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2011 EA-2B EXAM SOLUTIONS

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2011 EA-2B Exam Solutions

These solutions were prepared based on the law as in effect at December 31, 2010.

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!

Revision History:

February 16, 2016	Revised solution for problem 22
April 23, 2014	Revised solution for problem 31
April 12, 2013	Revised solution for problem 43
March 19, 2013	Revised solutions for problems 13, 23, 33, 39, 44 and 45
April 27, 2012	Revised solutions for problems 8, 17 and 24
April 7, 2012	Revised solutions for problems 29 and 37
February 27, 2012	Original solutions

NOTES on 2011exam

The 2011 exam was not a typical exam in terms of difficulty. I think this exam was much trickier than earlier years' exams.

<u>Exam Year</u>	<u>Pass Mark</u>	<u>Percentage Who passed</u>	
2011	63	39.2	
2010	69	43.7	
2009	68	59.1	(not a typo!)
2008	63	37.2	
2007	59	39.2	

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Problem 1

TRUE

In general, amendments are allowed as long as they do not decrease (or restrict) benefits. This is typically done when the employer wants to increase benefits to reduce any excise tax on a reversion.

See PBGC regulation 4041.8.

Answer is A

Problem 2

TRUE

In Q&A-11 of Notice 2008-30, it states that spousal consent is normally required for a participant to elect out of the QJSA. But it then refers to a regulation that does allow for the specific case mentioned in this question:

"A-11. In general, spousal consent is required for a participant to waive a plan's QJSA form of distribution and elect an alternative distribution form. However, § 1.401(a)-20, Q&A-16, provides that a participant may elect out of the QJSA, in favor of an actuarially equivalent alternative joint and survivor annuity that satisfies the conditions to be a QJSA, without spousal consent."

Answer is A

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Problem 3

TRUE

In general, any sale, exchange or leasing of property between the plan and a disqualified person is a prohibited transaction under 4975(c)(1)(A).

Answer is A

Problem 4

FALSE

There is no requirement in the law that changes the effective date of an amendment to match the date that the AFTAP is certified. If the plan is subject to the 436(c) restriction, then the effective date of the amendment is not relevant. The amendment can not go into effect until the restriction is lifted.

Answer is B

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Problem 5

TRUE

In general, any transfer to, or use by or for the benefit of, a disqualified person of the income or assets of a plan is a prohibited transaction under 4975(c)(1)(D).

Answer is A

Problem 6

TRUE

§4980(a) of the Internal Revenue Code states that the excise tax upon reversion is 20%.
§4980(d) states that the excise tax increases to 50% unless either

-) The employer establishes a “qualified replacement plan”, or
-) The employer grants certain benefit increases prior to plan termination.

The general definition of a qualified replacement plan includes 95% participation by continuing employees from the terminating plan, plus an asset transfer of at least 25% of the excess assets. You can reduce the 25% asset transfer by the value of benefit improvements made within the 60 days ending on the date of plan termination.

Since the replacement plan only covers 90% of the existing participants, it does not meet the definition of a “qualified replacement plan”. The excise tax remains at 50%.

Answer is A

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Problem 7

TRUE

The term “complete withdrawal” is defined in ERISA Section 4203(a):

"Act Sec. 4203. (a) For purposes of this part, a complete withdrawal from a multiemployer plan occurs when an employer—

- (1) permanently ceases to have an obligation to contribute under the plan, or*
- (2) permanently ceases all covered operations under the plan."*

Answer is A

Problem 8

Revised 04/27/12

TRUE

The key point of the problem is that companies A and B are members of a controlled group. In IRC 414(q)(2), it states that for purposes of various sections (including IRC 411), all employees of all corporations which are members of a controlled group are treated as employed by a single employer.

You must include the period of time that the employee worked for Company B when determining service under Company A's pension plan. Smith gets full credit for the years prior to 2012. They have 15 years of vesting service at 01/01/2012, so they are 100% vested under any vesting schedule that satisfies IRC 411.

Answer is A

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Problem 9

TRUE

Separate accounting is a requirement for plans which offer voluntary contributions. See IRC 411(b)(3).

Answer is A

Problem 10

FALSE

This problem states what everyone had hoped for (no 436 restrictions at termination), but the final regulations state that all 436 restrictions remain in force at termination. The only exception is that the plan is allowed to purchase annuities to implement the termination (which overrides the 436(d) restriction).

Answer is B

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Problem 11

FALSE

In the regulation at 1.410(b)-6(f)(1), it specifies that a terminating employee may be excludable if they satisfy six criteria:

1. Employee does not benefit under the plan for the year
2. Employee is eligible to participate
3. The plan has a minimum period of service, or a requirement of being employed on the last day to receive an allocation
4. Employee fails to receive an allocation due to failure to satisfy item 3
5. Employee terminates with no more than 500 hours, and is not an employee on last day of the plan year
6. If this paragraph is applied to any employee, it is applied to all employees for the year

Smith is an hourly employee, and is covered by Plan B. This question refers to 410(b) coverage testing for Plan A.

Since the plans are not aggregated for testing, Smith does not satisfy criteria number two above. As a result, Smith must be treated as a non-excludable employee for testing Plan A.

Answer is B

Problem 12

FALSE

This question tests a tiny detail from the instructions for the PBGC Comprehensive premium package. Normally an election to use (or revoke) the Alternative Premium Funding Target is made as part of the comprehensive premium filing.

If an election (or revocation) is not made as part of the comprehensive filing, it may be made as part of an amended filing only if (1) the original comprehensive filing was made before the due date and (2) the amended filing was made on or before the due date. The plan in this question has 450 participants, which is a mid-size plan. The filing date for both the flat rate premium and the variable rate premium is October 15th during the plan year.

The problem states the estimated filing is made on 10/15/2010. Any amended filing must be after the due date of October 15. An election to use the Alternative Premium Funding Target can not be made as part of that filing, since it would be too late.

Answer is B

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Problem 13

Revised 03/19/13

FALSE

This prohibited transaction rule has been tested often on the enrollment exams. The 10% limitation in ERISA section 407(a) applies to qualified employer securities and qualified employer real property. There is no prohibited transaction, as long as the investment does not exceed 10% at the time of acquisition of the security.

The limitation is that the total stock (after the purchase) could not exceed 10% of the assets. Just eyeballing the data in the problem, the plan will have about 5% of the assets in employer stock after purchasing 400,000 more.

Answer is B

NOTE

The actual percentage is slightly larger:

$$5.06\% = (400,000 + 50,000)/(400,000 + 8,500,000)$$

The plan can purchase twice as much stock without hitting the 10% limitation. You can solve for the exact amount of additional stock that can be purchased:

$$10.0\% = (X + 50,000)/(X + 8,500,000)$$

$$.1X + 850,000 = X + 50,000$$

$$800,000 = .9X$$

$$X = 888,889$$

Problem 14

FALSE

Under IRC 436(d), no “prohibited payments” can be made unless the AFTAP is between 60% and 80%. The definition of “prohibited payments” includes any payment in excess of the monthly straight life annuity benefit.

Answer is B

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Problem 15

FALSE

In a standard termination, the assets must be sufficient to cover all benefit liabilities at the date of distribution of assets. But it is possible for assets to be insufficient at the termination date.

There are two ways to make the plan sufficient:

-) The plan sponsor can sign a commitment to make the plan sufficient
-) A majority owner can elect to forgo receipt of plan benefits to the extent necessary to make the plan sufficient

Answer is B

Problem 16

Similar to 2007 #2

FALSE

The regulation has a detailed description of the reportable event. Since the distribution is due to the substantial owner's death, a reportable event has not occurred:

“4043.27(a) **Reportable event.** A reportable event occurs for a plan when --

- (1) There is a distribution to a substantial owner of a contributing sponsor of the plan;
- (2) The total of all distributions made to the substantial owner within the one-year period ending with the date of such distribution exceeds \$10,000;
- (3) The distribution is not made by reason of the substantial owner's death; and
- (4) Immediately after the distribution, the plan has nonforfeitable benefits (as provided in § 4022.5) that are not funded.”

Answer is B

Note that there are also several waivers for this reportable event at 4043.27(c).

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Problem 17

Similar to 2009 #7

Revised 04/27/12

TRUE

IRC Section 411(a)(8) defines normal retirement age as the earlier of

1. Attainment of "normal retirement age" as defined under the plan, or
2. The later of
 -) Attainment of age 65 or
 -) 5th anniversary of participation date

This definition requires that the participant's normal retirement age can be no later than attainment of age 65 and the 5th anniversary of participation. The definition in the problem is allowable, since normal retirement age would be no later than attainment of age 64 and the 4th anniversary of participation.

Answer is A

Problem 18

TRUE

The safe harbor for unit credit plans at 1.401(a)(4)-3(b)(3) requires the plan to meet the 133 1/3% benefit accrual rule of §411(b)(1)(B). This requires that the rate of benefit accrual for any year can be no greater than 4/3 of any earlier year's rate of benefit accrual.

This is a front loaded plan, since the accrual rate for the earlier years is higher than the accrual rate for later years. This plan meets the safe harbor, since the ratio of later accrual rates to earlier years is less than 100%.

Answer is A

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Problem 19

TRUE

There have been many earlier exam questions on the regulations governing standards of performance of enrolled actuaries. This one tests a very tiny detail in the 901.13 regulation:

"(f) Denial of enrollment. An applicant may be denied enrollment if:

(1) The Joint Board finds that the applicant, during the 15-year period immediately preceding the date of application and on or after the applicant's eighteenth birthday has engaged in disreputable conduct. The term disreputable conduct includes, but is not limited to:

(i) An adjudication, decision, or determination ... that the applicant has engaged in conduct evidencing fraud, dishonesty or breach of trust.

...

(vi) Contemptuous conduct in connection with matters before the Department of the Treasury, or the Department of Labor, or the Pension Benefit Guaranty Corporation including the use of abusive language ..."

Assume that you were previously an enrolled actuary, and the Joint Board denies your application for renewal. The result is that your enrollment has been terminated.

Answer is A

Problem 20

TRUE

Normally an election to use (or revoke) the Alternative Premium Funding Target is made as part of the comprehensive premium filing. Once the election to use the Alternative Premium Funding Target has been made, it can't be revoked for a period of five years.

The point of the question is that the plan sponsor has not previously made this election. If they had made that election, then they could not have calculated the variable rate premium using the Standard Premium Funding Target in 2011.

Answer is A

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Problem 21 - Page 1

The main point of this problem is calculating the additional contribution under IRC 436 to allow the plan amendment to go into effect. To do this, you must know the rules in the 436 regulation regarding computation of the presumed adjusted funding target, presumed adjusted funding target attainment percentage (AFTAP) and the interim adjusted value of assets.

Presumed adjusted funding target

In this problem, the 2011 valuation has not been performed yet. The 2010 AFTAP was certified as 95%. Prior to April 1, 2011, the presumed AFTAP has the same value as the 2010 AFTAP, or 95%.

If the 2011 AFTAP is not certified by April 1, 2011, the presumed AFTAP would still be 95% - it would not be subject to the "10% haircut" in the regulations. This is only done if the presumed AFTAP crosses the boundary values of 60% or 80%.

Under the regulation, you must derive a value for the funding target that corresponds to the value of the presumed AFTAP:

Presumed adjusted FT = (Interim value of adjusted assets) / (presumed AFTAP)

Interim value of adjusted assets

The interim value of adjusted assets is defined as the valuation assets minus three items:

-) Carryover balance (CB)
-) Prefunding balance (PB)
-) Value of any receivable contribution for the prior plan year

This calculation is not complicated, because both balances are equal to zero. In addition, there are no receivable contributions for 2010. You are given the market value of assets as 100,000. You can safely assume that the actuarial value of assets at January 1, 2011 is equal to the market value of 100,000.

Interim value of

Adj assets = AAV - CB - PB - (PV of 2010 receivable)
 = 100,000

Presumed adj FT = 100,000 / 95%
 = 105,263

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Problem 21 - Page 2

Deemed reduction in CB / PB

The presumed adjusted funding target is a totally fictitious amount that corresponds to the presumed AFTAP. The regulation at 1.436-1(g)(2)(ii) says the rules in 1.436-1(a)(5) (deemed elections to reduce the CB and PB) must be applied based on the presumed AFTAP.

This problem is simplified, because both balances are equal to zero. As a result, there is no deemed reduction in either balance.

Presumed AFTAP after plan amendment

After the plan amendment goes into effect, the funding target will increase by 40,000. The revised presumed adjusted funding target is 145,263 (40,000 + 105,263). You can calculate the resulting presumed AFTAP based on the AAV at the valuation date:

Post-amendment

$$\begin{aligned}\text{Presumed AFTAP} &= 100,000 / 145,263 \\ &= 68.84\%\end{aligned}$$

Unless an additional IRC 436 contribution is made, the plan amendment can not go into effect. You can calculate the necessary asset value so that the revised presumed AFTAP is equal to 80%. After the additional IRC 436 contribution is made, the asset value is equal to 100,000 + X.

Desired value of

$$\begin{aligned}\text{Presumed AFTAP} &= 80.0\% \\ &= (100,000 + X) / 145,263\end{aligned}$$

$$\begin{aligned}100,000 + X &= 145,263 * 80\% \\ X &= 16,211\end{aligned}$$

Answer is A

NOTE

The problem specifies X as the present value of the contribution instead of the amount of the contribution paid. Since the AAV is given at the valuation date, you would have to determine the present value of any additional IRC 436 contribution paid after the valuation date. The problem would have to state the date of payment of the contribution, as well as the 2011 effective interest rate.

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Problem 22

Similar to 2010 #3

Revised 02/16/16

§4980(a) of the Internal Revenue Code states that the excise tax upon reversion is 20%.

§4980(d) states that the excise tax increases to 50% unless either

-) The employer establishes a “qualified replacement plan”, or
-) The employer grants certain benefit increases prior to plan termination.

The general definition of a qualified replacement plan includes 95% participation by continuing employees from the terminating plan, plus an asset transfer of at least 25% of the excess assets. You can reduce the 25% asset transfer by the value of benefit improvements made within the 60 days ending on the date of plan termination.

Instead of establishing a “qualified replacement plan”, the plan can grant benefit increases at plan termination. The benefit improvements must meet three criteria:

-) Present value 20% of the reversion (prior to the benefit changes)
-) Uniform for all participants
-) Benefit increases for non-active participants can not exceed 40% times [20% of the reversion (prior to the benefit changes)]

I. TRUE

As described above, unless the plan sponsor takes action, the excise tax is 50%.

II. FALSE

This part of the problem states that the plan sponsor uses 300,000 to increase benefits, which is 30% of the initial reversion. As a result, the excise tax is reduced to 20%:

$$\begin{aligned}\text{Tax on reversion} &= 20\%(1,000,000 - 300,000) \\ &= 140,000\end{aligned}$$

III. TRUE

This part of the problem states that the plan sponsor makes an asset transfer of 300,000 to a qualified replacement plan, which is 30% of the initial reversion. As a result, the excise tax is reduced to 20%:

$$\begin{aligned}\text{Tax on reversion} &= 20\%(1,000,000 - 300,000) \\ &= 140,000\end{aligned}$$

Only items I and III are true.

Answer is B

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Problem 23 - Page 1

§411(c)(2) of the IRC defines the calculation of the employee provided accrued benefit. After the passage of OBRA '89, the §417(e) interest rate is used to accumulate the employee contributions plus interest (EECWI) from the determination date to normal retirement age. The resulting EECWI is converted to an annual annuity by dividing by an annuity at the §417(e) interest rate. For a normal form other than a life annuity, factors in Revenue Ruling 76-47 were used to adjust the resulting benefit.

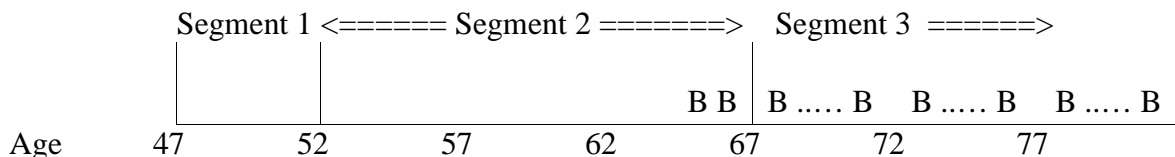
Prior exam problems essentially tested the definitions as they existed prior to PPA 2006, or gave you all the factors that you needed. After the passage of PPA 2006, the §417(e) segment rates are used to accumulate the employee contributions.

This problem has been simplified compared to prior problems on EECWI calculations. You are given very little data, and don't even know Smith's hire date. You have to think carefully to figure out how to use the information given in the problem.

The next step is to calculate each year's employee contributions with interest, and then the amount of the employee provided accrued benefit. Smith apparently started making contributions in 2008:

Year	12/31			EECWI Calculation
	contrib	120% AFR	12/31 EECWI	
2008	1,000	4.31%	1,000.00	
2009	1,000	2.48%	2,024.80	$= 1.0248 * 1,000.00 + 1,000$
2010	Zero	2.95%	2,084.53	$= 1.0295 * 2,024.80 + 0$

You are told that Smith is age 45 at 12/31/08, so they are age 47 at 12/31/10. The point of the problem is that both ages 65 and 66 fall within the second segment of the yield curve:



You must convert the mandatory contribution balance to a benefit at normal retirement age, which is 18 years later. The EECWI at 12/31/10 is accumulated with interest at the §417(e) segment rates until normal retirement age 65.

It seems clear that the conversion of the EECWI at age 65 will be based on the given annuity value of 11.93, which presumably reflects the 2nd and 3rd segment interest rates. What is not so clear is how you adjust the 12/31/10 EECWI up to age 65. My first two guesses were to accumulate for 18 years using either 5.19% or 5.67% - but I was wrong.

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Problem 23 - Page 2

Revised 03/19/13

The point of the problem is that you can back into the correct factor by using the deferred annuity that is given in the problem. The deferred annuity factor of 4.28 does not reflect any pre-retirement mortality. The interest accumulation for age 47 to age 65 is 2.7874, which equals $11.93/4.28$.

Now you can calculate the accrued benefit attributable to employee contributions:

EECWI at 12/31/10	2,084.53
417(e)(3) accumulation	2.7874
EECWI at 65	5,810.38
Annuity at NRA	11.93
EE provided benefit	487.04

The monthly employee-provided benefit is 40.59, which equals $487.04/12$.

Answer is D

NOTES:

1. There is no formal guidance from the IRS on how to do the calculation of the employee provided accrued benefit where the 417(e) rates are defined as the segment interest rates. I was surprised that they asked this question on the exam.
2. There is a simpler approach to work this problem. You can think of the EECWI in a similar fashion to a cash balance account. You can calculate the employee provided benefit directly by using the deferred annuity factor. The employee-provided annual benefit at age 65 is 487.04, which equals $2,084.53/4.28$. The monthly benefit is 40.59.
3. One thing that annoyed me about this problem is that some of the data values seem “fishy”. I compared the accumulation factor to age 65 of 2.7874 to the results based on both the 2nd and the 3rd segment rates. It seems unlikely to me that the correct value is actually greater than both of these results. If you use either of these values to calculate the EECWI account at 65, you get the wrong answer (range C).

Only use 2nd segment rate for 18 years
 $2.4862 = (1.0519)^{18}$

Only use 3rd segment rate for 18 years
 $2.6986 = (1.0567)^{18}$

Problem 24

Revised 04/27/12

The key to this problem is what "the minimum qualified pre-retirement death annuity" means. This refers to the qualified pre-retirement spouse annuity (QPSA). This is an annuity type similar to a qualified joint and survivor annuity, which is defined in 417(b)(1) as a joint and survivor annuity of at least 50%.

In 417(c)(1)(A)(ii), if the participant dies prior to their earliest retirement age, the annuity should commence at that earliest retirement age. Based on the plan provisions, Smith's earliest retirement age is 65. The reason is that they only had 9 years of service at death. The QPSA is based on benefit commencement at age 65.

There is a trick in the wording to this question. The problem states that the plan has two optional payment forms: 100% J&S and 50% J&S. The problem does not specify the amount of the Qualified J&S benefit defined under the plan, so you don't know if the death benefit uses the 50% or 100% continuation.

The trick is that a qualified plan must have both a Qualified Joint and Survivor annuity (QJSA) and a Qualified Optional Survivor annuity (QOSA). Under 417(g), the definition of the QOSA requires that the death benefit percentage is related to the QJSA death benefit percentage in the following way:

-) QOSA percentage must equal 75% when the QJSA percentage is less than 75%
-) QOSA percentage must equal 50% when the QJSA percentage is 75% or greater

The plan does not offer a J&S continuation of 75%. In order to satisfy 417(g), you must assume that the QOSA continuation is 50%, and the QJSA continuation is 100%. Under 417(c), the definition of the QPSA requires that the death benefit percentage is greater than or equal to the QJSA death benefit percentage. The minimum amount of the QPSA is equal to 100%.

Based on benefit commencement at age 65, the 100% J&S reduction factor is .80. The resulting QPSA benefit payable to the spouse is $800 = .80(100\%)(1,000)$.

Answer is E

NOTE

This is a very confusing (and overly tricky) question. One way to get it wrong is to set up the QOSA with a 75% continuation. That does seem to satisfy the relationships described above for both the QJSA and the QPSA. But there is a major flaw in the reasoning – the 75% QOSA would mean the plan has three optional forms of payment, which contradicts the information given in the problem.

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Problem 25

Similar to 2010 #22

This is a very simple problem on calculating the variable rate premium (VRP). The key point is knowing the definition of the variable rate premium cap.

The unfunded vested benefits liability (UVB) is calculated as the excess of the premium funding target over the market value of assets. The market value includes the present value of any prior year contributions that are received by the date the premium filing. The contributions are discounted using the prior year's effective interest rate.

Ignoring the cap, you calculate the variable rate premium as .009 times the UVB. The UVB must be rounded up to the next higher multiple of 1,000:

$$\begin{aligned}\text{UVB} &= 2,180,000 - 1,300,000 \\ &= 880,000\end{aligned}$$

$$\begin{aligned}\text{VRP} &= 880,000 * .009 \\ &= 7,920\end{aligned}$$

The plan is eligible for the cap if there are 25 or less employees on the first day of the plan year. On 12/31/2010, you are told there are 24 active participants, plus 14 non-active participants. Since the total employee count is less than 25, the plan is eligible for the VRP cap.

The variable rate premium cap is calculated based on the number of plan participants, and it is equal to $\$5 * (\text{participant count})^2$. Based on the 12/31/2010 data, the total participant count is 38, which is $24 + 14$:

$$\begin{aligned}\text{VRP cap} &= 5(38)^2 \\ &= 7,220\end{aligned}$$

The VRP cap of 7,220 is less than the previously calculated value of 7,920. The problem asks for the total PBGC premium, which is the sum of the flat rate premium (FRP) and the VRP. The JBEA tables given with the exam stated that the 2011 flat rate premium is \$35 per participant:

$$\begin{aligned}\text{FRP} &= \$35(38) \\ &= 1,330\end{aligned}$$

$$\begin{aligned}\text{FRP+VRP} &= 1,330 + 7,220 \\ &= 8,550\end{aligned}$$

Answer is D

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Problem 26

I. FALSE

ERISA 101(f) requires an annual funding notice. It must be provided annually.

II. TRUE

This is almost a direct quote from ERISA 101(f)(2)(B)(i)(I):

“in the case of a single-employer plan, a statement as to whether the plan's funding target attainment percentage (as defined in section 303(d)(2)) for the plan year to which the notice relates, and for the 2 preceding plan years, is at least 100 percent (and, if not, the actual percentages)”

III. TRUE

This is almost a direct quote from ERISA 101(f)(2)(B)(iv):

“a statement setting forth the funding policy of the plan and the asset allocation of investments under the plan (expressed as percentages of total assets) as of the end of the plan year to which the notice relates”

Only items II and III are true.

Answer is D

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Problem 27 - Page 1

Similar to 2009 #27

This is a typical PBGC guaranteed benefits question. This question tests your knowledge of the five year phase-in calculations.

Guaranteed benefits are based on the vested accrued benefits of the plan participants. 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.

The PBGC maximum monthly guaranteed benefit (MGB) is defined as the lesser of the adjusted ERISA §4022(b) value, or the highest five year consecutive compensation. The MGB is defined assuming payment on a life annuity basis at age 65.

One key point of the problem is that you use the 2011 MGB value, since the termination date is 01/01/2011. The 2011 MGB at 65 is 4,500.00 (from the tables given with the exam).

Another key point of the problem is that you must reduce the MGB for benefit commencement ages before 65. The MGB should be adjusted based on the later of the age at DOPT, or the age at benefit commencement. Based on the PBGC study note, it is correct to age adjust the MGB, even when it is based on the highest five year compensation.

The problem implies that the 2008 plan amendment was effective on 01/01/2008. For purposes of measuring the years that each plan was effective, you use the later of the effective date and the adoption date. The 01/01/08 plan has been in effect for three full years at DOPT, from 01/01/08 to 12/31/11.

The plan was amended on 01/01/2009 to freeze benefit accrual service. Since it did not change the rate of benefit accrual, this amendment is handled differently.

	Smith	Jones
Date of birth	01/01/55	01/01/80
01/01/11 age	56	31
Date of hire	01/01/90	01/01/05
Vesting service	21	6
Eligible for early retirement?	YES	NO
Assumed retirement age	56	65
Benefit accruals frozen	01/01/09	01/01/09
Benefit accrual service	19	4
Majority owner?	NO	NO
Vesting percentage	100%	100%

One point of the problem is that the calculations for Jones are based on assumed retirement at age 65. By the time they reach age 55, they will be eligible for early retirement based on future accrual of eligibility service. Based on the PBGC regulation at 4022.10, the effect of those future service accruals is not included as part of the guaranteed benefit calculation.

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Problem 27 - Page 2

	Smith	Jones
5 year average compensation	unknown	unknown
MGB at 65 (life annuity)	4,500.00	4,500.00
Assumed retirement age	56	65
MGB reduced for retirement age	$4,500.00 * .49$ $= 2,205.00$	$4,500.00 * 1.0$ $= 4,500.00$

The reduction factor of 49% for the MGB for Smith is from the tables given with the exam.

01/01/90 Base plan benefit	$\$50(19)$ $= 950.00$	$\$50(4)$ $= 200.00$
Early retirement benefit, reduced 5% per year before 65	$950.00 * (1 - 5\% * 9)$ $= 522.50$	200.00
Guaranteeable benefit increase	522.50	200.00
Years plan has been in effect	5	5
Phase-in	522.50	200.00

“01/01/08” Base plan benefit	$\$100(19)$ $= 1,900.00$	$\$100(4)$ $= 400.00$
Early retirement benefit, reduced 5% per year before 65	$1,900.00 * (1 - 5\% * 9)$ $= 1,045.00$	400.00
Guaranteeable benefit increase	$1,045.00 - 522.50$ $= 522.50$	$400.00 - 200.00$ $= 200.00$
Years plan has been in effect	3	3
Phase-in: Greater of \$60 or 60%(GBI)	$\$60 \text{ or } 522.50(60\%)$ $= 313.50$	$\$60 \text{ or } 200.00(60\%)$ $= 120.00$

Total guaranteed benefit	$522.50 + 313.50$ $= 836.00$	$200.00 + 120.00$ $= 320.00$
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In this problem, the MGB limit is so large that it has no effect. The sum of the guaranteed benefits is 1,156.00 per month.

Answer is B

NOTES

The effect of the future accrual of eligibility service for Jones is part of the non-vested accrued benefit that is assigned to PBGC Priority Category 6. This is one of the points of Revenue Ruling 86-48.

See the next page for notes re: Guaranteed benefit calculations.

2011 EA-2B Exam Solutions

Problem 27 - Page 3

Notes re: Guaranteed benefit calculations

1. The MGB does not increase beyond the year of plan termination. See Example 13 in Appendix A of the PBGC study note.
2. You should use the later of age at DOPT and age at benefit commencement for purposes of adjusting the MGB for age. See Example 16 in Appendix A of the PBGC study note.
3. You should use the form of payment in effect at the later of age at DOPT and age at benefit commencement for purposes of adjusting the MGB for form of payment. See Example 18 in Appendix A of the PBGC study note.
4. For retirements after DOPT, all benefit service accruals ceased at DOPT.
5. When calculating the phase-ins, the percent is more valuable when the amount of the Guaranteeable benefit increase exceeds 100. If it is less than 100, then the fixed dollar amount is more valuable. At 100, they both produce the same result.
6. If there were a change in normal form of benefits, you would have to normalize the benefits. Normalization 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 (DOPT). This is a necessary step; otherwise you would be comparing apples and oranges.
7. In some problems, plan amendments have different effective dates and adoption dates. For purposes of measuring the years that each set of plan provisions was effective, you use the later of the effective date and the adoption date. In the absence of any other information, you can assume both dates are the same (based on 2011 exam condition 12).

2011 EA-2B Exam Solutions

Problem 28

Similar to 2010 #36

The key to working this question is understanding the cross testing rules. You are told that the plans are aggregated for testing under 401(a)(4). The problem states that the testing method is "annual benefits basis".

This problem asks for Smith's benefit percentage value for the average benefit percentage test (ABPT) result. The ABPT calculations require you to aggregate the DB and DC plans. Since you have no choice about aggregating the plans for the ABPT, you do not have to satisfy the DB/DC gateways.

You need to cross test the DC plan on a benefits basis to determine the equivalent accrual rate. When you add the DB plan accrual rate to the DC plan equivalent accrual rate, you have the aggregate accrual rate for the ABPT.

The 401(k) deferrals would be disaggregated for testing under 401(a)(4). For purposes of the ABPT, the 410(b) regulation requires that you ignore the mandatory disaggregation rule. You must include the 401(k) deferrals with the profit sharing allocation to calculate the ABPT result.

This problem does not define the testing age. The 401(k) plan and the DB plan have different normal retirement ages. This means that there is no uniform normal retirement age, so the testing age is 65 by default. This is the second exam question (since 2008-21) that touched on the relationship between uniform normal retirement age and the testing age.

	Smith
401(k) deferral	16,500
Profit sharing allocation	5,000
12/31/2010 age	50
Lump sum value at testing age 65	$21,500(1.085)^{15}$
	= 73,094
Equivalent benefit accrual at testing age 65	$73,094/8.83$
	= 8,278
DB Annual accrual	<u>2,000</u>
Total Annual accrual at testing age 65	10,278
Pay limited by 401(a)(17)	100,000
Aggregate equivalent accrual rate	$10,278 / 100,000$
	= 10.28%

Answer is D

NOTE

One point of the problem is that you ignore the catch-up deferrals.

2011 EA-2B Exam Solutions

Problem 29 - Page 1

Similar to EA-2A 2010 #08

Revised 04/07/12

The problem tells you the 01/01/2010 adjusted funding target attainment percentage (AFTAP) was certified on 03/01/2010. The first step in the problem is to calculate the 2010 AFTAP.

The AFTAP is defined in IRC 436(j)(2), and it is similar to the funding target attainment percentage (FTAP) defined in 430(d)(2). The AFTAP has an adjustment for any non-HCE annuity purchases (NHAP) in the prior two years. The calculation uses the actuarial asset value (AAV), the carryover balance (CB), the prefunding balance (PB), and the non At-Risk funding target:

$$\text{AFTAP} = \frac{\text{NHAP} + \text{AAV} - \text{CB} - \text{PB}}{\text{NHAP} + \text{Funding Target (non At-Risk)}}$$

The problem tells you nothing about annuity purchases for prior years, so you can safely assume they are zero.

$$\begin{aligned} \text{2010 AFTAP} &= \frac{0 + 790,000 - 0 - 80,000}{0 + 1,000,000} \\ &= 71.0\% \end{aligned}$$

Since this plan offers a lump sum payment option, it is subject to the IRC 436(d) benefit restrictions on accelerated benefit distributions. Apparently this plan could not pay lump sums in 2010. In order for the plan to pay lump sum benefits in 2010, the AFTAP must be at least 80%.

It should be clear that there is no “deemed reduction” in the prefunding balance at 01/01/2010. The resulting AFTAP is only 79.0% = 790,000 / 1,000,000. Since it is impossible to get the AFTAP up to 80%, the “deemed reduction” rule does not apply.

In order for the plan to pay lump sum benefits in 2011, the AFTAP must be at least 80%. You need to calculate the 2011 AFTAP to see if it satisfies IRC 436(d). The problem does not give you the value of the 2011 PB, but you can calculate it based on the information given. Since no 2010 contributions were paid, the 2010 PB grows with the rate of return earned on plan assets (see IRC 430(f)(6)(B)(ii)):

$$\begin{aligned} \text{01/2011 PB} &= 80,000 * (1 + 20\%) \\ &= 96,000 \end{aligned}$$

The trick to the question is that you can not use this value of the PB to calculate the 2011 AFTAP at 03/31/2011. The reason is that the “deemed reduction” rules may require a decrease in the PB to occur at 01/01/2011.

2011 EA-2B Exam Solutions

Problem 29 - Page 2

Revised 04/07/12

You need to determine the presumed value of the funding target (PFT) at 01/01/2011. This calculation is based on the presumed AFTAP at 01/01/2011. Since the 2010 certified AFTAP is less than 80%, the presumed AFTAP at 01/01/2011 has the same value of 71.0%:

$$\begin{aligned} \text{Presumed AFTAP} &= \frac{\text{NHAP} + \text{AAV} - \text{CB} - \text{PB}}{\text{NHAP} + \text{Presumed Funding Target (non At-Risk)}} \end{aligned}$$

$$\begin{aligned} \text{Presumed AFTAP} &= \frac{0 + 750,000 - 0 - 96,000}{0 + \text{PFT}} \\ &= 71.0\% \end{aligned}$$

$$\begin{aligned} \text{2011 PFT} &= (750,000 - 96,000) / 71.0\% \\ &= 921,127 \end{aligned}$$

Since the presumed AFTAP is less than 80%, there may be a deemed reduction under IRC 436(f)(3). If it is possible to reduce the CB (and PB) enough to increase the AFTAP to 80%, then this reduction must occur as if the employer had elected to do so under IRC 430(f). The simplest approach is to calculate the final value of the PB that produces a presumed AFTAP that is equal to 80%:

$$\begin{aligned} \text{Desired Presumed AFTAP} &= \frac{0 + 750,000 - 0 - (\text{reduced PB})}{0 + 921,127} \\ &= 80.0\% \end{aligned}$$

$$\begin{aligned} .80(921,127) &= 750,000 - (\text{reduced PB}) \\ \text{Reduced PB} &= 13,099 \end{aligned}$$

The final step is to calculate the certified AFTAP at 03/31/2011, based on the reduced value of the PB. This calculation uses the actual value of the funding target (instead of the presumed value).

$$\begin{aligned} \text{03/31/2011 AFTAP} &= \frac{0 + 750,000 - 0 - 13,099}{850,000} \\ &= 86.69\% \end{aligned}$$

Answer is D

2011 EA-2B Exam Solutions

Problem 30

Similar to 2004 #30

This question tests your understanding of when a 204(h) notice is required. In general, notice is required for an amendment that either

1. Significantly reduces the rate of future benefit accrual, or
2. Eliminates or significantly reduces early retirement benefits, or a retirement type subsidy

In IRC 4980F(e)(1)(iii), there is a 204(h) notice required for “applicable employees”. These are participants who are adversely affected by the plan amendment. In this problem, only the active employees are subject to a decrease in future benefit accruals.

Now you can go down the list of answers to see if any are acceptable:

-) Answer A is not acceptable due to posting of a notice on the bulletin board. Q&A-13 of the 54.4980F regulation discusses how 204(h) notices may be provided. Paragraph (a) of Q&A-13 states
“... the posting of notice is not considered provision of section 204(h) notice.”
-) Answer B appears to be acceptable
-) Answer C is not acceptable, since it does not give notification to the salaried employees.
-) Answer D is not acceptable, since notification is given on 11/25/2010. The general rule is that the 204(h) notice must be provided at least 45 days before the effective date of any 204(h) amendment. For this plan, the notice is required by 11/16/2010.

Based on the preceding discussion, only answer B is acceptable.

Answer is B

NOTE

There is a 15 day advance notice required for

-) "business transactions", which includes acquisitions or dispositions
-) Small plans (less than 100 participants)
-) Multiemployer plans

2011 EA-2B Exam Solutions

Problem 31 - Page 1

This is the most complicated question on IRC 436 on the 2011 exam. It is hard to believe they can make a more complicated / confusing question on the topic of AFTAP certifications.

The first step in the problem is the sneakiest part. The plan was set up at 01/01/2005, and it is not subject to IRC 436(e) restrictions on benefit accruals until 01/01/2010. This is based on the exception in the law at IRC 436(g):

“Subsections (b), (c), and (e) shall not apply to a plan for the first 5 plan years of the plan. For purposes of this subsection, the reference in this subsection to a plan shall include a reference to any predecessor plan.”

The second step is to create a table showing the certification information given in the problem, starting with 01/01/2010. In addition, you need to allow for periods when no AFTAP has been certified.

If there has been no certification by October 1, then the AFTAP is presumed to be less than 60% at that date. At January 1, the presumed AFTAP will have the same value as the prior year's certified AFTAP. If the current year's AFTAP is not certified by April 1, the presumed AFTAP may be subject to the “10% haircut” in the regulations. This is only done if the presumed AFTAP crosses the boundary values of 60% or 80%.

For example, at 01/01/2010 the presumed AFTAP is equal to 82%, which was the value of the 2009 certified AFTAP. At 04/01/2010 the presumed AFTAP drops to 72%.

Plan Year	Certification Type	Date Issued	Value	Plan Year	Certification Type	Date Issued	Value
2009	Specific	02/01/2009	82%	2010	Presumed	01/01/2010	82%
2010	Presumed	04/01/2010	72%				
2010	Range	07/01/2010	60%-80%	2010	Presumed	10/01/2010	< 60%
2011	Presumed	01/01/2011	< 60%				
2010	Specific	02/01/2011	65%	2011	Presumed	02/01/2011	65%
2011	Presumed	04/01/2011	< 60%				
2011	Specific	07/01/2011	63%				
2012	Presumed	01/01/2012	63%				
2012	Presumed	04/01/2012	< 60%				
2013	Presumed	01/01/2013	< 60%				
2012	Specific	04/01/2013	67%	2013	Presumed	04/01/2013	< 60%
2013	Range	09/01/2013	60%-80%				
2013	Specific	12/01/2013	72%				

In some rows there are entries for two different years. I tried to show how the certification for one year can have a domino effect and change a subsequent presumed AFTAP.

2011 EA-2B Exam Solutions

Problem 31 - Page 2

Revised 04/23/14

A key point of the problem is that the range certification for 2013 is handled differently than that for 2010. There was no specific certification of the 2010 AFTAP prior to 12/31/2010, so the 2010 AFTAP was conclusively presumed below 60% at 10/01/2010. This did not happen in 2013, since there was a specific certification of the 2013 AFTAP prior to 12/31/2013.

Now I will re-write the table as a single column of AFTAP values. I will only include the ones that directly affect the plan's benefit accruals.

The participant has 9 full years of service (108 months), from 01/01/2005 through 01/01/2014. The plan does not provide for automatic restoration of benefit accruals when the IRC 436 restriction is lifted.

Plan Year	Certification Type	Date Issued	Value	Accruals restricted?	No benefit accruals	Benefit accruals
2005	N/A	01/01/2005	(hire date)			
2010	Presumed	01/01/2010	82%			60 months
2010	Presumed	04/01/2010	72%			3 months
2010	Range	07/01/2010	60%-80%			3 months
2010	Presumed	10/01/2010	< 60%	Yes		3 months
2011	Presumed	01/01/2011	< 60%	Yes	3 months	
2011	Specific	02/01/2011	65%		1 month	
2011	Presumed	04/01/2011	< 60%	Yes		2 months
2011	Specific	07/01/2011	63%		3 months	
2012	Presumed	01/01/2012	63%			6 months
2012	Presumed	04/01/2012	< 60%	Yes		3 months
2013	Presumed	01/01/2013	< 60%	Yes	9 months	
2012	Specific	04/01/2013	< 60%	Yes	3 months	
2013	Range	09/01/2013	60%-80%		5 months	
2013	Specific	12/01/2013	72%			3 months
2013	N/A	12/31/2013	N/A			1 month
ALL TOTAL					24 months	84 months

The participant's monthly accrued benefit at 01/01/2014 is \$168 (\$2 times 84).

Answer is C

NOTE

The situation that occurred in 2010 is specifically addressed in the regulation at 1.436-1(h)(4)(ii)(B):

"However, if the plan's enrolled actuary has issued a range certification for the plan year but does not issue a certification of the specific adjusted funding target attainment percentage for the plan by the last day of that plan year, the adjusted funding target attainment percentage for the plan is retroactively deemed to be less than 60 percent as of the first day of the 10th month of the plan year."

2011 EA-2B Exam Solutions

Problem 32

Similar to 2010 #22

This is a very simple problem on calculating the variable rate premium (VRP). The key point is knowing the definition of which plans are eligible for the variable rate premium cap.

The unfunded vested benefits liability (UVB) is calculated as the excess of the premium funding target over the market value of assets. The market value includes the present value of any prior year contributions that are received by the date the premium filing. The contributions are discounted using the prior year's effective interest rate.

Ignoring the cap, you calculate the variable rate premium as .009 times the UVB. The UVB must be rounded up to the next higher multiple of 1,000:

$$\begin{aligned}\text{VRP} &= 330,000 * .009 \\ &= 2,970\end{aligned}$$

The plan is eligible for the cap if there are 25 or less employees on the first day of the plan year. On 12/31/2010, you are told there are 11 active participants, plus 16 non-participant actives and 11 non-active participants.

There are 22 plan participants and 27 active employees. Since the total employee count is more than 25, the plan is not eligible for the VRP cap.

The problem asks for the total PBGC premium, which is the sum of the flat rate premium (FRP) and the VRP. The JBEA tables given with the exam stated that the 2011 flat rate premium is \$35 per participant:

$$\begin{aligned}\text{FRP} &= \$35(22) \\ &= 770\end{aligned}$$

$$\begin{aligned}\text{FRP+VRP} &= 770 + 2,970 \\ &= 3,740\end{aligned}$$

Answer is C

2011 EA-2B Exam Solutions

Problem 33

Similar to 2009 #25

Revised 03/19/13

Under the Rolling Five Method, the calculation of withdrawal liability is relatively simple. Since the withdrawal occurred during 2010, you should use the UVB at 12/31/2009.

The first step is calculation of Employer A's share of the 12/31/09 UVB. This is based on the ratio of Employer A's contributions to the total contributions in the prior five years:

$$\begin{aligned}\text{A's share} &= 6,500,000 * \frac{90,000}{5,000,000} \\ &= 117,000\end{aligned}$$

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 employer's share of the UVB. The final withdrawal liability is calculated as the employer's share less the deductible.

The mandatory de minimis is the lesser of 50,000 or 3/4% of the plan's total UVB:

$$\begin{aligned}\text{De minimis} &= \text{Lesser of } 50,000 \text{ and } .0075 * 6,500,000 \\ &= 48,750\end{aligned}$$

The deductible is the de minimis amount reduced by the excess of the allocated UVB over 100,000:

$$\begin{aligned}\text{Deductible} &= 48,750 - (117,000 - 100,000) \\ &= 31,750\end{aligned}$$

The final employer withdrawal liability is $117,000 - 31,750 = 85,250$.

Answer is D

2011 EA-2B Exam Solutions

Problem 34

This problem tests the 2008 changes (due to PPA 2006) in the method for calculating the Variable Rate Premium (VRP) on the PBGC-1 Form, Schedule A. This calculation is similar to the old General rule calculation of the variable rate premium.

In this problem, you are not given values of the Standard Premium Funding Target. Instead, you are given values of the IRC 430 Funding Target at both 01/01/2010 and 01/01/2011. The problem states that an election was made to use the Alternative Premium Funding Target. Under the PBGC 4006 regulation, the Alternative Premium Funding Target is equal to the vested portion of the IRC 430 Funding Target.

The variable rate premium is calculated based on the unfunded vested benefits liability. This is defined as the excess of the premium funding target over the adjusted market value of assets. There are no receivable contributions in this problem, so there is no adjustment to the market value of assets at 01/01/2011.

The only trick to the question is the handling of the temporary supplement for vested active participants. Based on the PBGC 4006 regulation, you only include the value of the supplement for vested participants who are currently eligible to receive the supplement.

$$\begin{aligned}\text{Premium funding target} &= 12,580,000 - 250,000 \text{ (participants not eligible)} \\ &\quad - 550,000 \text{ (non-vested benefits)} \\ &= 11,780,000 \\ \text{Market value} &= 6,900,000 \\ \text{Unfunded vested liability} &= 11,780,000 - 6,900,000 \\ &= 4,880,000\end{aligned}$$

The unfunded vested liability must be rounded up to the next multiple of 1,000. The last step is to multiply the adjusted value of the unfunded vested liability by .009:

$$\begin{aligned}\text{Variable rate premium} &= 4,880,000 * .009 \\ &= 43,920\end{aligned}$$

Answer is C

NOTES

1. If the market value excludes receivable contributions, then you must add the discounted value of contributions paid for plan years prior to the premium payment year. You only include the receivable if it has been deposited on or before the date the variable rate premium is paid.
2. The interest rate used for discounting the receivable contribution is the Effective Interest Rate for the plan year that corresponds to the contribution.

2011 EA-2B Exam Solutions

Problem 35

This problem is a mixed bag of small details on mandatory employee contributions. Most of these ideas have been tested in True/False questions on earlier exams.

I. FALSE

You only use 120% of the federal midterm rate to accumulate the employee contribution balance while the employee is active. For projecting the balance to normal retirement age, the 417(e) rates are used.

II. FALSE

This is not done for mandatory employee contributions. But a separate account is used for voluntary employee contributions.

III. TRUE

This is a tiny detail of the regulation. Testing for benefits rights and features under 401(a)(4) applies to optional forms. At 1.401(a)(4)-4(e)(3)(iii)(E), mandatory employee contributions are given as an example of an “other right or feature” that is subject to testing.

Only item III is true.

Answer is C

2011 EA-2B Exam Solutions

Problem 36

This is the first calculation problem on the plan termination premium. This requires knowledge of section 4006.7 of the PBGC regulations, which defines the premium rate for a "DRA 2005 termination", which is subject to the plan termination premium.

One trick to the question is choosing the participant count at the correct date. Unlike the variable rate premium, you do not use the value at the end of the prior plan year. Instead, you should use the count on the day before the plan termination date.

The participant count is then multiplied by \$1,250 for most plans. For certain "eligible plans" under PPA section 402(c)(1) (plans of commercial passenger airlines and airline catering services) which also meet other requirements, the termination premium is \$2,500.

$$\begin{aligned}\text{Participant count at 11/13/2011} &= 8 + 20 + 325 + 73 \\ &= 426\end{aligned}$$

$$\begin{aligned}\text{Termination premium per year} &= 426 * 1,250 \\ &= 532,500\end{aligned}$$

There is another trick to the wording of this question. It does not ask for the initial termination premium. It asks for the total termination premium owed to the PBGC, which includes a period of three years:

$$\begin{aligned}\text{Total termination premium} &= 532,500 * 3 \\ &= 1,597,500\end{aligned}$$

Answer is C

2011 EA-2B Exam Solutions

Problem 37 - Page 1

Similar to 2007 #32

Most PBGC problems are strictly concerned with benefits in priority categories for asset allocation purposes, or with the definition of guaranteed benefits. In this problem, the participant has benefits in both Priority Category 3 and in Priority Category 4, which is unusual for exam questions.

Priority Category 4 is defined based on the five year phase-in for non-owners. After you subtract the benefit in Priority Category 3, you will have the remaining benefit allocated to Priority Category 4.

The first part of the problem is calculation of the Priority Category 3 (PC3) benefit. The plan termination date (DOPT) is 01/01/2011. Participants in PC3 are those who were (or could have been) in pay status at DOPT-3, or 01/01/2008. The early retirement eligibility that is used is based on the plan provisions in effect at DOPT-3.

Priority Category 3 benefits are the lowest amount payable in the three years preceding DOPT, determined based on lowest level of plan benefits in effect for the five years preceding DOPT. There are no maximum benefit limits on PC3 benefits. For participants who were not in pay status at DOPT-3, the PC3 benefit is calculated as if they retired at DOPT-3.

	Smith: PC3 benefit
Date of birth	01/01/45
Date of hire	01/01/85
01/01/2008 age	63
01/01/2008 service	23
01/01/2008 final average compensation	$65,833.33 = (72,500 + 65,000 + 60,000) / 3$
01/01/2008 plan Early retirement factor	$92\% = 1 - 4\%(65 - 63)$
01/01/1985 plan accrual rate	2.00%
01/01/1985 plan accrued benefit at 01/01/08	$30,283.33 = (23)(2.00\%)(65,833.33)$
01/01/1985 plan retirement benefit at 1/01/08	$2,321.72 = 92\%(30,283.33) / 12$

This problem also tests your knowledge of the five year phase-in calculation. Guaranteed benefits are based on the vested accrued benefits of the plan participants. In calculating the guaranteed benefit, remember that changes in vesting schedule, normal retirement age, early retirement reductions, and normal form of annuity payment are all considered as changes in benefit amount that are subject to the phase in rules.

The change in plan benefits at 01/01/2009 is subject to phase-ins at the DOPT of 01/01/2011. In general, you should use the later of the adoption date and the effective date of the increase for phase-in purposes.

2011 EA-2B Exam Solutions

Problem 37 - Page 2

Revised 04/07/12

The termination date is 01/01/2011. You should use the 2011 MGB at 65, which equals 4,500 per month. The PBGC maximum monthly guaranteed benefit (MGB) is defined as the lesser of the adjusted ERISA §4022(b) value, or the highest five year consecutive compensation. The MGB should be adjusted based on the later of benefit commencement age, or age at DOPT. Smith is age 66 at 01/01/2011, so the 4,500 MGB should be adjusted to age 66.

One minor trick in the calculations is that the participant retired at age 65, on 01/01/2010. Their plan benefit should be based on their service at 01/01/2010 (instead of 01/01/2011).

Smith: PC3+PC4 benefit - 5 year phase-ins	
Date of birth	01/01/45
01/01/2011 age	66
Date of hire	01/01/85
01/01/2010 service (retirement date)	25
01/01/2011 annual MGB limit at 65	54,000.00 = 4,500.00*12
Five year high average compensation	Clearly exceeds 54,000
01/01/2011 monthly MGB limit at 66	4,950.00 = 4,500.00*1.10
01/01/2010 final average compensation	76,666.67 = (82,500+75,000+72,500)/3
01/01/1985 plan benefit accrual rate	2.00%
01/01/1985 plan vested accrued benefit	3,194.44 = (1.0)(25)(2.00%)(76,666.67) / 12
Full years plan has been in effect	5
Phase-in	3,194.44
01/01/2009 plan benefit accrual rate	2.06%
01/01/2009 plan vested accrued benefit	3,290.28 = (1.0)(25)(2.06%)(76,666.67) / 12
Guaranteeable benefit increase	95.83 = 3,290.28 - 3,194.44
Full years plan has been in effect	2
2 year phase-in	40%(95.83) or 40/mo. = 40.00
Total PC3+PC4 benefit	3,234.44 = 3,194.44 + 40.00

In this problem, the MGB limit is so large that it has no effect.

The monthly benefit assigned to PC4 equals 3,234.44 minus the PC3 benefit of 2,321.72, or 912.72. The annual equivalent is 10,952.67, which equals 12*912.72.

Answer is C

See page 3 of the solution for problem 27 for notes re: Guaranteed benefit calculations.

2011 EA-2B Exam Solutions

Problem 38 - Page 1

Similar to 2008 #27

This is a typical PBGC guaranteed benefits question. This question tests your knowledge of the five year phase-in calculations.

Guaranteed benefits are based on the vested accrued benefits of the plan participants. 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.

The PBGC maximum monthly guaranteed benefit (MGB) is defined as the lesser of the adjusted ERISA §4022(b) value, or the highest five year consecutive compensation. The MGB is defined assuming payment on a life annuity basis at age 65.

One key point of the problem is that you use the 2010 MGB value, since the termination date is 12/31/2010. The 2010 MGB at 65 is 4,500.00 (from the tables given with the exam).

Another key point of the problem is that you must reduce the MGB for benefit commencement ages before 65. The MGB should be adjusted based on the later of the age at DOPT, or the age at benefit commencement. Based on the PBGC study note, it is correct to age adjust the MGB, even when it is based on the highest five year compensation.

The plan amendments were effective on 01/01 and 07/01. For purposes of measuring the years that each plan was effective, you use the later of the effective date and the adoption date.

The 01/01/1990 plan has been in effect for five full years at DOPT. The 07/01/2007 plan has been in effect for only three full years at DOPT, from 07/01/2007 to 07/01/2010.

Smith: 5 year phase-ins

Date of birth	01/01/48
Date of retirement	01/01/10
01/01/2010 age	62
Date of hire	01/01/78
Past service	32
Majority owner?	NO
Vesting percentage	100%

(next page)

2011 EA-2B Exam Solutions

Problem 38 - Page 2

5 year average compensation
MGB at 65 (life annuity)
MGB reduced for age at DOPT

$$\begin{aligned} 52,800.00 &= (50,000+52,000+53,000+53,000+56,000)/5 \\ \text{Lesser of } 4,500.00 &\text{ or } 4,400.00 \text{ (equals } 52,800 / 12) \\ 3,784.00 &= .86 * 4,400.00 \end{aligned}$$

The five year average compensation is less than the \$4,500 MGB for 2010. The age adjustment factor is based on the age at plan termination, which is age 63.

01/01/1990 Base plan benefit

$$\begin{aligned} &100(32) \\ &= 3,200.00 \end{aligned}$$

Early retirement benefit,
Unreduced at age 62

$$3,200.00$$

Guaranteeable benefit increase

$$3,200.00$$

Years plan has been in effect

$$5$$

Phase-in

$$3,200.00$$

02/01/06 Base plan benefit

$$\begin{aligned} &140(32) \\ &= 4,480.00 \end{aligned}$$

Early retirement benefit

$$= 4,480.00$$

Guaranteeable benefit increase

$$\begin{aligned} &= 3,784.00 \quad (\text{hit MGB}) \\ &3,784.00 - 3,200.00 \\ &= 584.00 \end{aligned}$$

Years plan has been in effect

$$3$$

Phase-in: Greater of \$60 or
60%(GBI)

$$\begin{aligned} &\$60 \text{ or } 584.00(60\%) \\ &= 350.40 \end{aligned}$$

Total guaranteed benefit

$$\begin{aligned} &3,200.00 + 350.40 \\ &= 3,550.40 \end{aligned}$$

Answer is C

See page 3 of the solution for problem 27 for notes re: Guaranteed benefit calculations.

2011 EA-2B Exam Solutions

Problem 39

Similar to 2009 #37

Revised 03/19/13

Based on looking at years with at least 1000 hours, this participant appears to have 6 years of service. The key point of the problem is that you can ignore the hours earned in 1996 and 1997.

IRC 411(a)(6)(D) allows exclusion of certain years from the calculation of vesting service, but only for non-vested participants. In order to do so, the number of consecutive 1-year breaks in service must equal or exceed the greater of 5, or the aggregate number of years of service before such period (of consecutive 1-year breaks in service).

If a participant works less than 501 hours in a year, there is a 1-year break in service in that year. In the years from 1999-2003, there are five consecutive 1-year breaks in service.

The participant had only two years of vesting service prior to 2004, but they were not yet vested. As a result, the prior years of service in 1996 and 1997 can be ignored.

One minor trick to the problem is that it does NOT ask for the participant's vesting service at 12/31/2010. It asks for the sum of the "vesting service credits" at three points in time. I assume this refers to the participant's vesting service:

Date	Vesting service
12/31/98	2
12/31/04	0
12/31/10	4

The total is 6 years of "vesting service credits". This is not the same as the vesting service. The participant only has four years of vesting service.

Answer is B

NOTE

Two other items have been tested in recent similar exam questions.

-) IRC 411(a)(4)(A) allows you to ignore the hours earned in years prior to the year an employee attains age 18.
-) IRC Section 411(a)(4)(C) allows you to ignore years of service when the employer did not maintain the plan, or a predecessor plan.

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Problem 40 - Page 1

This is the first question asked on the EA exams which required knowledge of the mechanics of a cash balance plan (A.K.A. applicable defined benefit plan). The key idea is that you accumulate the current account balance to normal retirement age using the 5% interest crediting rate.

The factors given in the problem are annual life annuities. This may be a “typo” in the data, but the factors should be adjusted to monthly life annuities. This is based on 2011 exam condition 4. If you incorrectly use the annual annuities, you still get a numerical value in the correct answer range.

The problem asks for Smith’s early retirement benefit payable at the earliest possible commencement date. The early retirement eligibility is attainment of age 60 with 4 years of plan participation:

01/01/2011 Data

Birth date	01/01/1951
Hire date	01/01/1990
Age	60
Service	21
Effective date	01/01/2008
Participation service	3

Smith will be eligible for early retirement at 01/01/2012. At that date they will have attained age 61 and completed 4 years of plan participation.

The first step is to bring the account balance forward to normal retirement age 65. This calculation is done using the 5% interest crediting rate:

$$\begin{aligned}\text{Age 65 account} &= 7,566.00 \times (1.05)^5 \\ &= 9,656.35\end{aligned}$$

The accrued benefit is equal to the projected account balance divided by the monthly life annuity factor at age 65. The problem gives the annual factors at the 7.5% actuarial equivalent interest rate. I will use the standard adjustment for a monthly life annuity:

$$\begin{aligned}\ddot{a}_x^{(12)} &= \ddot{a}_x - 11/24 \\ \ddot{a}_{65}^{(12)} &= \ddot{a}_{65} - 11/24 \\ &= 8.46 - .4583 \\ &= 8.0017\end{aligned}$$

$$\begin{aligned}\text{AB} &= 9,656.35 / 8.0017 \\ &= 1,206.79\end{aligned}$$

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Problem 40 - Page 2

The problem states that the early retirement benefit is the actuarial equivalent of the accrued benefit. In general, this calculation would be done using the N_x commutation functions:

$$ERB_x = AB * N_{65}^{(12)} / N_x^{(12)}$$

In this problem, you are not given those commutation functions. You need to express the actuarial reduction in terms of annuities:

$$N_{65}^{(12)} = D_{65} * \ddot{a}_{65}^{(12)}$$

$$\begin{aligned} ERB_x &= AB * (D_{65} * \ddot{a}_{65}^{(12)}) / (D_x * \ddot{a}_x^{(12)}) \\ &= AB * (D_{65} / D_x) * (\ddot{a}_{65}^{(12)} / \ddot{a}_x^{(12)}) \\ &= AB * (v^{65-x} * {}_{65-x}p_x) * (\ddot{a}_{65}^{(12)} / \ddot{a}_x^{(12)}) \end{aligned}$$

The problem does not give any definition for pre-retirement mortality, so you should assume there is none. Now you can calculate the early retirement benefit based on the 7.5% interest rate, and the annual life annuity factors given:

$$\begin{aligned} ERB_{61} &= AB * (v^4 * {}_4p_{61}) * (\ddot{a}_{65} - 11/24) / (\ddot{a}_{61} - 11/24) \\ &= 1,206.79 * (1.075)^{-4} * (1.0) * (8.46 - .4583) / (9.27 - .4583) \\ &= 1,206.79 * (.7488) * (8.0017 / 8.8117) \\ &= 820.58 \end{aligned}$$

The monthly early retirement benefit is $68.38 = 820.58/12$.

Answer is B

NOTE

There is another approach you can use, which avoids getting tangled up in the definition of the actuarially equivalent benefit. The problem states that “the present value of the accrued benefit is the balance of a hypothetical account projected to normal retirement date”.

You can use that definition directly:

$$\begin{aligned} \text{PV of } ERB_{61} &= \text{PV of hypothetical account} \\ ERB_{61} * \ddot{a}_{61}^{(12)} &= 9,656.35 * (1.075)^{-4} \\ ERB_{61} &= 9,656.35 * (1.075)^{-4} / (\ddot{a}_{61} - 11/24) \\ &= 9,656.35 * (.7488 / 8.8117) \\ &= 820.58 \text{ per annum} \end{aligned}$$

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Problem 41 - Page 1

The problem implies that you are testing non-discrimination for 2011. In general, you should assume the testing date is the last day of the plan year.

The problem asks which of the employees are non-excludable. There are many definitions of an excludable employee in the code and regulations:

-) Do not satisfy plan's eligibility (age / service)
-) Nonresident aliens
-) Collectively bargained employees
-) Qualified Separate Lines of Business (QSLOB)
-) Terminating employees
-) Governmental / tax exempt
-) Former employees
-) Former employees treated as employees

For each group of employees, you need to determine the date of entry. If they are not eligible to participate in 2011, they are excludable. In general, you can ignore the option to separately test the "Otherwise excludable employees", unless it is mentioned in the problem.

<u>Employees</u>	<u>Date of Birth</u>	<u>Date of Hire</u>	<u>Date of Termination</u>	<u>Date of Rehire</u>	<u>2010 Hours</u>	<u>2011 Hours</u>	<u>Entry Date</u>
100	1/1/1971	1/1/2010			2,080	2,080	
50	1/1/1971	1/1/2010			2,080	800	
35	1/1/1971	1/1/2010	5/1/2011		2,080	800	
25	1/1/1971	1/1/2010	3/1/2011		2,080	300	
20	1/1/1971	1/1/2010			850	1,200	
10	1/1/1981	1/1/2010	3/1/2011	12/1/2011	2,080	450	
20	1/1/1991	1/1/2010			1,050	1,050	

The first three groups of employees enter the plan on 01/01/2011, which is the 1/1 after completion of 1,000 hours. All those participants are over age 21.

Note that employees in the third group all terminated at 05/01/2011. The handling of terminated employees is tricky. The rules in 1.410(b)-6(f)(1) specify that a terminating employee may be excludable if they satisfy six criteria.

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Problem 41 - Page 2

<u>Grp</u>	<u>Ees</u>	<u>Date of Birth</u>	<u>Date of Hire</u>	<u>Date of Termination</u>	<u>Date of Rehire</u>	<u>2010 Hours</u>	<u>2011 Hours</u>	<u>Entry Date</u>
1	100	1/1/1971	1/1/2010			2,080	2,080	1/1/2011
2	50	1/1/1971	1/1/2010			2,080	800	1/1/2011
3	35	1/1/1971	1/1/2010	5/1/2011		2,080	800	
4	25	1/1/1971	1/1/2010	3/1/2011		2,080	300	
5	20	1/1/1971	1/1/2010			850	1,200	
6	10	1/1/1981	1/1/2010	3/1/2011	12/1/2011	2,080	450	
7	20	1/1/1991	1/1/2010			1,050	1,050	

Here are the six criteria in 1.410(b)-6(f)(1):

1. Employee does not benefit under the plan for the year
2. Employee is eligible to participate
3. The plan has a minimum period of service, or a requirement of being employed on the last day to receive an allocation
4. Employee fails to receive an allocation due to failure to satisfy item 3
5. Employee terminates with no more than 500 hours, and is not an employee on last day of the plan year
6. If this paragraph is applied to any employee, it is applied to all employees for the year

The employees in the third group are not excludable, because they worked too many hours in 2011, and they do not satisfy the fifth criteria above.

The employees in the fourth group are all excludable. The reason is that they terminated in 2011 and had less than 501 hours worked in 2011.

The employees in the fifth group are all excludable. The reason is that they had less than 1,000 hours worked in 2010. They will not enter the plan until 1/1/2012.

The employees in the sixth group are not excludable. The reason is that they terminated in 2011, but were subsequently rehired in 2011. As a result, they do not satisfy the fifth criteria above.

The employees in the seventh group are all excludable. The reason is that they are only age 20 at 1/1/2011. They will not enter the plan until 1/1/2012.

The employees in groups 1,2,3 and 6 are non-excludable. The total number is 195.

Answer is C

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Problem 43 - Page 1

This is almost a typical PBGC guaranteed benefits question. This question tests your knowledge of the five year phase-in calculations. The one unusual aspect is that it asks for the PBGC guaranteed benefits question payable at expected retirement age.

Guaranteed benefits are based on the vested accrued benefits of the plan participants. 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.

The PBGC maximum monthly guaranteed benefit (MGB) is defined as the lesser of the adjusted ERISA §4022(b) value, or the highest five year consecutive compensation. The MGB is defined assuming payment on a life annuity basis at age 65.

One key point of the problem is that you use the 2011 MGB value, since the termination date is 01/01/2011. The 2011 MGB at 65 is 4,500.00 (from the tables given with the exam).

Another key point of the problem is that you must reduce the MGB for benefit commencement ages before 65. The MGB should be adjusted based on the later of the age at DOPT, or the age at benefit commencement. Based on the PBGC study note, it is correct to age adjust the MGB, even when it is based on the highest five year compensation.

The plan amendments were effective on 10/01 and 07/01. For purposes of measuring the years that each plan was effective, you use the later of the effective date and the adoption date.

The 01/01/1990 plan has been in effect for five full years at DOPT. The 07/01/2007 plan has been in effect for three full years at DOPT, from 07/01/2007 to 07/01/2010. The 10/01/2009 plan has been in effect for only one full year at DOPT, from 10/01/2009 to 10/01/2010.

Smith: 5 year phase-ins	
Date of birth	01/01/55
01/01/2011 age	56
Date of hire	01/01/85
Past service	26
Expected retirement age	56
Majority owner?	NO
Vesting percentage	100%

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Problem 43 - Page 2

Revised 04/12/13

Average compensation
MGB at 65 (life annuity)
MGB reduced for expected retirement age

$$\begin{aligned}8,333.33 &= 100,000/12 \text{ (assumed)} \\ \text{Lesser of } 4,500.00 &\text{ or } 8,333.33 \\ 2,205.00 &= .49 * 4,500.00\end{aligned}$$

The average compensation is given, but the number of years is undefined. You must ignore the portion of the MGB definition that is based on compensation. The age adjustment factor is based on the expected retirement age, which is age 56.

01/01/1990 Base plan benefit
Early retirement factor at 56
Early retirement benefit
Guaranteeable benefit increase
Years plan has been in effect
Phase-in

$$\begin{aligned}2,166.67 &= 1.0\%(26)(8,333.33) \\ .55 &= 1 - 5\%(65-56) \\ 1,191.67 &= .55(2,166.67) \\ 1,191.67 \\ 5 \\ 1,191.67\end{aligned}$$

07/01/07 Base plan benefit
Early retirement factor at 56
Early retirement benefit
Guaranteeable benefit increase
Years plan has been in effect
Phase-in: Greater of \$60 or 60%(GBI)

$$\begin{aligned}2,166.67 &= 1.0\%(26)(8,333.33) \\ 1.00 &= 1 - 0\%(65-56) \\ 2,166.67 &= 1.0(2,166.67) \\ 975.00 &= 2,166.67 - 1,191.67 \\ 3 \\ \$60 \text{ or } 975.00(60\%) \\ &= 585.00\end{aligned}$$

10/01/09 Base plan benefit
Early retirement factor at 56
Early retirement benefit
Guaranteeable benefit increase
Years plan has been in effect
Phase-in: Greater of \$20 or 20%(GBI)

$$\begin{aligned}4,333.33 &= 2.0\%(26)(8,333.33) \\ 1.00 &= 1 - 0\%(65-56) \\ 4,333.33 &= 1.0(4,333.33) \\ &= 2,205.00 \quad (\text{hit MGB}) \\ 38.33 &= 2,205.00 - 2,166.67 \\ 1 \\ \$20 \text{ or } 38.33(20\%) \\ &= 20.00\end{aligned}$$

Total guaranteed benefit

$$1,796.67 = 1,191.67 + 585.00 + 20.00$$

Answer is C

See page 3 of the solution for problem 27 for notes re: Guaranteed benefit calculations.

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Problem 44 - Page 1

This is a fairly long problem on calculations involving imputed permitted disparity and the most valuable accrual rate (MVAR) under 401(a)(4). You must calculate the MVAR first, and then you can apply the rules for imputed permitted disparity.

The method to calculate accrual rates is given as the annual method. You should use the given monthly benefit amounts to calculate the annual increase in the accrued benefit for 2010. This is 6,000, which equals $12(3,500 - 3,000)$.

In general, you must determine the most valuable form of payment at each benefit commencement age up to testing age (65). This problem states that benefits may be paid at any time after termination, which would require calculations from current age up to testing age. The early retirement benefit is the actuarial equivalent of the benefit payable at normal retirement age.

The Qualified J&S form is always the most valuable form of benefit payment (as defined in the 1.401(a)(4) regulation). You calculate the most valuable accrual rate (MVAR) by dividing the greatest normalized change in the accrued benefit by (testing service)*(average annual compensation).

The problem only gives factors at age 45 and age 65. It also states that you should use the benefit payable at age 45 to determine the most valuable accrual rate. This means that you can skip the calculations at age 65. To calculate the most valuable accrual rate, you need to allow for payment at age 45, converted to a QJ&S form. The normalized benefit reflects a life annuity payment form at testing age 65.

The actuarial equivalent early retirement benefit is usually defined as follows

$$ERB_X = AB * N_{65}^{(12)} / N_X^{(12)}$$

In this problem, you are not given those commutation functions. You need to express the actuarial reduction in terms of annuities:

$$\begin{aligned} ERB_X &= AB * (D_{65} * \ddot{a}_{65}^{(12)}) / (D_X * \ddot{a}_X^{(12)}) \\ &= AB * (v^{65-X} * {}_{65-X}p_X) * (\ddot{a}_{65}^{(12)} / \ddot{a}_X^{(12)}) \end{aligned}$$

In the absence of any information, you should simply ignore the mortality. Now you can calculate the actuarial equivalent early retirement factor, using the plan factors at 5%:

$$\begin{aligned} ERF_{45} &= (v^{65-45} * {}_{65-45}p_{45}) * (\ddot{a}_{65}^{(12)} / \ddot{a}_{45}^{(12)}) \\ &= (1.05)^{-20} (1.0) (10.04/15.24) \\ &= .2483 \end{aligned}$$

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Problem 44 - Page 2

Revised 03/19/13

The plan has a qualified J&S annuity with 50% continuation to the survivor. You need to calculate the actuarial equivalent reduction factor at age 45, using the plan factors at 5%:

$$\begin{aligned} \text{J\&S} &= \ddot{a}_{45}^{(12)} / (50\% \text{ J\&S annuity})_{45} \\ &= 15.24 / 16.12 \\ &= .9454 \end{aligned}$$

<u>Age</u>	<u>Accrued</u>	<u>ERF</u>	<u>J&S</u>	<u>Early ret</u>	<u>8.5%</u>	<u>8.5%</u>	<u>Normalized</u>
	<u>Benefit</u>				<u>50% J&S</u>	<u>8.5%</u>	
	(1)	(2)	(3)	(4)=(1)(2)(3)	<u>Annuity</u>	<u>Interest</u>	(4)(5)(6) / 7.95
45	12(500)	.2483	.9454	1,408	11.16	(1.085) ²⁰	10,107

Now use the normalized benefit, and divide by both testing service and testing compensation to determine the accrual rate. Be careful to apply the 401(a)(17) limit to the compensation:

$$\begin{aligned} \text{MVAR} &= \frac{10,107}{(1) * (245,000)} \\ &= 4.125\% \end{aligned}$$

There are different calculations for the imputed permitted disparity based on whether the average annual compensation exceeds the covered compensation. The data in the problem gives Smith's covered compensation as 100,116.

For employees with average annual compensation above covered compensation, you must calculate the "C rate" and the "D rate", and use the lesser of the rates. These are defined at 1.401(a)(4)-7(c)(3) as:

C Rate	D Rate
$\frac{\text{ER provided accrual}}{\text{avg. annual comp} - \frac{1}{2} (\text{covered comp.})}$	$\frac{\text{ER provided accrual} + (\text{permitted disparity factor}) * (\text{covered comp.})}{\text{Average annual compensation}}$

Since you are adjusting the MVAR for permitted disparity, you do not use the actual 6,000 benefit accrual during 2010. You must use the normalized value of 10,107 instead. As in the earlier calculation, don't forget to apply the 401(a)(17) limit to the compensation.

Typically you would look up the permitted disparity factor based on the participant's birth date, which is not given. Instead, you are given the permitted disparity factor as .65%.

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Problem 44 - Page 3

$$\begin{aligned}\text{C rate (MVAR)} &= 10,107 / [245,000 - .50(100,116)] \\ &= 5.18\%\end{aligned}$$

$$\begin{aligned}\text{D rate (MVAR)} &= [10,107 + .65\%(100,116)] / 245,000 \\ &= 4.39\%\end{aligned}$$

The final MVAR adjusted for imputed permitted disparity is the lesser of the two values, or 4.39%.

Answer is C

Problem 45 - Page 1

Revised 03/19/13

The problem asks for the NHCE concentration percentage for 2011. This is the ratio of non-excludable non-HCEs to total non-excludable employees. This is normally truncated and used to lookup the values of the Safe harbor and Unsafe harbor percentages.

This is mostly a question on the definition of highly compensated employee (HCE). IRC section 414(q)(1) defines an HCE as any employee who

- A. Was a 5% owner at any time during the current year or the prior year, or
- B. For the preceding year
 - i. Had compensation from the employer in excess of "110,000", and
 - ii. If the employer elects application of this clause for the prior year, was in the top paid 20% of employees for the prior year

The value of 110,000 is in quotes, since it represents a table value for the 2010 year. That is the prior year HCE threshold for determining if someone is an HCE in 2011. Based on pay alone, unrelated employee E is an HCE. No one else earned more than 110,000 for 2010.

This problem focuses on the concept of constructive stock ownership rules of IRC Section 318. This has rarely been tested on prior exams. IRC 318(a)(1) describes the attribution rules for family members:

"Individuals are considered as owning the stock owned (directly or indirectly) by their children, grandchildren, parents, or spouse. "Spouse" does not include a legally separated spouse. "Children" does include a legally adopted child."

Both Smith and Smith's spouse are 5% owners. Since they are married, they each are attributed ownership of 50% of the company. After attributing the stock ownership of their children, they are each 100% owners ($100\% = 50\% + 46\% + 4\%$).

Child A, the son of Child A and Child A's spouse are all 5% owners. Both the son and the spouse are each attributed ownership of 46% of the company. Child A is attributed Smith's stock ownership (since Smith is their parent) for a total of 96% of the company.

Child B is attributed Smith's stock ownership (since Smith is their parent) for a total of 54% of the company. The son of Child B and Child B's spouse are NOT 5% owners. Both the son and the spouse are each attributed ownership of 4% of the company.

The key idea is that the attribution starts with a clean slate for each family member. Otherwise, you would have numerous situations where EVERY family member would be an HCE.

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Problem 45 - Page 2

Child C is attributed Smith's stock ownership (since Smith is their parent) for a total of 50% of the company. The son and daughter of Child C and Child C's spouse are NOT 5% owners.

The total number of employees is $14 = 2 + 3 + 3 + 4 + 2$. All of them are non-excludable, since the problem states that they meet the plan's eligibility requirement.

There are eight HCEs:

Unrelated employee E
Smith and Smith's spouse
Child A, the son of Child A and Child A's spouse
Child B
Child C

That means there are six non-HCEs. Now you can calculate the NHCE concentration percentage for 2011:

$$\begin{aligned}\text{NHCCP} &= 6/(6+8) \\ &= 42.86\%\end{aligned}$$

Answer is D

NOTE

The definition of a 5% owner comes from the 1.416 regulation. It is defined as someone who owns more than 5% of the stock.