Next the FFL is calculated under 412. The definition is similar to that under 404, except that the asset value is adjusted by the credit balance. Since the credit balance is zero, the FFL is identical to that calculated under 404, or 3,846.

If the Accumulated Funding Deficiency exceeds the Full Funding Limitation, then there is a credit in the MFSA equal to the excess:

$$\text{FFL credit} = 4,294 - 3,846 = 448.$$

Now set up the final MFSA for 1989:

Minimum Funding Standards Account for 1989			
<u>Charges</u>		<u>Credits</u>	
Normal cost	4,000	Credit balance	-0-
		Gain amort	24
		Contrib 12/31	x
		F.F.C. 12/31	448
Interest	320	Interest	2
	4,320		x+474

The minimum contribution required under IRC Section 412 is one that results in a zero credit balance:

$$4,320 = 474 + x$$

$$x = 3,846$$

Going back to the steps outlined at the start of this problem, the final deductible limit is the greater of 4,305 under IRC Section 404 or 3,846 under IRC Section 412. This can't exceed the FFL of 3,846 under IRC Section 404, so the final deductible limit is 3,846.

answer is A

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Problem 22

Revenue Ruling 81-212 contains acceptable methods used to allocate Minimum Funding Standards Account items when a plan is spun off into two or more plans. Revenue Ruling 86-47 contains different rules which must be used when the market value of assets exceeds the present value of benefits on a termination basis (before the plan is spun off), and when one of the spun off plans has a zero UAL.

RR 86-47 requires the allocation of the credit balance in an unusual manner. First determine the lesser of (MVA - CB) or PV of accrued benefits for the single plan. Then allocate the lesser amount between the spun-off plans on a termination basis. Calculate the excess of the market value of assets allocated to each plan over the amount allocated in the prior sentence. The credit balance is allocated to the spun-off plans based on the excess calculated in the prior sentence.

For Plan A, the MVA less CB is 750,000 - 100,000, or 650,000. The PV of accrued benefits is 575,000, which is less. You already have the values for PVAB allocated on a plan termination basis.

	<u>Plan A</u>	<u>Plan B</u>	<u>Plan C</u>
Allocated market value	750,000	450,000	300,000
PV of accrued benefits	575,000	350,000	225,000
Excess of MVA over PVAB	175,000	100,000	75,000
Allocated credit balance			
57.14% of (MVA - PVAB)	100,000	57,143	42,857

answer is D

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Problem 23

This is a typical PBGC guaranteed benefits question. It tests your knowledge of the definition of benefits included in the various Priority Categories. Since there is no early retirement provision, and neither participant is over normal retirement age, there are no benefits in Priority Category three. With no employee contributions, there are no benefits in PC1 or PC2 either.

In general, PC4 includes all guaranteed benefits based on the five year phase-in of benefit improvements for regular employees, and the 30 year phase-in for substantial owners. If the assets are sufficient to cover these benefits, then the substantial owner can receive benefits based on the five year phase-in.

The plan has not been improved in the five years prior to DOPT. This simplifies the guaranteed benefit calculation. Guaranteed benefits are based on the vested benefits of the plan participants:

	SMITH	BROWN	TOTAL
Age at DOPT	59	55	
Past service at DOPT	11	9	
Vesting % at DOPT	100%	80%	
Accrued benefit	11(65) = 715/mo	9(65) 585/mo	
Vested benefit	8,580	5,616	
Present value factor	7	5	
PV benefits in PC4	60,060	28,080	88,140
Allocated assets	44,292	20,708	65,000

Since the assets are exhausted in PC4, they are allocated based on the present value of benefits. There are zero assets allocated to PC1, PC2, and PC3. The assets are allocated based on 73.75% of liability for PC4.

answer is A

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Problem 24 - Page 1

In this problem you can not check the Full Funding Limitation, since you are not given the Entry Age Normal accrued liability. Since the cost method is an aggregate type cost method, you do not have to set up any gain/loss amortization bases at 01/01/89.

For waivers granted prior to 1988, a 15 year amortization period should be used (use 5 years for waivers after 1987). One of the general conditions of the exam states that the interest rate used to calculate the amortization of a waiver should be based on the valuation interest rate. In this problem you should use 150% of the FMR for January 1989 to amortize the waiver.

$$\begin{aligned} \text{Amortization of IAL} &= 325,000 \div \ddot{a}_{\overline{30}|.07} \\ &= 24,477 \end{aligned}$$

Since the plan has just been established at 01/01/88, the credit balance is zero at 01/01/88.

Minimum Funding Standards Account for 1988

<u>Charges</u>		<u>Credits</u>	
Normal cost	30,000	Credit balance	-0-
IAL amort	24,477	Actual cont 12/31	-0-
Interest	3,813	Interest	-0-
	58,291		-0-

The amount of the waiver for 1988 is 58,291. The debit balance at 01/01/89 is offset by the credit under IRC Section 412(b)(3)(C). The same amount is set up as an amortization base and amortized over five years at 13.53% :

$$\begin{aligned} \text{Amortization of waiver} &= 58,291 \div \ddot{a}_{\overline{5}|.1353} \\ &= 14,787 \end{aligned}$$

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Problem 24 - Page 2

To calculate the contribution that is eligible for waiver for 1989, you must allow for the fact that you "can't waive a waiver". See IRC Section 412(d)(1) which states that the waiver excludes the portion of the minimum funding standard determined under subsection (b)(2)(c), which is the amortization of a waiver. In other words, the employer must pay the five year amortization of the 1988 waiver, but the rest of the 1989 contribution is eligible for waiver.

Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Debit balance	58,291	Credit balance	-0-
Normal cost	25,000	412(b)(3)(C)	58,291
IAL amort	24,477		
Waiver amort	14,787	Req'd contrib	14,787
Interest	9,544	Interest	6,081
	<hr/>		<hr/>
	132,100		79,159

The calculation of the interest in the MFSA is tricky, because the waiver amortization payment should receive a full year's interest at 13.53%. The amount of the debit balance at 12/31/89 is 132,100 - 79,159, or 52,941. This represent the waiver if the entire 1989 contribution is waived.

Since half of this amount is waived, the minimum required contribution at 12/31/89 is

$$1.1353(14,787) + .50(52,941) = 43,258.$$

answer is E

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Problem 25 - Page 1

Under any individual cost method, there are always two things to look for: (i) gains and losses, and (ii) the Full Funding Limitation. Since you are told that the actuarial value of assets equals the market value, it is possible to calculate the FFL each year.

You are told that the 1987 MFSA included a Full Funding Credit. This means that all the MFSA amortization bases have been zeroed out at 01/01/88. The only way that any amortization bases will appear in the MFSA is when experience losses occur, or when a plan benefit change or assumption change creates a charge base.

Section 7 of RR 81-213 defines a "Special G/L" calculation which establishes an amortization base that FORCES the theoretical equation of balance to hold. Section 7 of RR 81-213 states that you can do a special determination of the G/L only when an experience loss has occurred. The proposed regulation at 1.412(b)-1(f)(2)(ii) contains basically the same rule, except that it does not require a loss to have occurred.

In this problem, the 01/01/89 valuation presents the first opportunity to re-establish the "equation of balance" between the UAL, 412 bases, and the credit balance:

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} \\ 5,000 &= \text{LOSS} - 6,000 \\ \text{LOSS} &= 5,000 + 6,000 = 11,000 \end{aligned}$$

$$\text{Loss amortization payment} = 11,000 \div a_{\overline{5}|.08} = 2,551$$

Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Normal cost	9,000	Credit balance	6,000
Loss amort	2,551	12/31 contrib	x
Interest	924	Interest	480
	12,475		x+6,480

The minimum contribution required under IRC Section 412 is one that results in a zero credit balance:

$$12,475 = 6,480 + x \qquad x = 5,995$$

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Problem 25 - Page 2

It is necessary to check the Full Funding Limitation for purposes of 412. Based on the 12/82 proposed regulation, the Accumulated Funding Deficiency based on no contribution and no credit balance must be calculated. This gives an AFD equal to 12,475.

Next the FFL is calculated under 412. The definition is similar to that under 404, except that the asset value is adjusted by the credit balance. Since you have no information on the current liability, there is only one "old" FFL calculation:

$$\begin{aligned} \text{old FFL} &= 1.08 (\text{EAN AL} + \text{EANC} - (\text{lesser MVA, AAV} - \text{CB})) \\ &= 1.08 (130,000 + 9,000 - (125,000 - 6,000)) \\ &= 1.08 (20,000) \\ &= 21,600 \end{aligned}$$

If the Accumulated Funding Deficiency exceeds the Full Funding Limitation, then there is a credit in the MFSA equal to the excess. Since the AFD is less than the FFL, the FFL does not apply, and the final minimum contribution is 5,995.

answer is B

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Problem 26 - Page 1

This is a tricky Section 415 benefit calculation problem. The first step is to calculate the basic plan benefits. Next, the 415 limits must be applied. Since this participant was born between 1938 and 1954, the limits for a Social Security Retirement Age of 66 are used. The dollar maximum of 98,064 at age 65 has to be adjusted for the assumed retirement age of 60.

The overall 415 limit is defined as the lesser of 98,064 or 100% of 3 year FAE. The application of the 415 limits can not reduce the benefit below 10,000. The dollar maximum must be reduced pro-rata for less than 10 years of participation service. The other two limits would be reduced pro-rata for less than 10 years of service from hire.

The plan was set up at 01/01/87, and Smith attains age 60 on 01/01/99. Since Smith has more than ten years of both total service and participation service at 01/01/99, the pro-rata reductions in the 415 limits will not apply.

The reductions specified in Section 415 are 6 2/3% per year for the first three years prior to SSRA, and 5% per year thereafter. Starting at age 62, an actuarial reduction must be used, based on the greater of the interest rate in the plan or 5%. The definition of the actuarial reduction depends on the risk of forfeiture. Notice 87-21: A-5 states "the mortality decrement may be ignored to the extent that a forfeiture does not occur at death".

If a plan has a pre-retirement death benefit equal to the lump sum value of the participant's accrued benefit, then it is 100% true that a forfeiture does not occur at death. In this case, you can ignore 100% of the mortality decrement. For a plan with no pre-retirement death benefit, it is 0% true that a forfeiture does not occur at death. In this case you must reflect 100% of the mortality decrement. Since you are told nothing about death benefits in this plan, you must assume there is no death benefit, which results in a true actuarial reduction.

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Problem 26 - Page 2

The resulting limitation at age 62 is

$$98,064 (1 - 3(.06667) - .05) = 98064(.75) = 73,547.$$

The actuarial reduction from age 62 down to age 60 is based on 6% interest

$$N_{62}^{(12)} \div N_{60}^{(12)} = 232 / 281 = .8256$$

The resulting limitation at age 60 is

$$73,547 (.8256) = 60,722.$$

Now calculate the projected plan benefit at retirement age 60:

Smith	
01/01/89 Age	50
01/01/89 Service	6
Age 49 compensation	170,000
Projected age 59 compensation	170,000*(1.05) ¹⁰ = 276,912 = 200,000 limited by 401(a) (17)
Projected 3 year FAE	200,000
Projected plan benefit at 60	.02(16)200,000 = 64,000
100% 3 yr FAE 415 maximum	276,912 not limited
415 dollar maximum at 60	60,722
Final benefit is lesser of 415 limits and plan benefit	= 60,722

answer is C

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Problem 27

This is a simple asset allocation problem. You are given values for priority categories 1-4, 5, and 6 in the problem. Set up a revised table that shows the liabilities including the value of the early retirement subsidies. You should multiply the PC1-4 values by 120%:

	<u>Plan A</u>	<u>Plan B</u>	<u>Plan C</u>
PC1 through PC4	90,000	12,000	78,000
PC5	8,000	3,500	4,500
PC6	20,000	2,000	18,000
Total termination liability	118,000	17,500	100,500

The market value must be allocated next. This amount can be allocated to the spun off plans based on 100% of the liability for PC1-4, plus 100% of PC5, plus 10% of PC6:

	<u>Plan A</u>	<u>Plan B</u>	<u>Plan C</u>
100% of PC1 through PC4	90,000	12,000	78,000
100% of PC5	8,000	3,500	4,500
10% of PC6	2,000	200	1,800
Market value of assets	100,000	15,700	84,300

answer is D

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Problem 28 - Page 1

The regulation at 1.404(a)-14(h) contains rules for maintenance of 10-year amortization bases used to calculate the deductible limit. It specifies that the O/S balance of the 10-year amortization bases must equal the UAL. The UAL under 404 is based on certain adjustments for carryover and non-deducted contributions, of which we have none in this problem.

The general rules for writing down the bases are as follows:

1. Total contribution with respect to all bases equals the difference between (i) and (ii):
 - (i) is the sum of
 - (A) the total deduction for the prior year, plus
 - (B) interest on actual contribution for the prior year, plus
 - (C) interest on the carryover at the beginning of the prior year
 - (ii) is the normal cost plus interest from the date it is calculated

Interest on the above items is at the valuation rate to the current valuation date.
2. The limit adjustment for any base is the lesser of the 10-year amortization of the base, or the outstanding balance of the base
3. The contribution with respect to a base equals the product of (i) and (ii):
 - (i) is the total contribution with respect to all bases
 - (ii) is the ratio of the limit adjustment for the base to the sum of the limit adjustments for all bases
4. The unamortized amount of any base equals (i) plus (ii) minus (iii):
 - (i) is the unamortized amount of the base at last year's valuation date
 - (ii) is interest on (i) from last year's valuation date to this year's valuation date
 - (iii) is the contribution with respect to the base

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Problem 28 - Page 2

In this problem, the initial base is written down, and a new base is established at 01/01/88 due to an experience G/L. At 1.404(a)-14(g), the regulation specifies that the G/L base is the same one set up under Section 412. The usual calculation of the G/L base is the difference between the expected UAL and the actual UAL.

From 01/01/87 to 01/01/88 there is only one base, so there is no allocation involved. The O/S 404 base at 12/31/87 must equal the expected UAL at 12/31/87 calculated using the standard formula:

$$\begin{aligned} e_{UAL_1} &= (1+i)(UAL_0 + NC_0) - (\text{Contribution} + \text{interest}) \\ e_{UAL_1} &= 1.07 (600,000 + 125,000) - 200,000 \\ &= 575,750 \end{aligned}$$

The experience gain for 1987 is equal to the e_{UAL} minus the UAL:

$$\text{Gain} = 575,750 - 500,000 = 75,750$$

The sum of the two bases (575,750 - 75,750) equals the UAL at 01/01/88. Now you must calculate the remaining portion of the 575,750 at 01/01/89.

$$\begin{aligned} \text{Contribution toward all bases} &= 220,000(1+.25(.07)) - 1.07(140,000) \\ &= 74,050 \end{aligned}$$

$$\text{Limit adjustment for IAL base} = 600,000 \div \ddot{a}_{\overline{10}|.07} = 79,838$$

$$\text{Limit adjustment for Gain base} = -75,750 \div \ddot{a}_{\overline{10}|.07} = -10,080$$

$$\begin{aligned} \text{Contribution with respect to IAL base} &= 74,050 * 79,838 \div (79,838 - 10,080) \\ &= 84,750 \end{aligned}$$

$$\text{Unamortized amount of base} = 1.07(575,750) - 84,750 = 531,303$$

answer is C

There is a way to check your work in this problem. If you calculate the outstanding amount of the gain base, then the sum of the two bases should equal the expected UAL at 12/31/88.

Contribution with respect to Gain base:

$$74,050 * -10,080 \div (79,838 - 10,080) = -10,700$$

$$\text{Unamortized amount of base} = 1.07(-75,750) - 10,700 = -70,353$$

$$\text{Total O/S 10-year bases} = 531,303 - 70,353 = 460,950$$

$$\text{Expected UAL} = 1.07(500,000 + 140,000) - 1.0175(220,000) = 460,950$$

Problem 29 - Page 1

With an individual cost method, there are two things to be aware of. One is that the Full Funding Limitation may apply. The other is that you should check for experience gains or losses each year. In this problem, you have a new plan, and no market value of assets, so you can't check the Full Funding Limitation.

When you have a change in plan benefits, you calculate the expected UAL based on the old benefit level. This should be compared to the actual UAL on the old benefit level to give the experience G/L. Since you have no retired or terminated vested participants, you can calculate the accrued liability on the \$30 benefit level as a ratio of the accrued liability on the \$40 benefit level:

$$\begin{aligned} 01/01/89 \text{ \$30 AL} &= (3/4)(216,000) = 162,000 \\ 01/01/89 \text{ plan change base} &= 216,000 - 162,000 = 54,000 \end{aligned}$$

The experience gain for 1988 is equal to the ${}_e\text{UAL}$ minus the UAL:

$${}_e\text{UAL}_1 = (1+i)(\text{UAL}_0 + \text{NC}_0) - (\text{Contribution} + \text{interest})$$

$$\begin{aligned} {}_e\text{UAL}_1 &= 1.07 (150,000 + 25,000) - 40,000 \\ &= 147,250 \end{aligned}$$

$$01/01/89 \text{ \$30 UAL} = 162,000 - 40,000 = 122,000$$

$$\text{Gain} = 147,250 - 122,000 = 25,250$$

$$\text{amortization for IAL base} = 150,000 \div \ddot{a}_{\overline{30}|.07} = 11,297$$

$$\text{amortization for benefit base} = 54,000 \div \ddot{a}_{\overline{30}|.07} = 4,067$$

$$\text{amortization for gain base} = 25,250 \div \ddot{a}_{\overline{5}|.07} = 5,755$$

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Problem 29 - Page 2

Minimum Funding Standards Account for 1988

<u>Charges</u>		<u>Credits</u>	
Normal cost	25,000	Credit balance	-0-
IAL amort	11,297	12/31 contrib	40,000
Interest	2,541	Interest	-0-
	<hr/>		<hr/>
	38,838		40,000

The credit balance at 12/31/88 is $40,000 - 38,838 = 1,162$.

Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Normal cost	29,000	Credit balance	1,162
IAL amort	11,297	Gain amort	5,755
Plan chg amort	4,067	12/31 contrib	x
Interest	3,105	Interest	484
	<hr/>		<hr/>
	47,470		x+7,402

The minimum contribution at 12/31/89 is $47,470 - 7,402 = 40,068$.

answer is A

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Problem 30

The regulation at 1.404(a)-14(h) contains rules for maintenance of 10-year amortization bases used to calculate the deductible limit. It specifies that the O/S balance of the 10-year amortization bases must equal the UAL. The UAL under 404 is based on certain adjustments for carryover and non-deducted contributions, of which we have none in this problem.

In this problem, we have a single 404 base of 490,000 at 01/01/89. The change in interest rate produces a new 404 base of 65,000 at 01/01/89. The limit adjustment on the "old" base must be recalculated on the 7% interest rate.

You usually calculate the number of years of amortization remaining in the original 404 base at the old interest rate. You do not have to do that in this problem because the deductible limits paid on January 15 of the following year are treated as if paid at the end of each year. The result is that the remaining amortization period of the 490,000 base is exactly 5 years at 01/01/89.

Now calculate the new limit adjustments for both bases on 7% interest:

$$\begin{aligned} \text{Limit adjustment for IAL base} &= 490,000 \div \ddot{a}_{\overline{5}|.07} = 111,688 \\ \text{Limit adjustment for chg base} &= -65,000 \div \ddot{a}_{\overline{10}|.07} = -8,649 \end{aligned}$$

Normal cost plus Limit adjustments

$$\begin{aligned} &= 1.07 (52,000 + 111,688 - 8,649) \\ &= 165,892 \end{aligned}$$

answer is C

This problem seems too easy. The Full Funding Limitation can't be calculated, and there are no experience G/L or current liability items to worry about. It is really a set-up for the NEXT problem.

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Problem 31

There are two difficult questions to answer in this problem: (i) should you assume that the plan will continue to be Top Heavy for all future years for purposes of the T-H minimum benefit, and (ii) how do you apply Projected Unit Credit to a plan that has two different types of benefit.

The reasonable funding methods regulation contains the definition of the Projected Unit Credit cost method. At 1.412(c)(3)-1(e)(3) is a discussion of allocation of liabilities under Unit Credit methods. In general, PUC requires calculation of what I call a "funding accrued benefit", which is not necessarily the same as the accrued benefit defined under the plan. The projected benefit under the plan is calculated, including a salary scale. The "funding accrued benefit" is calculated by applying a ratio, which is based on the years of benefit service at the valuation divided by such years at assumed retirement age. The years of benefit service are weighted by the rates of benefit accrual, which reproduces the benefit formula.

The PUC normal cost is calculated as the present value of the change in the accrued benefit in the year following the valuation date. Smith has seven years of service at age 57. The 1988 salary of 30,000 corresponds to salary during the age of 56. The projected plan benefit at assumed retirement age 65 is $2,520 = (65-50)(12)(\$14)$.

Top Heavy minimum calculations

Projected 3 year FAE at age 64: $30,000(1.05)^8 \ddot{a}_{\overline{3}|1.05} \div 3 = 42,247$

The plan has been Top Heavy for one year at 01/01/89. The plan also must be Top Heavy at 01/01/89, because both the first and second plan years use 12/31/88 as the determination date. The T-H minimum will be based on one year of T-H service at 01/01/89, and two T-H years at 01/01/90.

Projected Top Heavy minimum at retirement: $7,604 = (2\%)(9)(42,247)$

	Funding Accrued Benefit as of	
	01/01/89	01/01/90
Years of service	7	8
Plan benefit: 2,520 * service/15	1,176	1,344
Years of T-H service	1	2
Top heavy minimum: 7,604 * T-H svc/9	845	1,690
Final AB, greater of plan, T-H benefit	1,176	1,690

Normal cost = $(1,690-1,176) \ddot{a}_{65}^{(12)} (D_{65} \div D_{40})$
 $= 514(10)(1.07)^{-8} = 2,991$

answer is C

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Problem 32 - Page 1

In this problem you can not check the Full Funding Limitation, since you are not given the Entry Age Normal valuation results. The point of this question is that the asset valuation method has been changed from market value to adjusted market value of assets. This is a change in cost method as defined in Revenue Procedure 85-29.

Revenue Procedure 85-29 contains the rules for setting up a new amortization base when there is a change in cost method. The amortization period is the greater of the remaining period for amortizing the initial accrued liability, or the lesser of (i) 15 years, or (ii) the average future working lifetime of the active population.

The amount of the amortization base must satisfy the formulas that are applicable to all reasonable funding methods (1.412(c)(3)-1):

$$\text{PV Future Normal costs} = \text{PV Future Benefits} - \text{Actuarial Assets} - \text{O/S 412 amortization bases} + \text{credit balance}$$

For cost methods with Unfunded Actuarial Liabilities, this can be restated as $\text{UAL} = \text{O/S 412 bases} - \text{credit balance}$. Under the old asset valuation method, you have

$$\begin{aligned} 12/31/88 \text{ UAL} &= \text{O/S 412 bases} - \text{CB} \\ &= \ddot{a}_{21|1.07} * (100,000 \div \ddot{a}_{30|1.07}) - 10,000 \\ &= 11.5940 * 7,531 - 10,000 \\ &= 77,320 \\ 01/01/89 \text{ UAL} &= 97,320 \end{aligned}$$

$$\text{Method change base} = 20,000 \text{ (new AAV is lower by 20,000)}$$

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Problem 32 - Page 2

The MFSA for this plan was established at 1-1-80, so the computation of the amortization period is as follows:

Greater of IAL period (30 - (89-80) = 21 years),
 or lesser of (15 or PVL/L)
 = 21 years

$$\text{CHG amortization payment} = 20,000 \div \ddot{a}_{\overline{21}|} 1.07 = 1,725$$

$$\begin{aligned} \text{PVNC} &= \text{PVFB} - \text{AAV} - \text{UAL} \\ &= 350,000 - 180,000 - 97,320 \\ &= 72,680 \end{aligned}$$

$$\text{PVE/E} = 1,000,000 \div 100,000 = 10.000$$

$$\text{NC} = 72,680 \div 10.0000 = 7,268 \text{ at } 01/01/89$$

Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Normal cost	7,268	Credit balance	10,000
IAL amort	7,531	Min contrib 12/31	x
CHG amort	1,725	Interest	700
Interest	1,157		
	17,681		10,700+x

The minimum contribution required under 412 is one that results in a zero credit balance:

$$17,681 = 10,700 + x$$

$$x = 6,981$$

answer is C