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FALL 1988 EA-2 EXAM SOLUTIONS

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The 1988 exam had easier questions than the 1986 or 1987 exams. As a result, the passing score on the 1988 exam was much higher than in previous years. Passing the 1988 exam required approximately three more correct answers than the 1987 exam.

The solutions for the 1988 exam use beginning of year amortization payments in setting up the Minimum Funding Standards Account. This is a change from the approach used in the 1987 solutions. These solutions were prepared based on the law as in effect at June 30, 1988.

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 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 100 or more participants, then the final deductible limit will be the UCL.

Revision History:

11/14/92 Corrected text on this page for solutions to 404 problems

11/14/92 Reflected corrected text in solutions to problems 3, 13, 16, 26

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Problem 1

For any plan, the Top Heavy determination date is the last day of the preceding 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.

12/31/88 is the determination date for this plan. Since Brown's distributions occurred prior to 12/31/83, they are excluded in the ratio calculation. Black's values are included since they occurred after 12/31/83. The ratio is calculated as follows:

Numerator for key employees:

$$\text{Smith} = 180,000 + 100,000 = 280,000$$

Denominator for all employees:

Smith	=	180,000	+	100,000	=	280,000
Green	=	30,000	+	50,000	=	80,000
White	=	80,000	+	40,000	=	120,000
Black	=	40,000	+	20,000	=	50,000
						<hr/>
						530,000

$$\text{Top Heavy ratio is } 280,000 \div 530,000 = .528$$

answer is C

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Problem 2

Under the Frozen Initial Liability method, there is no separate calculation of gains and losses. The simplified version of the equation of balance

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

can be used to derive the Unfunded Accrued Liability at 01/01/86. You are told that waivers were granted for 1986 and 1987, which will allow computation of the 01/01/88 Unfunded Accrued Liability.

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.

$$\begin{aligned} 01/01/86 \text{ UAL} &= 180,000 (\ddot{a}_{\overline{26}|.07} \div \ddot{a}_{\overline{30}|.07}) - 10,000 \\ &= 171,539 - 10,000 = 161,539 \end{aligned}$$

For 1986, there would be a zero contribution, since the entire amount would be waived. From here there are two ways to work the problem. One requires filling out the Minimum Funding Standards Account entries for 1986 and 1987, and backing into the 01/01/88 UAL. The alternate approach is to work through the 01/01/87 and 01/01/88 UAL values directly:

$$\begin{aligned} 01/01/87 \text{ UAL} &= 1.07 (161,539 + 60,000) - \text{zero contribution} \\ &= 237,047 \end{aligned}$$

You can use the equation of balance to derive the amount of the waiver, which would be the debit balance at 12/31/86:

$$\begin{aligned} 01/01/87 \text{ UAL} &= \text{O/S 412 bases} - \text{credit balance (0)} \\ &= 180,000 (\ddot{a}_{\overline{25}|.07} \div \ddot{a}_{\overline{30}|.07}) + \text{waiver base} \\ &= 169,042 + 68,006 \end{aligned}$$

As stated in Section 412(d)(1), the amortization of a previous waiver can not be waived. Even though a full waiver is granted for 1987, the contribution will not be zero:

$$\begin{aligned} 1987 \text{ contribution} &= 1986 \text{ waiver amortization} \\ &= 68,006 (\ddot{a}_{\overline{15}|.07}) \\ &= 6,978 \end{aligned}$$

$$\begin{aligned} 01/01/88 \text{ UAL} &= 1.07 (237,047 + 80,000 - 6,978) \\ &= 331,774 \end{aligned}$$

answer is D

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Problem 3 - 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.
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 100 or more participants, then the final deductible limit will be the UCL.

Section 404 deductible limit calculations

$$\begin{aligned} &\text{Normal cost plus Limit adjustments} \\ &= 1.07 (200,000 + 1,000,000 \div \bar{a}_{101.07}) \\ &= 1.07 (200,000 + 133,063) \\ &= 356,378 \end{aligned}$$

The definition of the Full Funding Limitation is the excess of the Accrued Liability including Normal Cost over the lesser of the Market or Actuarial value of assets. In this problem, we are given information on the current liability, so the FFL is reduced to the lesser of the prior definition, or the excess of 150% of the current liability over the lesser of the Market or Actuarial value of assets. These values are all calculated as of the end of the plan year. In addition, for any aggregate cost method which does not directly generate an Accrued Liability, the Entry Age Normal Accrued Liability and Normal Cost must be used.

$$\begin{aligned} 404 \text{ FFL} &= \text{lesser of} \\ &\quad (i) \text{ 150\% of EOY current liab} - 1.07 * (\text{lesser of (MVA, AAV)} - \text{ben pmts}) \\ &\quad (ii) 1.07 * (\text{Normal cost} + \text{Accrued Liability} - \text{lesser of (MVA, AAV)}) \end{aligned}$$

$$\begin{aligned} \text{FFL} &= \text{lesser of} \\ &\quad (i) 150\%(220,000) - 1.07 * (0 - 0) \\ &\quad (ii) 1.07 (\text{EANC} + 1,000,000) - 1.07 * (0 - 0) \\ &= 330,000 \end{aligned}$$

It should be clear that the current liability definition will produce the lowest value for the FFL under Section 404. You can calculate the FFL even though you do not know the EAN Accrued Liability or Normal Cost.

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Problem 3 - Page 2

Section 412 minimum contribution calculations

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

$$1,000,000 \div \ddot{a}_{\overline{30}|1.07} = 75,314$$

Minimum Funding Standards Account for 1988

<u>Charges</u>		<u>Credits</u>	
Normal cost	200,000	Credit balance	0
IAL amort	75,314	Min contrib 12/31	x
Interest	19,272	Interest	0
	<hr/>		<hr/>
	294,586		x

This seems to imply that the minimum contribution is 294,586, but that may be incorrect. 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 is simply the charges of 294,586 in this problem.

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:

Let ADJ VALUE = lesser of (MVA, AAV) less the credit balance
412 FFL = lesser of
 (i) 150% of EOY current liab - $1.07 * (\text{ADJ VALUE} - \text{ben pmts})$
 (ii) $1.07 * (\text{Normal cost} + \text{Accrued Liability} - \text{ADJ VALUE})$
 = 330,000

In this problem, the FFL under 404 and 412 is the same, since the credit balance is zero. The 412 FFL credit is defined as the excess of the accumulated funding deficiency based on zero contribution and zero credit balance over the FFL, which is $294,586 - 330,000$, or less than zero.

There is no 412 FFL credit in this situation, so the minimum funding requirement is 294,586. The maximum deductible limit is reduced to the 330,000 FFL under Section 404, since that is less than the 356,378 calculated under 404, but greater than the 294,586 calculated for 412.

The contribution of x in the 1988 MFSA is 330,000, which produces a credit balance of 35,414 at 12/31/88.

answer is B

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Problem 4

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. Since the participant was hired prior to 1985, the computation of the DC fraction takes 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 12% pay
12/31/84	75,000	18,750	26,250	30,000	37,500	26,250	-0-
12/31/85	100,000	25,000	35,000	30,000	37,500	35,000	12,000
12/31/86	130,000	32,500	45,500	30,000	37,500	37,500	15,600
12/31/87	170,000	42,500	59,500	30,000	37,500	37,500	20,400
						-----	-----
						136,250	48,000

$$\begin{aligned} \text{DC fraction} &= 48,000 \div 136,250 \\ &= .352 \end{aligned}$$

answer is B

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Problem 5

In this problem you can not check the Full Funding Limitation, since you are not given the market value of assets. 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 $\text{UAL} = \text{O/S 412 bases} - \text{credit balance}$. Since this plan was valued under the Aggregate method prior to 1988, the only 412 base will be the method change base. The MFSA for this plan was established at 1-1-84, so the computation of the amortization period is as follows:

$$\begin{aligned} &\text{Greater of IAL period (} 30 - (88-84) = 26 \text{ years) ,} \\ &\quad \text{or lesser of (15 or PVL/L)} \\ &= 26 \text{ years} \end{aligned}$$

$$\begin{aligned} \text{UAL} &= 650,000 - 430,000 = 220,000 \\ \text{O/S 412 bases} &= \text{UAL} + \text{CB} \\ &= 220,000 + 20,000 \\ &= 240,000 \end{aligned}$$

$$\text{CHG amortization payment} = 240,000 \div \ddot{s}_{\overline{26}|.07} = 18,967.$$

Minimum Funding Standards Account for 1988

<u>Charges</u>		<u>Credits</u>	
Normal cost	75,000	Credit balance	20,000
CHG amort	18,967	Min contrib 12/31	x
Interest	6,578	Interest	1,400
	100,545		21,400+x

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

$$100,545 = 21,400 + x$$

$$x = 79,145$$

answer is E

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Problem 6 - 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.

The first step is to calculate the deductible limit for 1986. In general, the deductible limit equals 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:

$$1.07 (50,000 + 100,000 \div \ddot{s}_{\overline{10}|1.07}) \\ = 1.07 (63,306) = 67,738$$

The FFL obviously does not apply, but you can calculate it as

$$\text{FFL} = 1.07 (\text{AL} + \text{NC} - \text{lesser MVA, AAV}) \\ = 1.07 (100,000 + 50,000 - 0) \\ = 160,500$$

The next step is to calculate the credit balance at 12/31/86. This is necessary to calculate the minimum contribution for 1987. The IAL amortization payment is based on 30 years:

$$\text{IAL amortization payment} = 100,000 \div \ddot{s}_{\overline{30}|1.07} = 7,531.$$

Minimum Funding Standards Account for 1986

<u>Charges</u>		<u>Credits</u>	
Normal cost	50,000	Credit balance	-0-
IAL amort	7,531	Max contrib 07/01	67,738
Interest	4,027	Interest	2,371
	<hr/>		<hr/>
	61,558		70,109

The credit balance at 12/31/86 is 70,109 - 61,558 = 8,551. It should be clear that the FFL under 412 will be quite large, and that no FFL credit would be generated for the MFSA.

The easy way to miss this problem is to go ahead and set up the MFSA for 1987 and calculate the minimum contribution. This is incorrect due to the fact that an experience gain or loss base may be created, since this is an individual cost method. The G/L base is calculated as the difference between the actual and the expected unfunded liabilities.

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Problem 6 - Page 2

The expected UAL at 01/01/87 is calculated using the standard formula:

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

$${}_e\text{UAL}_1 = 1.07 (100,000 + 50,000) - (67,738 + 2,371)$$

$$= 90,391$$

The experience gain for 1986 is equal to the UAL minus the ${}_e\text{UAL}$:

$$\text{UAL} = 120,000 - 72,000 = 48,000$$

$$\text{GAIN} = 90,391 - 48,000 = 42,391$$

$$\text{G/L amortization payment} = 42,391 \div \ddot{a}_{\overline{15}|1.07} = 4,350.$$

The amortization is based on 15 years since this gain occurred prior to 1988. For gain and loss amortization bases set up in 01/01/88 and later valuations, a five year amortization period must be used.

Minimum Funding Standards Account for 1987

<u>Charges</u>		<u>Credits</u>	
Normal cost	40,000	Credit balance	8,551
IAL amort	7,531	GAIN amort	4,350
Interest	3,327	Min contrib 12/31	x
		Interest	903
	<hr/> 50,858		<hr/> 13,804+x

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

$$50,858 = 13,804 + x$$

$$x = 37,054$$

answer is B

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Problem 7 - Page 1

In this problem you can not check the Full Funding Limitation, since you are not given the market value of assets. 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 $\text{UAL} = \text{O/S 412 bases} - \text{credit balance}$. Since this plan was valued under the Aggregate method prior to 1988, the only 412 base will be the method change base. The MFSA for this plan was established at 1-1-80, so the computation of the amortization period is as follows:

$$\begin{aligned} &\text{Greater of IAL period (} 30 - (88-80) = 22 \text{ years) ,} \\ &\quad \text{or lesser of (} 15 \text{ or PVL/L)} \\ &= 22 \text{ years} \end{aligned}$$

$$\text{UAL}_1 - e\text{UAL}_1 = 275,000 - 250,000 = 25,000 \text{ change base}$$

$$\text{CHG amortization payment} = 25,000 \div \ddot{a}_{22|0.07} = 2,112.$$

12/31/87 Calculations:

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

$$\begin{aligned} \text{Credit balance} &= \text{O/S 412 bases} - \text{UAL} \\ &= 300,000 (\ddot{a}_{22|0.07} \div \ddot{a}_{30|0.07}) - 250,000 \\ &= 17,416 \end{aligned}$$

$$\text{IAL amortization payment} = 300,000 \div \ddot{a}_{30|0.07} = 22,594.$$

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Problem 7 - Page 2

Minimum Funding Standards Account for 1988

<u>Charges</u>		<u>Credits</u>	
Normal cost	50,000	Credit balance	17,416
IAL amort	22,594		
CHG amort	2,112	Min contrib 12/31	x
Interest	5,229	Interest	1,219
	<hr/>		<hr/>
	79,935		18,635+x

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

$$79,935 = 18,635 + x$$

$$x = 61,301$$

answer is C

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Problem 8

This problem tests your knowledge of the ERISA Section 4044 asset allocation priority categories. In general, PC3 includes employees who were retired, or who could have retired three years before plan termination. The benefit amount is based on the plan provisions in effect in the five years preceding plan termination that produce the lowest benefit level. Benefits in Priority Category 3 are not subject to any phase-ins, and they can exceed the Maximum Guaranteed Benefit amount.

Brown is age 67 at 12/31/87, and was age 64 at 12/31/84. Smith is age 69 at 12/31/87, and was age 66 at 12/31/84. Based on the plan provisions in effect five years ago, Brown was not eligible to retire at 12/31/84, but Smith was eligible. The total monthly benefit in PC3 is Smith's early retirement benefit at 12/31/84:

12/31/87 service	35
12/31/84 service	32
12/31/84 monthly ben	$32 * 20 = 640$

answer is A

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Problem 9

Under the de minimis rule of IRC Section 1.414(1)-1, the smaller plan's spinoff is treated as an experience G/L. Plan C will have its MFSA set up as a new plan. Plan B will inherit all the amortization bases and the credit balance from Plan A. A new G/L amortization base will have to be set up for Plan B. The amount of the base will equal the UAL of Plan C.

		<u>Plan A</u>	<u>Plan B</u>	<u>Plan C</u>
Given	(A) EAN AL	1,250,000	1,225,000	25,000
Given	(B) AAV	1,000,000	988,000	12,000
(A) - (B)	(C) UAL	250,000	237,000	13,000
Given	(D) Credit bal	40,000	40,000	-0-
(C) + (D)	(E) O/S bases	290,000	277,000	-0-

The 412 amortization bases for Plan B are the original IAL base's outstanding amount of 290,000 less the 13,000 gain base due to the spinoff of Plan C. After calculation of the amortization amounts, the MFSA for 1987 can be set up. Since Plan A was set up at 01/01/83, there are 26 years remaining in the amortization of the IAL at 01/01/87. Since the experience G/L occurred before 1988, it is amortized over fifteen years.

$$\text{IAL amortization payment} = 290,000 \div \ddot{s}_{\overline{15}|.07} = 22,918.$$

$$\text{G/L amortization payment} = 13,000 \div \ddot{s}_{\overline{15}|.07} = 1,334.$$

Minimum Funding Standards Account for 1987

<u>Charges</u>		<u>Credits</u>	
Normal cost	78,000	Credit balance	40,000
IAL amort	22,918	G/L amort	1,334
Interest	7,064	Min contrib 12/31	x
		Interest	2,893
	<hr/>		<hr/>
	107,983		44,227+x

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

$$107,983 = 44,227 + x$$

$$x = 63,755$$

answer is C

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Problem 10

Revenue Procedure 85-29 contains the rules for setting up a new amortization base when there is a change in cost method. Since we are changing from Entry Age Normal to Frozen Initial Liability, there will be no new base required for the change in cost method. The reason is that the definition of the initial UAL under both methods is identical.

Since this plan was valued under Entry Age Normal prior to 1988, a new amortization base would be set up for an experience G/L during 1987. Since we are told there is no G/L for 1987, use the equation of balance to determine the credit balance at 12/31/87:

$$\begin{aligned} \text{UAL} &= \text{PVB} - \text{AAV} - \text{PVNC} \\ &= 1,500,000 - 500,000 - 600,000 \\ &= 400,000 \end{aligned}$$

$$\text{IAL amortization payment} = 500,000 \div \ddot{a}_{30|0.07} = 37,657.20$$

$$\text{G/L amortization payment} = 20,000 \div \ddot{a}_{15|0.07} = 2,052.23$$

$$\begin{aligned} \text{Credit balance} &= \text{O/S 412 bases} - \text{UAL} \\ \text{O/S 412 bases} &= 37,657.20 * \ddot{a}_{26|0.07} - 2,052.23 * \ddot{a}_{14|0.07} \\ &= 476,498 - 19,204 \\ &= 457,294 \end{aligned}$$

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} = 400,000 \\ &= 457,294 - \text{CB} \\ \text{12/31/87 credit balance} &= 57,294 \end{aligned}$$

To set up the MFSA for 1987, you have to calculate the normal cost:

$$\begin{aligned} \text{NC} &= \text{PVNC} \div (\text{PVE} \div \text{Payroll}) \\ &= 600,000 \div (2,000,000 \div 200,000) = 60,000 \text{ at } 01/01/88 \end{aligned}$$

Minimum Funding Standards Account for 1988

<u>Charges</u>		<u>Credits</u>	
Normal cost	60,000	Credit balance	57,294
IAL amort	37,657	G/L amort	2,052
		Min contrib 12/31	x
Interest	6,836	Interest	4,154
	<hr/>		<hr/>
	104,493		63,500+x

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

$$104,493 = 63,500 + x$$

$$x = 40,993$$

answer is B

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Problem 11

Under the Presumptive Method, you must set up numerous pools of unfunded vested liability. The first pool is set up at the end of the plan year preceding enactment of MEPPAA, which gives 12,000,000 at 12/31/79. Under the Presumptive method, the pools of liability are assumed to decrease 5% per year. The difference between the actual UVB and the expected amount for all prior pools of UVB creates a new pool of UVB.

At 12/31/80, the expected amount for the first pool is 95% of 12,000,000 or 11,400,000. The amount of the second UVB pool is the difference between 11,400,000 and the actual UVB of 10,000,000 at 12/31/80.

$$12/31/80: \quad 10,000,000 = 11,400,000 - 1,400,000.$$

At 12/31/81, the expected amount for the first pool is 90% of 12,000,000 or 10,800,000. The expected amount of the second UVB pool is 95% of -1,400,000 or -1,330,000. The amount of the third UVB pool is the difference between 10,800,000 - 1,330,000 and the actual UVB of 10,000,000 at 12/31/81.

$$12/31/81: \quad 10,000,000 = 10,800,000 - 1,330,000 + 530,000.$$

Employer A's share of these pools of 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:

$$\begin{aligned} & 10,800,000 * \frac{(24,000 + 20,000 + 18,000 + 14,000 + 12,000)}{(1,400,000 + 1,400,000 + 1,200,000 + 1,200,000 + 1,000,000)} \\ & - 1,330,000 * \frac{(25,000 + 24,000 + 20,000 + 18,000 + 14,000)}{(1,500,000 + 1,400,000 + 1,400,000 + 1,200,000 + 1,200,000)} \\ & + 530,000 * \frac{(25,000 + 25,000 + 24,000 + 20,000 + 18,000)}{(1,500,000 + 1,500,000 + 1,400,000 + 1,400,000 + 1,200,000)} \\ & = 10,800,000 (88/6200) - 1,330,000 (101/6700) + 530 (112/7000) \\ & = 141,721 \end{aligned}$$

After determining the UVB allocated to Employer A, 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 ($.0075 * 10,000,000 = 75,000$). 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 41,721 or 8,279. The final employer withdrawal liability is $141,721 - 8,279 = 133,442$.

answer is C

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Problem 12

In this problem you can not check the Full Funding Limitation, since you are not given the market value of assets. 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 $\text{UAL} = \text{O/S 412 bases} - \text{credit balance}$. The MFSA for this plan was established at 1-1-84, so the computation of the amortization period for the new base is as follows:

$$\begin{aligned} &\text{Greater of IAL period (} 30 - (88-84) = 26 \text{ years) ,} \\ &\quad \text{or lesser of (} 15 \text{ or PVL/L)} \\ &= 26 \text{ years} \end{aligned}$$

The method change base for 412 is the difference between the UAL under Unit Credit and the UAL under Entry Age Normal. The information about the original 412 bases and the credit balance at 12/31/87 can be used to calculate the expected UAL under Unit Credit at 12/31/87:

$$\begin{aligned} {}^e\text{UAL}_1 &= \text{O/S 412 bases} - \text{Credit balance} \\ &= 10,000 * \ddot{a}_{\overline{26}|.07} + 1,500 * \ddot{a}_{\overline{27}|.07} - 1,250 \\ &= 126,536 + 19,239 - 1,250 = 144,525 \end{aligned}$$

Actual UAL under Unit Credit at 01/01/88 including the 9,000 gain is $144,525 - 9,000 = 135,525$.

$$\text{EAN UAL}_1 - \text{U.C. UAL}_1 = 160,000 - 135,525 = 24,475 \text{ change base}$$

$$\text{CHG amortization payment} = 24,475 \div \ddot{a}_{\overline{26}|.07} = 1,934.$$

answer is D

Note that the answer asks for the 01/01/88 amortization charge.

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Problem 13

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.
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 100 or more participants, then the final deductible limit will be the UCL.

Section 404 deductible limit calculations

For a plan year starting 01/01/87, the deductible limit is calculated for the tax year starting 07/01/87. The deductible limit will get a full year's interest from 01/01/87 to 12/31/87.

$$\begin{aligned} &\text{Normal cost plus Limit adjustments} \\ &= 1.07 (40,000 + 300,000 \div \ddot{a}_{\overline{10}|1.07}) \\ &= 1.07 (40,000 + 39,919) \\ &= 85,513 \end{aligned}$$

Since you do not know the market value of assets, the Full Funding Limitation can be ignored for this problem.

Section 412 minimum contribution calculations

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

$$300,000 \div \ddot{a}_{\overline{30}|1.07} = 22,594$$

Minimum Funding Standards Account for 1987

<u>Charges</u>		<u>Credits</u>	
Normal cost	40,000	Credit balance	0
IAL amort	22,594	Max contrib 02/88	85,513
Interest	4,382	Interest	0
	<hr/>		<hr/>
	66,976		85,513

The contribution of 85,513 in the 1987 MFSA produces a credit balance of 18,537 at 12/31/87.

answer is C

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Problem 14

When the interest rate is changed, it is necessary to recalculate the annual amortization payment, as well as to calculate a new amortization base. This is true both under 404 maximum and 412 minimum contribution calculations. For Section 404 calculations, the new amortization base is calculated as the difference in the Accrued Liability due to the change in interest rate (see 1.404(a)-14(g)(2)). For minimum funding purposes, the new base is calculated as the difference in the "unfunded past service liability" due to the change in interest rate (see 1.412(b)-1(c)).

Since the maximum was paid at the end of each year, the O/S 404 bases should equal the expected amount based on a ten year interest amortization of the IAL:

$$\begin{aligned} \text{UAL} &= \text{O/S 404 bases} = 240,000 \left(\ddot{a}_{\overline{71}.08} \div \ddot{a}_{\overline{101}.08} \right) \\ &= 186,217 \end{aligned}$$

Since there was only a single old base, no complicated calculation of the remaining amortization period is necessary - just use seven years. The new base created by the change in interest rate is 150,000 - 130,000 or 20,000. The limit adjustment for the new base is based on 10 years:

$$\text{old base limit adjustment} = 186,217 \div \ddot{a}_{\overline{71}.07} = 32,293$$

$$\text{new base limit adjustment} = 20,000 \div \ddot{a}_{\overline{101}.07} = 2,661$$

$$\begin{aligned} &\text{Normal cost plus Limit adjustments} \\ &= 1.07 \left(20,000 + 32,293 + 2,661 \right) \\ &= 58,801 \end{aligned}$$

Since the FFL can be ignored, 58,801 is the final deductible limit.

answer is D

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Problem 15

According to Revenue Ruling 79-237, the normal cost and all amortization amounts should be pro-rated in the year of plan termination. Items that should not be pro-rated include:

- 412(b)(3)(A) Employer contribution
- 412(b)(3)(C) Amount of waived funding deficiency
- 412(b)(3)(D) Switch-back credit for AMFSA
- 412(b)(5) Interest on MFSA items
- 412(c)(6) Full Funding Limitation credit
- Beginning Credit Balance

The MFSA must be maintained through the end of the plan year that the plan is terminated. Since you do not know the market value of assets, the Full Funding Limitation can be ignored for this problem. The amortization of the IAL under Section 412 is based on 20 years, since $88 - 78 = 10$.

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} \\ \text{O/S 412 bases} &= \text{Credit balance} + \text{UAL} \\ &= 20,000 + 300,000 \\ &= (\text{IAL amortization}) * \ddot{a}_{\overline{20}|.07} \end{aligned}$$

$$\begin{aligned} \text{IAL amortization} &= 320,000 \div \ddot{a}_{\overline{20}|.07} \\ &= 28,230 \end{aligned}$$

Minimum Funding Standards Account for 1988

<u>Charges</u>		<u>Credits</u>	
Normal cost	$\frac{1}{2}$ (25,000)	Credit balance	20,000
IAL amort	$\frac{1}{2}$ (28,238)	Contrib 12/31	-0-
Interest	1,863	Interest	1,400
	<hr/>		<hr/>
	28,478		21,400

The contribution of zero in the 1988 MFSA produces a debit balance of 7,078 at 12/31/88.

answer is B

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Problem 16 - 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.
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 100 or more participants, then the final deductible limit will be the UCL.

1987 Section 404 deductible limit calculations

You are told that 1987 contribution equals the deductible limit for 1987 less the 1986 carryover. In order to calculate the deductible limit, you have to derive the value of the IAL based on the 6,000 amortization charge in the MFSA:

$$\begin{aligned} \text{IAL} &= 6,000 * \ddot{a}_{\overline{30}|.07} \\ &= 79,666 \end{aligned}$$

The limit adjustment equals 10 year amortization of the initial accrued liability:

$$\text{Limit Adjustment} = 79,666 \div \ddot{a}_{\overline{10}|.07} = 10,601$$

$$\text{Deductible limit} = 1.07 (9,000 + 10,601) = 20,973$$

Now the Full Funding Limitation must be checked under Section 404. The Full Funding Limitation is adjusted with interest to earlier of end of the plan year, or end of the tax year. If there are any carryover contributions for 404 purposes, then the FFL under 404 is increased by the unadjusted amount of the carryover contributions (see Revenue Ruling 82-125).

$$\begin{aligned} \text{FFL} &= 1.07 (\text{AL} + \text{NC} - \text{lesser MVA, AAV}) + \text{carryover} \\ &= 1.07 (95,000 + 8,000 - 90,000) + 2,000 \\ &= 1.07 (13,000) + 2,000 \\ &= 15,910 \end{aligned}$$

Since the FFL is less than the normal cost plus limit adjustments, the final deductible limit is 15,910. We should also check the 412 minimum contribution requirement to be sure that it is less than 15,910 - this will be shown later in the solution. The actual contribution for 1987 is 15,910 less 2,000 or 13,910.

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Problem 16 - Page 2

Section 412 minimum contribution calculations

Minimum Funding Standards Account for 1987

<u>Charges</u>		<u>Credits</u>	
Normal cost	9,000	Credit balance	10,000
IAL amort	6,000	Actual cont 12/31	13,910
Interest	1,050	Interest	700
	<hr/>		<hr/>
	16,050		24,610

This seems to imply that the credit balance is 24,610 - 16,050 or 8,560, but that may be incorrect. 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 is simply the charges of 16,050 in this problem.

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:

Let ADJ VALUE = lesser of (MVA, AAV) less the credit balance
 412 FFL = lesser of
 (i) 150% of EOY current liab - 1.07 * (ADJ VALUE - ben pmts)
 (ii) 1.07 * (Normal cost + Accrued Liability - ADJ VALUE)
 = 1.07 (8,000 + 95,000 - (90,000 - 10,000))
 = 24,610

The 412 FFL credit is defined as the excess of the accumulated funding deficiency based on zero contribution and zero credit balance over the FFL. There is no 412 FFL credit in this situation, so the credit balance of 8,560 is correct.

answer is B

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Problem 17 - Page 1

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 first step in the solution is to calculate the amount of the UAL, and then the Normal Cost for 1988. Then the amount of the waiver for 1988 can be determined, which will allow the MFSA to be set up for 1989. The remaining amortization period for the IAL is $30 - (88 - 81) = 23$.

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{credit balance} \\ &= (450,000 \div \ddot{s}_{30|0.07}) * \ddot{s}_{23|0.07} - 25,000 \\ &= 33,891 * \ddot{s}_{23|0.07} - 25,000 \\ &= 408,773 - 25,000 = 383,773 \end{aligned}$$

To set up the MFSA for 1988, you have to calculate the normal cost:

$$\begin{aligned} \text{PVNC} &= \text{PVFB} - \text{AAV} - \text{UAL} \\ &= 1,750,000 - 700,000 - 383,773 \\ &= 666,227 \\ \text{PVE/E} &= 16,000,000 \div 900,000 = 17.7778 \\ \text{NC} &= 666,227 \div 17.7778 = 37,475 \text{ at } 01/01/88 \end{aligned}$$

Minimum Funding Standards Account for 1988

<u>Charges</u>		<u>Credits</u>	
Normal cost	37,475	Credit balance	25,000
IAL amort	33,891	Actual cont 12/31	-0-
Interest	4,996	Interest	1,750
	<hr/>		<hr/>
	76,362		26,750

The debit balance at 12/31/88 is $76,362 - 26,750$ or $49,612$. This is the amount of the waiver base that is set up at 01/01/89. Since this waiver is granted after 1987, use a 5 year amortization period.

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Problem 17 - Page 2

amortization for 49,612 waiver = $49,612 \div 57.07 = 11,308$

Minimum Funding Standards Account for 1989

<u>Charges</u>		<u>Credits</u>	
Debit balance	49,612	Credit balance	-0-
Normal cost	40,000	Waiver credit	49,612
IAL amort	33,891		
Waiver amort	11,308	Min contrib 12/31	x
Interest	9,437	Interest	3,473
	<hr/>		<hr/>
	144,248		53,085+x

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

$$144,248 = 53,085 + x$$

$$x = 91,163$$

answer is E

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Problem 18

The sum of the defined benefit and defined contributions under IRC Section 415(e)(3) can't exceed 1.00. Since you are given the DC fraction of 40%, the DB fraction must be limited to 60%. The definition of the DB fraction is the ratio of the benefit under the plan to the lesser of (i) 140% of 3 year average compensation, or (ii) 125% of the maximum dollar benefit under IRC Section 415(b)(1)(A).

Smith is age 65 at 01/01/88, and the Social Security retirement age is also 65. With an effective date of 01/01/85, Smith's participation service under this plan will be three years at retirement. Based on the 01/01/85 date of hire, total service at retirement is three years.

1985 pay corresponds to age 62 = 100,000
1986 pay corresponds to age 63 = 130,000
1987 pay corresponds to age 64 = 170,000
3 year final average pay = 133,333

Projected plan benefit prior to limitations = 133,333

100% FAE3 Section 415 limit = 133,333
Reduce based on years of service less than 10 = $133,333 * (3/10)$
= 40,000

Social Security Retirement Age = 65 since born prior to 1938
Section 415 dollar limit during 1988 = 94,023 at age 65
Reduce based on years of participation less than 10 = $94,023 * (3/10)$
= 28,207

RB = maximum retirement benefit
 $60\% = RB \div (\text{lesser of } 1.25(28,207) \text{ or } 1.40(40,000))$
 $RB = 60\% (1.25 * 28,207)$
= 21,155

answer is B

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Problem 19 - Page 1

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.

Since you are given market values of assets and the Entry Age Normal valuation results, you must check the Full Funding Limitation in this problem. The determination of the Normal Cost under the Aggregate method in the 1988 valuation would have to take the waiver base under 412 into account. You can't verify this, so you must assume that the Normal Cost has been calculated correctly.

amortization for 30,000 waiver = $49,612 \div \bar{a}_{15|1.07} = 3,078$

Minimum Funding Standards Account for 1987

<u>Charges</u>		<u>Credits</u>	
Normal cost	18,000	Credit balance	-0-
Waiver amort	3,078	Actual cont 12/31	17,000
Interest	1,475	Interest	-0-
	22,554		17,000

This seems to imply that there is a debit balance of 22,554 - 17,000, or 5,554 but that may be incorrect. 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 is simply the charges of 22,554 in this problem.

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:

Let ADJ VALUE = lesser of (MVA,AAV) less the credit balance
 412 FFL = lesser of
 (i) 150% of EOY current liab - $1.07 * (\text{ADJ VALUE} - \text{ben pmts})$
 (ii) $1.07 * (\text{Normal cost} + \text{Accrued Liability} - \text{ADJ VALUE})$
 = $1.07 (25,000 + 170,000 - (178,000 - 0))$
 = 18,190

The 412 FFL credit is defined as the excess of the accumulated funding deficiency based on zero contribution and zero credit balance over the FFL. This excess is 22,554 - 18,190, or 4,364. Now set up the MFSA for 1987 reflecting the FFL credit.

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Problem 19 - Page 2

Minimum Funding Standards Account for 1987

<u>Charges</u>		<u>Credits</u>	
Normal cost	18,000	Credit balance	-0-
Waiver amort	3,078	Actual cont 12/31	17,000
		FFL credit	4,364
Interest	1,475	Interest	-0-
	<hr/>		<hr/>
	22,554		21,364

At 12/31/87 a funding deficiency of 1,190 exists. You are not told that a waiver was granted. You must assume that the entire debit balance is paid in the next year. Since the "old" FFL applied, the 412 amortization bases are eliminated in the 1988 MFSA:

Minimum Funding Standards Account for 1988

<u>Charges</u>		<u>Credits</u>	
Debit balance	1,190	Credit balance	-0-
Normal cost	22,000	Min contrib 12/31	x
Interest	1,623	Interest	-0-
	<hr/>		<hr/>
	24,813		x

This seems to imply that the minimum contribution is 24,813 but that may be incorrect. It is necessary to check the Full Funding Limitation for purposes of 412. The Accumulated Funding Deficiency based on no contribution and no credit balance must be calculated; this is simply the charges of 24,813 in this problem. The FFL calculation does not treat the debit balance as a negative credit balance:

$$\begin{aligned}
 412 \text{ FFL} &= \text{lesser of} \\
 &\quad (i) \text{ 150\% of EOY current liab} - 1.07 * (\text{ADJ VALUE} - \text{ben pmts}) \\
 &\quad (ii) 1.07 * (\text{Normal cost} + \text{Accrued Liability} - \text{ADJ VALUE}) \\
 &\quad = 1.07 (30,000 + 195,000 - (200,000 - 0)) \\
 &\quad = 26,750
 \end{aligned}$$

The 412 FFL credit is defined as the excess of the accumulated funding deficiency based on zero contribution and zero credit balance over the FFL. This excess is 24,813 over 26,750, which is less than zero. The FFL does not apply for 1988, and the minimum contribution is 24,813.

answer is B

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Problem 20

You are told that 5,000 of the 1987 contribution was deducted for 1986. The asset values shown in these problems are the assets used to calculate the contribution under IRC Section 412. This means that the asset values of 151,000 and 157,000 do not include the 5,000 deducted early under 404.

The Full Funding Limitation is adjusted with interest to earlier of end of the plan year, or end of the tax year. If there are any carryover contributions for 404 purposes, then the FFL under 404 is increased by the unadjusted amount of the carryover contributions (see Revenue Ruling 82-125). In this problem, the assets will be increased by the 5,000 that was deducted for 1986:

$$\begin{aligned}\text{FFL} &= 1.07(\text{AL} + \text{NC} - (\text{lesser MVA, AAV} + 5,000)) \\ &= 1.07 (170,000 + 57,000 - (151,000 + 5,000)) \\ &= 1.07 (71,000) \\ &= 75,970\end{aligned}$$

answer is C

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Problem 21

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 390,000 at 01/01/80 that has been reduced to 300,000 at 01/01/88. The change in interest rate produces a new 404 base of 40,000 at 01/01/88. The limit adjustment on the "old" base must be recalculated on the 7% interest rate. You must calculate the number of years of amortization remaining in the original 404 base at the 8% interest rate:

$$\text{Limit adjustment for IAL base} = 390,000 \div \ddot{a}_{\overline{10}|.08} = 53,816$$

$$\text{Remaining amort factor} = 300,000 / 53,816 = 5.5745$$

$$1.08 (1 - v^n) / .08 = 5.5745$$

$$(1 - v^n) = .4129$$

$$n (\log 1.08) = \log (.5871)$$

$$n = 6.920$$

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

$$\text{Limit adjustment for IAL base} = 300,000 \div \ddot{a}_{\overline{6.92}|.07} = 52,493$$

$$\text{Limit adjustment for chg base} = 40,000 \div \ddot{a}_{\overline{10}|.07} = 5,323$$

Normal cost plus Limit adjustments

$$= 1.07 (80,000 + 52,493 + 5,323)$$

$$= 147,463$$

answer is D

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Problem 22

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.

Since you are not given the Entry Age Normal valuation results, you can't check the Full Funding Limitation in this problem. The determination of the Normal Cost under the Aggregate method in the 1987 valuation must take the waiver base under 412 into account. The calculation must satisfy the formulas that are applicable to all reasonable funding methods (see 1.412(c)(3)-1 regulation):

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

At 12/31/86 a funding deficiency of 1,190 exists. You are not told that a waiver was granted. You must assume that the entire debit balance is paid in the next year. In calculating the normal cost, you can treat the debit balance as a negative credit balance.

$$\begin{aligned} \text{PVNC} &= \text{PVFB} - \text{AAV} - \text{O/S 412 bases} - \text{DB} \\ &= 100,000 - 60,000 - 5,000 - 1,000 \\ &= 34,000 \\ \text{PVE/E} &= 500,000 \div 100,000 = 5.00 \\ \text{NC} &= 34,000 \div 5.00 = 6,800 \text{ at } 01/01/87 \end{aligned}$$

$$\text{amortization for 1985 waiver} = 5,000 \div \ddot{a}_{\overline{15}|0.07} = 534$$

Minimum Funding Standards Account for 1987

<u>Charges</u>		<u>Credits</u>	
Debit balance	1,000	Credit balance	-0-
Normal cost	6,800	Min contrib 12/31	x
Waiver amort	534		
Interest	584	Interest	-0-
	<hr/>		<hr/>
	8,918		x

answer is C

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Problem 23

This problem is not difficult because you are told exactly what to do. Simply set up the MFSA and calculate the FFL and the Full Funding credit.

$$\text{amortization for IAL} = 400,000 \div 13.07 = 30,126$$

Minimum Funding Standards Account for 1987

<u>Charges</u>		<u>Credits</u>	
Normal cost	50,000	Credit balance	-0-
IAL amort	30,126		
Interest	5,609	Interest	-0-
	85,735		-0-

Based on the 12/82 proposed regulation, the Accumulated Funding Deficiency based on no contribution and no credit balance must be calculated. This is simply the charges of 85,735 in this problem.

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 FIL is an aggregate type method, the Entry Age Normal method must be used to calculate the FFL.

$$\begin{aligned}
 \text{Let ADJ VALUE} &= \text{lesser of (MVA, AAV) less the credit balance} \\
 412 \text{ FFL} &= \text{lesser of} \\
 &\quad (i) \text{ 150\% of EOY current liab} - 1.07 * (\text{ADJ VALUE} - \text{ben pmts}) \\
 &\quad (ii) 1.07 * (\text{Normal cost} + \text{Accrued Liability} - \text{ADJ VALUE}) \\
 &\quad = 1.07 (60,000 + 870,000 - (900,000 - 0)) \\
 &\quad = 32,100
 \end{aligned}$$

The 412 FFL credit is defined as the excess of the accumulated funding deficiency based on zero contribution and zero credit balance over the FFL. This excess is $85,735 - 32,100$, or 53,635.

answer is E

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Problem 24 - Page 1

The three benefit accrual rules must be tested for each formula. For a formula to fail the tests, it has to fail all three rules. For each of these tests the projected NRB is based on service continuing to NRA.

411(b)(1)(A) Three percent Rule

The minimum accrued benefit is 3% times years of participation (< 33.33) times the projected NRB. The NRB is based on the earliest possible entry age, with service to the earlier of 65 or NRA. If benefits are based on pay, use the highest 10 year final average earnings.

411(b)(1)(B) 133 1/3 percent Rule

The rate of benefit accrual for later plan years can't exceed 133 1/3 percent of the rate for earlier plan years. Any amendment to the plan which is in effect for the current year should be treated as in effect for all plan years.

411(b)(1)(C) Fractional Rule

The minimum accrued benefit is a fraction times the NRB. The NRB is based on level future pay equal to compensation that would be used to calculate the NRB for exit today. The fraction is the ratio of years of participation at separation to years of participation at NRA.

I. \$16 for first 10 years, \$21 for next 20 years, \$0 thereafter

This formula satisfies the 133 1/3% rule, since 21 is less than $1.333 * 16 = 21.33$.

II. \$12 for first 5 years, \$18 for next 10 years, \$24 for next 10 years, \$00 thereafter

This formula does not satisfy the 3% rule. The projected NRB for a participant who enters before age 40 is $12(5) + 18(10) + 24(10)$ which equals 480. The benefits should accrue at the rate of $.03(480)$ or 14.40 per year. The actual accrued benefit after one year of service is only 12.00.

This formula does not satisfy the 133 1/3% rule, since 18 is more than $1.333 * 12 = 16$.

This formula does not satisfy the fractional rule. The projected NRB for a participant who enters at age 40 is $12(5) + 18(10) + 24(10)$, which equals 480. The minimum accrued benefit after fifteen years of service should be $480 * (15 / 25) = 288$, but the actual accrued benefit after fifteen years of service is only $5(12) + 10(18) = 240$.

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Problem 24 - Page 2

III. \$16 for first 5 years, \$18 for next 10 years, \$25 for next 10 years, \$00 thereafter

This formula does not satisfy the $133 \frac{1}{3}\%$ rule, since 25 is more than $1.333 * 18 = 24$.

This formula does satisfy the 3% rule. The projected NRB for a participant who enters before age 40 is $16(5) + 18(10) + 25(10)$, which equals 510. The benefits should accrue at the rate of $.03(510)$ or 15.30 per year. The actual accrued benefit after fifteen years of service is $16(5) + 18(10) = 260$, and the minimum accrued benefit is $15.30(15) = 229.50$. The actual accrued benefit after twenty five years of service of 510 exceeds the minimum accrued benefit of $15.30(25) = 382.50$.

Formulas I and III satisfy the minimum benefit accrual rules.

answer is B

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Problem 25 - 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. This problem tests the method used to allocate the outstanding amortization bases 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.

The method of allocation is based on the fact that, for a plan with a non-zero UAL, the outstanding 412 amortization bases less the credit balance equals the 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 Accrued Liability under the cost method is calculated for each of the plans. In this problem, you are given the allocated credit balance, and you must allocate the O/S 412 bases between the plans.

Under the FIL method, the UAL is written down each year based on the formula for the expected UAL. At plan spinoff, the Entry Age Normal accrued liability is used to develop an allocation weight. This takes the accumulated experiences gains and losses of the spun off populations into account. The EAN AL is used to allocate the sum of the UAL and AAV, which is termed the "FIL accrued liability" in the revenue ruling. The market value of assets is used to allocate the AAV between the two plans. The difference between the allocated "FIL AL" and the allocated AAV is the allocated UAL. The O/S 412 amortization bases must equal the sum of the allocated UAL and the allocated credit balance.

$$\begin{aligned}\text{UAL} &= \text{O/S 412 bases} - \text{CB} \\ &= 100,000 - 20,000 \\ &= 80,000\end{aligned}$$

$$\begin{aligned}\text{"FIL AL"} &= \text{UAL} + \text{AAV} \\ &= 80,000 + 400,000 \\ &= 480,000\end{aligned}$$

		<u>Plan A</u>	<u>Plan B</u>
Given	(A) EAN AL	600,000	400,000
Allocated by (A)	(B) FIL AL	480,000	320,000
Given	(C) MVA	390,000	270,000
Allocated by (C)	(D) AAV	400,000	276,923
(B) - (D)	(E) UAL	80,000	43,077
Given	(F) CB	20,000	13,000
(E) + (F)	(G) O/S bases	100,000	56,077

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Problem 25 - Page 2

Now set up the MFSA for Plan B and calculate the minimum contribution. The amortization remaining on the IAL is $30 - (88 - 83) = 25$ years.

$$\text{amortization for IAL} = 56,077 \div \ddot{a}_{25|0.07} = 4,497$$

Minimum Funding Standards Account for 1988

<u>Charges</u>		<u>Credits</u>	
Normal cost	60,000	Credit balance	13,000
IAL amort	4,497	Min contrib 12/31	x
Interest	4,515	Interest	910
	<hr/>		<hr/>
	69,012		13,910+x

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

$$69,012 = 13,910 + x$$

$$x = 55,102$$

answer is C

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Problem 26 - Page 1

The key to this problem is that you should not assume the Alternative MFSA is used in 1988. This is based on the general conditions for the Enrollment exam. Since there is a funding deficiency at 12/31/87, and you are not told that a waiver is granted, you should amortize this over five years and put a switch-back credit in the MFSA.

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.
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 100 or more participants, then the final deductible limit will be the UCL.

Since you have no information on the market value of assets, you must ignore the Full Funding Limitation in this problem. Based on the 1.404(1)-14 regulations, if you were asked to calculate the deductible limit for 1987, you would compare the regular MFSA minimum funding requirement, not the AMFSA requirement.

Section 404 deductible limit calculations

In order to calculate the limit adjustment, you must determine the amount of the IAL. Use the equation of balance, but treat the funding deficiency as a negative credit balance:

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} + \text{DB} = 25,000 \\ &= (\text{IAL} \div \ddot{s}_{30\overline{1}.07}) * \ddot{s}_{26\overline{1}.07} + 12,000 \\ \text{IAL} &= 13,000 * (\ddot{s}_{30\overline{1}.07} \div \ddot{s}_{26\overline{1}.07}) = 13,641 \end{aligned}$$

$$\begin{aligned} \text{Normal cost plus Limit adjustments} &= 1.07 (15,000 + 13,641 \div \ddot{s}_{10\overline{1}.07}) \\ &= 1.07 (15,000 + 1,815) \\ &= 17,992 \end{aligned}$$

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Problem 26 - Page 2

Section 412 minimum contribution calculations

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

$$\text{IAL amortization} = 13,641 \div \ddot{a}_{\overline{30}|.07} = 1,027$$

$$\text{AMFSA switch-back} = 12,000 \div \ddot{a}_{\overline{5}|.07} = 2,735$$

Minimum Funding Standards Account for 1987

<u>Charges</u>		<u>Credits</u>	
Debit balance	12,000	Credit balance	0
Normal cost	15,000		
IAL amort	1,027	Min contrib 12/31	x
Switch-back amort	2,735	Switch-back credit	12,000
Interest	2,153	Interest	840
	<hr/>		<hr/>
	32,916		12,840+x

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

$$32,916 = 12,840 + x$$

$$x = 20,076$$

Since the minimum contribution under 412 exceeds the deductible limit under 404, the deductible limit becomes the same as the minimum. The reason this happened is that the five year amortization of the switch-back from the AMFSA has no direct effect on the calculation of the deductible limit under 404. The same effect occurs for funding waivers.

answer is D

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Problem 27

MOST ANSWER BOOKLETS SHOW THE CORRECT ANSWER AS B - SHOULD BE A!

The key aspect of the problem is the fact that there are annual collective bargaining agreements that expire on December 31 of each year. The IRC regulations at 1.412(c)(1)-2(g)(2)(i) state that a collective bargaining agreement that expires at the end of a plan year should be treated as being renewed by another agreement for the same term.

The effect of this provision with annual collective bargaining agreements is to delay for one year the amortization of both experience and shortfall gains and losses. In previous exam questions Fall 1986 # 16 and Fall 1985 #1, the correct answer range could be obtained by working the problem incorrectly, which would mean immediate amortization of experience and shortfall gains and losses.

The 1986 CBA expires 12/31/86, so it is treated as if it expires on 12/31/87 for purposes of determining amortization periods. Neither the shortfall G/L nor the experience G/L for 1986 would be amortized in 1987.

$$\begin{aligned}\text{Annual computation charge} &= 1.07(\text{NC} + \text{IAL} / \ddot{a}_{\overline{30}|.07}) \\ &= 1.07(20,000 + 200,000 / \ddot{a}_{\overline{30}|.07}) \\ &= 1.07 (20,000 + 15,063) = 37,517\end{aligned}$$

$$\begin{aligned}\text{Actual hours} &= \$45,000 / (6 \text{ ees} * 5\$/\text{hr}) = 1,500 \text{ per ee} \\ \text{Estimated hours} &= 1,600 \text{ per ee} \Rightarrow 6 * 1,600 = 9,600\end{aligned}$$

$$\text{Estimated unit charge} = 37,517 / 9,600 = 3.9081$$

$$\begin{aligned}\text{Net shortfall charge} &= 3.9081 (6 \text{ ees} * 1,500 \text{ per ee}) = 35,172 \\ \text{Shortfall G/L 1987} &= 37,517 - 35,172 = 2,345 \text{ loss}\end{aligned}$$

$$\text{Directly calculate this as } [(1,500 / 1,600) - 1.0] * 37,517$$

answer is A

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Problem 28

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:

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

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 employee portion is $(880,000 - 840,000) * (220,000 / 730,000)$, which equals 12,055. The residual assets that revert to the employer are $40,000 - 12,055 = 27,945$.

answer is D

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Problem 29

The only hard part of this problem is determining the remaining amortization periods and the amortization amounts. You are given the outstanding bases for the IAL, a plan amendment and a waiver. Use the equation of balance to calculate the credit balance at 12/31/87:

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} \\ \text{CB} &= \text{O/S 412 bases} - \text{UAL} \\ &= (200,000 - 80,000 + 50,000) - 150,000 \\ &= 20,000 \end{aligned}$$

At 1/1/76, the IAL was amortized over 40 years, 28 years remain at 1/1/88. At 1/1/82, the plan amendment was amortized over 30 years, 24 years remain. At 1/1/84, the waiver was amortized over 15 years, 11 years remain.

$$\text{amortization for 1976 IAL} = 200,000 \div \ddot{a}_{28|1.07} = 15,400$$

$$\text{amortization for 1982 amend} = -80,000 \div \ddot{a}_{24|1.07} = -6,519$$

$$\text{amortization for 1983 waiver} = 50,000 \div \ddot{a}_{11|1.07} = 6,232$$

Minimum Funding Standards Account for 1988

<u>Charges</u>		<u>Credits</u>	
Normal cost	20,000	Credit balance	20,000
IAL amort	15,400	Min contrib 12/31	x
Waiver amort	6,232	Amend amort	6,519
Interest	2,914	Interest	1,856
	<hr/>		<hr/>
	44,546		28,375+x

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

$$44,546 = 28,375 + x$$

$$x = 16,171$$

answer is A

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Problem 30

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 01/01/87, Smith has one year of participation at 01/01/88.

	Accrued Benefit as of	
	01/01/88	01/01/89
Years of service	29	30
2% * service * 200,000	116,000	120,000
100% 3 yr FAE	200,000	200,000
Pro-rate for years of service < 10	200,000	200,000
94,023 maximum	94,023	94,023
Years of participation	1	2
Pro-rate for years of participation < 10	9,402	18,805
10,000 minimum	10,000	10,000
Pro-rate for years of service < 10	10,000	10,000
Lesser of plan ben, or 415 maximum, but not less than 10,000 minimum	10,000	18,805

The benefit accrual during the year is 8,805. If you wanted to simply say the answer was 9,402, you should realize that is TOO easy.

answer is D

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Problem 31 - 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.

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 500,000 - 50,000, or 450,000. The PV of accrued benefits is 400,000, which is less. You already given 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	500,000	300,000	200,000
PV of accrued benefits	400,000	300,000	100,000
Excess of MVA over PVAB	100,000	-0-	100,000
Allocated credit balance	50,000	-0-	50,000

The actuarial value of assets should be allocated between the spun-off plans in accordance with the market values of assets for each plan. If one of the resulting plans has no Unfunded Accrued Liability, then none of the Section 412 amortization bases will be allocated to that plan.

	<u>Plan A</u>	<u>Plan B</u>	<u>Plan C</u>
Allocated market value	500,000	300,000	200,000
Allocated actuarial value	500,000	300,000	200,000
Accrued liability	600,000	500,000	100,000
Unfunded Accrued Liability	100,000	200,000	-0-

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.

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} \\ \text{UAL} + \text{CB} &= \text{O/S 412 bases} \\ 200,000 + 0 &= 250,000 - 100,000 + \text{new base} \\ \text{new base} &= 50,000 \end{aligned}$$

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Problem 31 - Page 2

The amortization period for the new base is the greater of 15 years, or the period that would result if the existing bases were combined and offset. You are given the remaining amortization periods for the combined amortization charges and credits. If the bases are offset, the result would be a charge base of 150,000, which also would be assigned the 29 year amortization period for the previous charges.

$$\text{amortization for charge bases} = (250,000 + 50,000) \div \ddot{a}_{29|0.07} = 22,836$$

$$\text{amortization for credit bases} = 100,000 \div \ddot{a}_{15|0.07} = 10,261$$

Minimum Funding Standards Account for 1987

<u>Charges</u>		<u>Credits</u>	
Normal cost	50,000	Credit balance	-0-
Charge amort	22,836	Credit amort	10,261
Interest	5,099	Min contrib 12/31	x
		Interest	718
	<hr/> 77,935		<hr/> 10,979+x

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

$$77,935 = 10,979 + x$$

$$x = 66,956$$

answer is C

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Problem 32

This is a very simple PBGC guaranteed benefit question, as long as you understand the concept of "Normalization". This is the process of converting benefits available under earlier sets of plan provisions to equivalent benefit amounts based on the plan provisions in effect at date of plan termination.

This is a necessary step, otherwise you would be comparing apples and oranges. It is not possible to compare a five year certain and life benefit directly to a life annuity form. If the benefits are converted to the same form of benefit payment, then you can calculate the increase in value directly.

At 01/01/89, Smith has 25 years of service and is age 55. The benefit under the 01/01/76 plan has been in effect for more than five years, and it is fully guaranteed.

01/01/76 plan benefit - life annuity basis	450.00 = \$18.00 * 25 years
01/01/76 plan benefit - 5 year C+C basis	438.75 = 450.00 * .975

Since the 01/01/76 benefit was payable on a life annuity, it must be converted to the five year C+C basis to be compared with the 04/01/86 benefit.

04/01/86 plan benefit - 5 year C+C basis	500.00 = \$20.00 * 25 years
--	-----------------------------

Neither of these benefits is affected by the PBGC monthly maximum of \$1,909 for 1988. The guaranteeable benefit increase is the difference of \$61.25 per month. Since the 04/01/86 benefits have been in effect for two full years, this benefit increase is phased in at the rate of the greater of \$40.00 or 40% (monthly). The \$40.00 is never adjusted for different forms of benefit payment.

The final monthly guaranteed benefit is $438.75 + 40.00 = 478.75$.

answer is D