

**a/s/m**

*Actuarial Study Materials*

**Solutions to the  
2011 EA-2A Exam**

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A.S.A., E.A., M.S.P.A.**

*Note:*  
**NO RETURN IF OPENED**

## ABOUT THIS MANUAL

The solutions in this manual represent the author's interpretation of the correct method of solving each of the questions from the 2011 EA-2A examination. The solutions follow the rules of ERISA and the Internal Revenue Code as of May, 31, 2011. In addition, the solutions follow the rules found in proposed regulations for IRC section 430, which were included in the syllabus for the exam.

The actual examination questions are available on ASM's web site at [www.studymanuals.com](http://www.studymanuals.com).

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AMERICAN SOCIETY OF PENSION PROFESSIONALS AND ACTUARIES  
JOINT BOARD FOR THE ENROLLMENT OF ACTUARIES  
SOCIETY OF ACTUARIES

Enrolled Actuaries Pension Examination, Segment A

# EA-2, Segment A

Date: Wednesday, November 9, 2011

Time: 8:30 a.m. – 12:30 p.m.

## INSTRUCTIONS TO CANDIDATES

- Write your candidate number here \_\_\_\_\_. Your name must not appear.
- Do not break the seal of this book until the supervisor tells you to do so.
- Special conditions generally applicable to all questions on this examination are found at the front of this book.
- All questions should be answered in accordance with laws, rules and regulations in effect as of May 31, 2011.
- This examination consists of 50 multiple-choice questions of varying value. The point value for each question is shown in parenthesis at the beginning of each question. Total point value is 160.
- Your score will be based on the point values for the questions that you answer correctly. No credit will be given for omitted answers and no credit will be lost for wrong answers; hence, you should answer all questions even those for which you have to guess. Answer choices C, D, and E will be considered incorrect answers on True-False questions.
- A separate answer sheet is inside the front cover of this book. During the time allotted for this examination, record all your answers on side 2 of the answer sheet. **NO ADDITIONAL TIME WILL BE ALLOWED FOR THIS PURPOSE.** No credit will be given for anything indicated in the examination book but not transferred to the answer sheet. Failure to stop writing or coding your answer sheet after time is called will result in the disqualification of your answer sheet or further disciplinary action.
- Five answer choices are given with each question, each answer choice being identified by a key letter (A to E). For each question, blacken the oval on the answer sheet which corresponds to the key letter of the answer choice that you select.
- Use a soft-lead pencil to mark the answer sheet. To facilitate correct mechanical scoring, be sure that, for each question, your pencil mark is dark and completely fills only the intended oval. Make no stray marks on the answer sheet. If you have to erase, do so completely.
- Do not spend too much time on any one question. If a question seems too difficult, leave it and go on.
- While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.
- Clearly indicated answer choices in the test book can be an aid in grading examinations in the unlikely event of a lost answer sheet.
- Use the blank portions of each page for your scratch work. Extra blank pages are provided at the back of the examination book.
- When the supervisor tells you to do so, break the seal on the book and remove the answer sheet.  
  
On side 1 of the answer sheet, space is provided to write and to code candidate information. Complete Blocks A through G as follows:
  - in Block A, print your name and the name of this test center;
  - in Block B, print your last name, first name and middle initial and code your name by blackening the ovals (one in each column) corresponding to the letters of your name; for each empty box, blacken the small rectangle immediately above the "A" oval;
  - write your candidate number in Block C (as it appears on your ticket of admission for this examination) and write the number of this test center in Block D (the supervisor will supply the number);
  - code your candidate number and center number by blackening the five ovals (one in each column) corresponding to the five digits of your candidate number and the three ovals (one in each column) corresponding to the last three digits of the test center number, respectively. Please be sure that your candidate number and the test center number are coded correctly;
  - in Block E, code the examination that you are taking by blackening the oval to the left of "Course EA-2, Segment A."
  - in Block F, blacken the appropriate oval to indicate whether you are using a calculator; and
  - in Block G, sign your name and write today's date. If the answer sheet is not signed, it will not be graded.  
On side 2 of your answer sheet, space is provided at the top for the number of this examination book. Enter the examination book number, from the upper right-hand corner of this examination book, in the four boxes at the top of side 2 marked "BOOKLET NUMBER."
- After the examination, the supervisor will collect this book and the answer sheet separately. **DO NOT ENCLOSE THE ANSWER SHEET IN THE BOOK.** All books and answer sheets must be returned. **THE QUESTIONS ARE CONFIDENTIAL AND MAY NOT BE TAKEN FROM THE EXAMINATION ROOM.**

**EA-2A Fall 2011  
Answer Key**

**Revised January 2012**

| <b>Question</b> | <b>Answer</b> | <b>Question</b> | <b>Answer</b>   |
|-----------------|---------------|-----------------|-----------------|
| <b>1</b>        | D             | <b>27</b>       | D               |
| <b>2</b>        | C             | <b>28</b>       | E               |
| <b>3</b>        | B             | <b>29</b>       | A               |
| <b>4</b>        | C             | <b>30</b>       | B               |
| <b>5</b>        | A             | <b>31</b>       | A               |
| <b>6</b>        | A             | <b>32</b>       | E               |
| <b>7</b>        | B             | <b>33</b>       | D               |
| <b>8</b>        | B             | <b>34</b>       | C               |
| <b>9</b>        | B             | <b>35</b>       | B               |
| <b>10</b>       | A             | <b>36</b>       | C               |
| <b>11</b>       | B             | <b>37</b>       | B               |
| <b>12</b>       | B             | <b>38</b>       | D               |
| <b>13</b>       | B             | <b>39</b>       | E               |
| <b>14</b>       | B             | <b>40</b>       | A               |
| <b>15</b>       | C             | <b>41</b>       | B               |
| <b>16</b>       | C             | <b>42</b>       | B               |
| <b>17</b>       | C             | <b>43</b>       | Correct for All |
| <b>18</b>       | C             | <b>44</b>       | C               |
| <b>19</b>       | C             | <b>45</b>       | D               |
| <b>20</b>       | C             | <b>46</b>       | A               |
| <b>21</b>       | B             | <b>47</b>       | D               |
| <b>22</b>       | D             | <b>48</b>       | B               |
| <b>23</b>       | B             | <b>49</b>       | C               |
| <b>24</b>       | C             | <b>50</b>       | C               |
| <b>25</b>       | A             |                 |                 |
| <b>26</b>       | C             |                 |                 |

**\*\*BEGINNING OF EXAMINATION\*\***

Data for Question 1 (4 points)

Funding standard carryover balance as of 1/1/2012: \$0.

Prefunding balance as of 1/1/2012: \$5,000.

The value of plan-related expenses expected to be paid from plan assets during 2012 as of 1/1/2012: \$22,500.

| Plan year                          | <u>2008</u> | <u>2009</u> | <u>2010</u> | <u>2011</u> |
|------------------------------------|-------------|-------------|-------------|-------------|
| Shortfall amortization installment | \$0         | \$0         | \$0         | \$8,000     |

Selected valuation results as of 1/1/2012:

|  |           |
|--|-----------|
| Market value of assets                               | \$625,000 |
| Actuarial value of assets                            | 685,000   |
| Funding target                                       | 850,000   |
| Target normal cost (excluding plan-related expenses) | 50,000    |

Shortfall amortization factors:

|        |        |
|--------|--------|
| 7-year | 5.6354 |
| 6-year | 5.0167 |

The employer makes a single contribution of \$X on 1/1/2012 in the **smallest amount that satisfies the minimum funding standard** for the 2012 plan year.

Question 1

In what range is \$X?

- (A) Less than \$76,000
- (B) \$76,000 but less than \$84,000
- (C) \$84,000 but less than \$92,000
- (D) \$92,000 but less than \$100,000
- (E) \$100,000 or more

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Data for Question 2 (2 points)

Normal retirement age: 65.

Normal retirement benefit: 1% of final average compensation per year of service.

Final average compensation: Highest consecutive 3-year average compensation out of last 6 years.

Data for participant Smith:

|               |          |
|---------------|----------|
| Date of birth | 1/1/1947 |
| Date of hire  | 1/1/1977 |

| <u>Year</u> | <u>Compensation</u> |
|-------------|---------------------|
| 2006        | \$255,000           |
| 2007        | 220,000             |
| 2008        | 225,000             |
| 2009        | 210,000             |
| 2010        | 205,000             |
| 2011        | 205,000             |

Question 2

In what range is Smith's annual accrued benefit as of 1/1/2012?

- (A) Less than \$74,000
- (B) \$74,000 but less than \$77,000
- (C) \$77,000 but less than \$80,000
- (D) \$80,000 but less than \$83,000
- (E) \$83,000 or more

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Data for Question 3 (3 points)

Selected valuation results as of 1/1/2012:

|   |              |
|---|--------------|
| Actuarial (market) value of assets                  | \$16,500,000 |
| Funding target                                      | 10,000,000   |
| Target normal cost                                  | 435,000      |
| Funding target with expected compensation increases | 11,500,000   |
| At-risk funding target for IRC section 404          | 16,500,000   |
| At-risk target normal cost for IRC section 404      | 500,000      |
| Effective interest rate                             | 6.00%        |

Question 3

In what range is the deduction limit for 2012?

- (A) Less than \$480,000
- (B) \$480,000 but less than \$780,000
- (C) \$780,000 but less than \$1,080,000
- (D) \$1,080,000 but less than \$1,380,000
- (E) \$1,380,000 or more

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Data for Question 4 (4 points)

Funding standard carryover balance as of 1/1/2012: \$5,500.

Prefunding balance as of 1/1/2012: \$0.

Effective interest rate for 2012: 6.52%.

Actual rate of return on assets for 2012: 3%.

Selected valuation results as of 1/1/2012:

|                                    |          |
|------------------------------------|----------|
| Actuarial (market) value of assets | \$94,000 |
| Funding target                     | 100,000  |
| Target normal cost                 | 8,000    |

7-year shortfall amortization factor for 2012: 5.9982

No shortfall amortization bases were established before 2012.

Contributions for the 2012 plan year:

\$8,400 paid on 4/1/2012  
\$10,000 paid on 4/1/2013

The plan sponsor elected to use \$4,000 of the funding standard carryover balance as of 1/1/2012 toward the 2012 plan year contribution.

Question 4

In what range is the maximum amount available to be added to the prefunding balance as of 1/1/2013?

- (A) Less than \$8,300
- (B) \$8,300 but less than \$10,300
- (C) \$10,300 but less than \$12,300
- (D) \$12,300 but less than \$14,300
- (E) \$14,300 or more

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Data for Question 5 (2 points)

Consider the following statements with respect to the 2012 valuation for an ongoing plan:

- I. The plan sponsor may elect to change from using the full yield curve for the 2011 plan year to segment rates for the 2012 plan year without requesting approval from the Commissioner for a change in method.
- II. The plan sponsor may elect to change from using an averaging method to determine the valuation assets for the 2011 plan year to using the market value of assets for the 2012 plan year without requesting approval from the Commissioner for a change in method.
- III. The plan sponsor may elect to change the segment rates used from October rates for the 2011 plan year to November rates for the 2012 plan year without requesting from the Commissioner approval for a change in method.

Question 5

Which, if any, of the above statements is/are true?

- (A) None
- (B) I only
- (C) II only
- (D) III only
- (E) The correct answer is not given by (A), (B), (C), or (D) above.

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Data for Question 6 (1 point)

The 2011 AFTAP was certified on 11/1/2011 to be 92.00%.

The 2012 AFTAP was not certified by 9/30/2012.

Consider the following statement:

From 1/1/2012 to 9/30/2012 the plan was permitted to pay lump sum distributions without restrictions.

Question 6

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 7 (4 points)

Valuation date: 1/1/2012.

Funding standard carryover balance as of 1/1/2012: \$1,685,000.

Prefunding balance as of 1/1/2012: \$0.

Effective interest rate: 6.00%.

Valuation data as of 1/1/2012:

|  |              |
|--|--------------|
| Actuarial (market) value of assets             | \$95,700,000 |
| Target normal cost                             | 2,750,000    |
| Funding target                                 | 93,900,000   |
| Present value of prior shortfall amortizations | 0            |

7-year shortfall amortization factor: 5.7813

2012 plan year contribution made on 7/1/2012: \$200,000.

The employer makes a contribution of **\$X** on 12/31/2012 in the **smallest amount that satisfies the minimum funding standard** for the 2012 plan year.

Question 7

In what range is **\$X**?

- (A) Less than \$800,000
- (B) \$800,000 but less than \$900,000
- (C) \$900,000 but less than \$1,000,000
- (D) \$1,000,000 but less than \$1,100,000
- (E) \$1,100,000 or more

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Data for Question 8 (1 point)

Consider the following statement concerning the prefunding balance:

Contributions in excess of the minimum required contribution may be added to the prefunding balance only if the election is made by the end of the plan year for which the contribution applies.

Question 8

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 9 (1 point)

Consider the following statement concerning the deduction limit for a plan covered by the PBGC:

When determining the deduction limit, the increase in the funding target for a salary related plan cannot reflect compensation projected beyond the current IRC section 401(a)(17) limit nor benefits beyond the current IRC section 415 limit.

Question 9

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 10 (3 points)

Valuation date: 1/1/2012.

Postretirement death benefit: \$5,000 if retiree has completed 20 years of service, paid at end of year of death.

Data for plan participant Smith:

Date of birth            1/1/1967  
Date of hire            1/1/1991

Segment rates for 2012: {5.0%, 6.0%, 7.0%}.

Selected commutation functions:

| Age | <u>Segment rate 1</u> |                  | <u>Segment rate 2</u> |                  | <u>Segment rate 3</u> |                  |
|-----|-----------------------|------------------|-----------------------|------------------|-----------------------|------------------|
|     | $\overline{N}_x$      | $\overline{D}_x$ | $\overline{N}_x$      | $\overline{D}_x$ | $\overline{N}_x$      | $\overline{D}_x$ |
| 45  | 1,902,981             | 109,766          | 1,102,397             | 71,651           | 648,046               | 46,958           |
| 65  | 485,664               | 38,891           | 242,191               | 21,002           | 122,078               | 11,408           |

There are no pre-retirement decrements assumed except for mortality.

$\$X$  equals the 1/1/2012 funding target for Smith for the post-retirement death benefit.

Question 10

In what range is  $\$X$ ?

- (A) Less than \$225
- (B) \$225 but less than \$275
- (C) \$275 but less than \$325
- (D) \$325 but less than \$375
- (E) \$375 or more

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Data for Question 11 (4 points)

Valuation date: 1/1/2012.

Normal retirement benefit: \$20 per month per year of service.

The plan was amended 1/1/2012 to increase the monthly rate to \$22 effective 1/1/2012 and to \$24 effective 1/1/2013.

Segment rates for 2012: {5.0%, 6.0%, 7.0%}.

Data for participant Smith:

Date of birth 1/1/1952  
Date of hire 1/1/1987

Selected commutation functions:

| Age | <u>Segment rate 1</u> |        | <u>Segment rate 2</u> |        | <u>Segment rate 3</u> |        |
|-----|-----------------------|--------|-----------------------|--------|-----------------------|--------|
|     | $N_x^{(12)}$          | $D_x$  | $N_x^{(12)}$          | $D_x$  | $N_x^{(12)}$          | $D_x$  |
| 60  | 716,302               | 51,272 | 357,175               | 29,032 | 186,269               | 16,527 |
| 65  | 467,939               | 38,891 | 232,565               | 21,002 | 122,078               | 11,408 |
| 80  | 99,039                | 13,385 | 41,453                | 6,270  | 18,666                | 2,958  |

There are no pre-retirement decrements assumed except for mortality.

$\$X$  is the sum of the funding target and the target normal cost for Smith as of 1/1/2012.

Question 11

In what range is  $\$X$ ?

- (A) Less than \$52,000
- (B) \$52,000 but less than \$53,000
- (C) \$53,000 but less than \$54,000
- (D) \$54,000 but less than \$55,000
- (E) \$55,000 or more

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Data for Question 12 (3 points)

Plan effective date: 1/1/2000.

The plan defines actuarial equivalence for all purposes as the applicable interest rates and mortality under IRC section 417(e) with no pre-retirement mortality.

Normal retirement benefit: \$200 per month per year of service.

Applicable 417(e) segment rates: {5.0%, 6.0%, 7.0%}.

Selected data for participant Smith:

|                     |          |
|---------------------|----------|
| Date of birth       | 1/1/1972 |
| Date of hire        | 1/1/1999 |
| Date of termination | 1/1/2012 |

Selected commutation functions:

| Age | <u>Segment rate 1</u> |         | <u>Segment rate 2</u> |        | <u>Segment rate 3</u> |        |
|-----|-----------------------|---------|-----------------------|--------|-----------------------|--------|
|     | $N_x^{(12)}$          | $D_x$   | $N_x^{(12)}$          | $D_x$  | $N_x^{(12)}$          | $D_x$  |
| 40  | 2,472,963             | 140,601 | 1,485,450             | 96,233 | 906,354               | 66,101 |
| 65  | 465,050               | 38,821  | 321,251               | 20,965 | 116,222               | 11,387 |
| 70  | 296,871               | 28,602  | 142,396               | 14,731 | 68,985                | 7,635  |
| 85  | 39,772                | 7,564   | 17,102                | 3,379  | 7,420                 | 1,521  |

Smith receives a lump sum on 1/1/2012 equal to the present value of his accrued benefit.

Question 12

In what range is the lump sum payable to Smith on 1/1/2012?

- (A) Less than \$58,000
- (B) \$58,000 but less than \$62,000
- (C) \$62,000 but less than \$66,000
- (D) \$66,000 but less than \$70,000
- (E) \$70,000 or more

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Data for Question 13 (2 points)

Valuation date: 1/1/2012.

Number of participants in the plan: 150.

Number of participants in the controlled group in 2011:

|                                   |     |
|-----------------------------------|-----|
| Single employer plan participants | 450 |
| Multiemployer plan participants   | 250 |

FTAP for 2011: 75.00%.

FTAP for 2011 using at-risk assumptions: 65.00%.

Consider the following statement:

The plan is at-risk for the 2012 plan year.

Question 13

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 14 (3 points)

Participant data as of 12/31/2011:

|   | <u>Smith</u> | <u>Jones</u> | <u>Brown</u> |
|---|--------------|--------------|--------------|
| Total service                             | 16           | 14           | 6            |
| Total service in years plan was top-heavy | 13           | 11           | 4            |
| Final five year average earnings          | \$225,000    | \$185,000    | \$110,000    |
| Non top-heavy accrued benefit             | 42,000       | 35,000       | 11,000       |
| Key employee                              | Yes          | No           | No           |

The plan provides the minimum top-heavy benefits required by law.

At 12/31/2011 Smith's accrued benefit is  $\$X$ , Jones' accrued benefit is  $\$Y$ , and Brown's accrued benefit is  $\$Z$ .

Question 14

In what range is  $\$X + \$Y + \$Z$ ?

- (A) Less than \$89,000
- (B) \$89,000 but less than \$91,000
- (C) \$91,000 but less than \$93,000
- (D) \$93,000 but less than \$95,000
- (E) \$95,000 or more

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Data for Question 15 (4 points)

The plan has always had more than 500 participants.

Before 1/1/2011, the FTAP (disregarding at-risk assumptions) was always greater than 100%.

FTAP (disregarding at-risk assumptions) as of 1/1/2011: 69.00%.

Shortfall amortization installment for 2011: \$75,000.

|                                    | <u>1/1/2011</u> | <u>1/1/2012</u> |
|------------------------------------|-----------------|-----------------|
| Funding standard carryover balance | \$0             | \$0             |
| Prefunding balance                 | 0               | 200,000         |

Selected valuation results as of 1/1/2012:

Actuarial (market) value of assets: \$7,900,000.  
Effective interest rate: 6.00%.

|                    | <u>Disregarding at-risk assumptions</u> | <u>At-risk</u> |
|--------------------|---|----------------|
| Funding target     | \$10,000,000                            | \$12,000,000   |
| Target normal cost | 1,000,000                               | 1,200,000      |

Shortfall amortization factors for 2012:

7-year: 5.9982  
6-year: 5.2932

The employer makes a single contribution of \$X on 1/1/2012 in the **smallest amount that satisfies the minimum funding standard.**

Question 15

In what range is \$X?

- (A) Less than \$1,350,000
- (B) \$1,350,000 but less than \$1,450,000
- (C) \$1,450,000 but less than \$1,550,000
- (D) \$1,550,000 but less than \$1,650,000
- (E) \$1,650,000 or more

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Data for Question 16 (5 points)

Type of plan: Multiemployer.

Funding method: Unit credit.

Valuation interest rate: 7.0%.

Credit balance in funding standard account as of 12/31/2011: \$500,000.

The plan was amended effective 1/1/2012 to increase the dollar multiplier for service after 2011 from \$25 to \$30 for active participants.

Selected valuation results (before plan amendment) at 1/1/2012:

|   |              |
|---|--------------|
| Actuarial (market) value of assets          | \$12,000,000 |
| Accrued liability for active participants   | 7,500,000    |
| Accrued liability for inactive participants | 7,500,000    |
| Normal cost                                 | 500,000      |

All funding standard account amortization bases established prior to 1/1/2012:

| <u>Years remaining</u> | <u>Charge</u> |
|------------------------|---------------|
| 13                     | \$150,000     |
| 14                     | 125,000       |

A single contribution of  $\$X$  is to be made on 12/31/2012 in the **smallest amount that satisfies the minimum funding standard** for the 2012 plan year.

Question 16

In what range is  $\$X$ ?

- (A) Less than \$300,000
- (B) \$300,000 but less than \$500,000
- (C) \$500,000 but less than \$700,000
- (D) \$700,000 but less than \$900,000
- (E) \$900,000 or more

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Data for Question 17 (4 points)

Type of plan: Multiemployer.

Effective date: 1/1/2011.

Actuarial cost method: Entry age normal.

Interest rate for 2011: 7.0%.

Interest rate for 2012: 6.0%.

Selected valuation results:

|                                    | <u>1/1/2011</u> | <u>1/1/2012 (after interest rate change)</u> |
|------------------------------------|-----------------|--|
| Accrued liability                  | \$1,000,000     | \$1,800,000                                  |
| Normal cost                        | 200,000         | 250,000                                      |
| Actuarial (market) value of assets | 0               | 400,000                                      |

No benefits or expenses were paid from plan assets during 2011 or 2012.

A single contribution of \$400,000 for 2011 was made on 12/31/2011.

The actuarial experience for 2011 was a loss of \$200,000 as of 1/1/2012.

A single contribution of **\$X** is to be made on 12/31/2012 in the **smallest amount that satisfies the minimum funding standard** for the 2012 plan year.

Question 17

In what range is **\$X**?

- (A) Less than \$297,500
- (B) \$297,500 but less than \$337,500
- (C) \$337,500 but less than \$377,500
- (D) \$377,500 but less than \$417,500
- (E) \$417,500 or more

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Data for Question 18 (4 points)

Funding standard carryover balance as of 1/1/2011: \$0.

Prefunding balance as of 1/1/2011: \$10,000.

Prefunding balance as of 1/1/2012: \$0.

No shortfall amortization bases were established before 2011.

Selected valuation results:

|                                    | <u>1/1/2011</u> | <u>1/1/2012</u> |
|------------------------------------|-----------------|-----------------|
| Actuarial (market) value of assets | \$130,000       | \$130,000       |
| Funding target                     | 140,000         | 155,000         |
| Target normal cost                 | 6,500           | 7,000           |
| Effective interest rate            | 6.50%           | 5.70%           |

The plan sponsor elected to use 15-year amortization for the 2011 plan year shortfall amortization base.

Shortfall amortization factors:

|          | <u>2011</u> | <u>2012</u> |
|----------|-------------|-------------|
| 6-years  |             | 5.4134      |
| 7-years  | 6.6632      | 6.1596      |
| 14-years |             | 10.4775     |
| 15-years | 10.7931     | 10.9826     |

There are no Installment Acceleration Amounts.

The employer makes a single contribution of \$X on 1/1/2012 in the **smallest amount that satisfies the minimum funding standard for 2012.**

Question 18

In what range is \$X?

- (A) Less than \$8,750
- (B) \$8,750 but less than \$9,500
- (C) \$9,500 but less than \$10,250
- (D) \$10,250 but less than \$11,000
- (E) \$11,000 or more

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Data for Question 19 (4 points)

Normal retirement benefit: 5% of final average pay per year of service up to 20 years.

Final average pay: Highest consecutive three-year average compensation.

Assumed compensation increases: 0%, which changes to 10% for the 2012 plan year.

There are no funding balances at 1/1/2012.

The 2012 IRC section 401(a)(17) limit is assumed to be \$245,000.

Data for plan's sole participant as of 1/1/2012:

|                   |           |
|-------------------|-----------|
| Date of birth     | 1/1/1967  |
| Date of hire      | 1/1/2009  |
| 2009 compensation | \$240,000 |
| 2010 compensation | 240,000   |
| 2011 compensation | 240,000   |

Selected valuation results as of 1/1/2012:

|                                      |           |
|--------------------------------------|-----------|
| Valuation (market) assets            | \$108,720 |
| Funding target                       | 108,720   |
| Target normal cost before the change | 36,240    |

7-year shortfall amortization factor: 6.6632

**\$X** equals the minimum required contribution for the 2012 plan year.

Question 19

In what range is **\$X**?

- (A) Less than \$36,000
- (B) \$36,000 but less than \$37,000
- (C) \$37,000 but less than \$38,000
- (D) \$38,000 but less than \$39,000
- (E) \$39,000 or more

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Data for Question 20 (3 points)

Plan year: July 1 to June 30.

Normal retirement benefit: 1% of final average pay for each year of service.

Final average pay: Highest consecutive three-year average plan years of compensation.

Data for participant Smith:

|                                    |           |
|------------------------------------|-----------|
| Date of birth                      | 1/1/1966  |
| Date of hire                       | 1/1/2007  |
| 2007 calendar year compensation    | \$245,000 |
| 2008 calendar year compensation    | 220,000   |
| 2009 calendar year compensation    | 150,000   |
| 2010 calendar year compensation    | 300,000   |
| 2011 calendar year compensation    | 90,000    |
| 2012 compensation from 1/1 to 6/30 | 173,000   |

Compensation is paid monthly and uniformly throughout the calendar year.

Question 20

In what range is Smith's final average pay as of 7/1/2012?

- (A) Less than \$211,000
- (B) \$211,000 but less than \$212,000
- (C) \$212,000 but less than \$213,000
- (D) \$213,000 but less than \$214,000
- (E) \$214,000 or more

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Data for Question 21 (4 points)

Plan effective date: 1/1/2008.

Type of plan: Multiemployer.

Actuarial cost method: Unit credit.

Valuation interest rate: 6.0%.

Unfunded past service liability as of 1/1/2008: \$2,000,000.

Amortization bases established before 1/1/2012:

|  |           |
|--|-----------|
| Experience loss during 2010              | \$600,000 |
| Plan amendment base established 1/1/2010 | 900,000   |
| Experience loss during 2009              | 100,000   |
| Experience loss during 2008              | 150,000   |

Credit balance as of 12/31/2011: \$0.

Selected valuation results as of 1/1/2012:

|                                    |             |
|------------------------------------|-------------|
| Actuarial (market) value of assets | \$9,550,000 |
| Accrued liability                  | 12,000,000  |
| Normal cost                        | 2,000,000   |
| Experience gain during 2011        | 789,312     |

The experience gain is the only amortization base established as of 1/1/2012.

**\$X** is the **smallest amount that satisfies the minimum funding standard** as of 1/1/2012.

Question 21

In what range is **\$X**?

- (A) Less than \$2,250,000
- (B) \$2,250,000 but less than \$2,350,000
- (C) \$2,350,000 but less than \$2,450,000
- (D) \$2,450,000 but less than \$2,550,000
- (E) \$2,550,000 or more

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Data for Question 22 (4 points)

Asset valuation method: The average of the market value of assets on the valuation date and the adjusted market value of assets for the preceding valuation date.

Segment rates for 2011: {5.5%, 6.5%, 7.5%}.

Segment rates for 2012: {5.0%, 6.0%, 7.0%}.

Assumed rate of return on assets: 8.5%.

Effective interest rate for 2011: 6.50%.

Effective interest rate for 2012: 6.00%.

Benefit payments and expenses are assumed to be paid mid-year.

Selected asset information:

| <u>Plan year</u>                     | <u>2011</u>  | <u>2012</u>  |
|--------------------------------------|--------------|--------------|
| Market value (excluding receivables) | \$34,000,000 | \$44,000,000 |
| Benefit payments                     | 2,000,000    |              |
| Expenses                             | 200,000      |              |

For the 2011 plan year, a contribution of \$500,000 is deposited on 1/1/2011 (which is not included in the 1/1/2011 assets shown above) and another contribution of \$1,000,000 is deposited on 9/1/2012.

$\$X$  is the actuarial value of assets on 1/1/2012 for the plan year beginning 1/1/2012.

Question 22

In what range is  $\$X$ ?

- (A) Less than \$40,400,000
- (B) \$40,400,000 but less than \$40,425,000
- (C) \$40,425,000 but less than \$40,450,000
- (D) \$40,450,000 but less than \$40,475,000
- (E) \$40,475,000 or more

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Data for Question 23 (3 points)

Mandatory employee contributions: 2.0% of compensation.

Funding standard carryover balance and prefunding balance are both \$0 as of 1/1/2012.

Selected valuation results as of 1/1/2012:

|  |              |
|--|--------------|
| Total plan compensation                                  | \$20,000,000 |
| Actuarial (market) value of assets                       | 36,000,000   |
| Funding target   | 36,000,000   |
| Present value of benefits expected to accrue during year | 2,000,000    |

7-year shortfall amortization factor for 2012: 5.9982

There are no shortfall amortization bases from prior years.

The value of plan-related expenses expected to be paid from plan assets during 2012 as of 1/1/2012: \$125,000.

The employer makes a single contribution for 2012 of \$**X** on 1/1/2012 in the **smallest amount that satisfies the minimum funding standard.**

Question 23

In what range is \$**X**?

- (A) Less than \$1,650,000
- (B) \$1,650,000 but less than \$1,800,000
- (C) \$1,800,000 but less than \$1,950,000
- (D) \$1,950,000 but less than \$2,100,000
- (E) \$2,100,000 or more

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Data for Question 24 (2 points)

Consider the following statements with respect to the termination of a single employer defined benefit plan with 1,000 participants:

- I. A Form 5500 must be filed for each year the plan has assets.
- II. A Schedule SB is not required to be filed for the plan year that includes the termination date.
- III. If the termination fails to occur, minimum funding standards continue to apply and a Schedule SB continues to be required.

Question 24

Which, if any, of the above statements is (are) true?

- (A) None
- (B) I and II only
- (C) I and III only
- (D) II and III only
- (E) The correct answer is not given by (A), (B), (C), or (D) above.

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Data for Question 25 (3 points)

Funding balances as of 1/1/2012 (prior to any deemed election to reduce the plan's funding balances to avoid benefit limitations under IRC section 436):

|                                    |          |
|------------------------------------|----------|
| Funding standard carryover balance | \$80,000 |
| Prefunding balance                 | 150,000  |

Selected valuation results as of 1/1/2012:

|                                    |             |
|------------------------------------|-------------|
| Actuarial (market) value of assets | \$3,079,450 |
| Funding target                     | 3,850,000   |

The plan's optional forms of benefit include a single lump sum up to \$15,000.

**\$X** is the deemed funding balance reduction to avoid benefit restrictions.

Question 25

In what range is **\$X**

- (A) Less than \$50,000
- (B) \$50,000 but less than \$100,000
- (C) \$100,000 but less than \$150,000
- (D) \$150,000 but less than \$200,000
- (E) \$200,000 or more

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Data for Question 26 (5 points)

Plan type: Multiemployer.

Valuation date: 1/1/2012.

Actuarial cost method: Projected unit credit.

Normal retirement benefit: 1% of final 5-year average compensation for each year of service.

Early retirement benefit:

|                              | Standard                  | Enhanced                        |
|------------------------------|---------------------------|---------------------------------|
| Eligibility requirement      | Age 55                    | Age 55 with 25 years of service |
| Early commencement reduction | 3% per year before age 65 | Unreduced                       |

Actuarial assumptions:

|                        |      |
|------------------------|------|
| Interest rate          | 7.5% |
| Compensation increases | 2.5% |

Participant data for Smith:

|                   |          |
|-------------------|----------|
| Date of birth     | 1/1/1971 |
| Date of hire      | 1/1/2008 |
| 2011 compensation | \$44,000 |

Selected commutation functions and all retirement rates:

|     |             |              |         |
|-----|-------------|--------------|---------|
| Age | $q_x^{ret}$ | $N_x^{(12)}$ | $D_x$   |
| 62  | 50%         | 2,079,449    | 210,916 |
| 65  | 100%        | 1,517,247    | 163,979 |

Question 26

What is the normal cost at 1/1/2012 for Smith?

- (A) Less than \$1,200
- (B) \$1,200 but less than \$1,350
- (C) \$1,350 but less than \$1,500
- (D) \$1,500 but less than \$1,650
- (E) \$1,650 or more

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Data for Question 27 (3 points)

Selected valuation results as of 1/1/2012:

|   |              |
|---|--------------|
| Market value of assets                            | \$18,000,000 |
| Actuarial value of assets                         | 17,000,000   |
| Funding target                                    | 24,000,000   |
| Target normal cost                                | 700,000      |
| Funding target with future compensation increases | 26,000,000   |
| At-risk funding target for IRC 404 purposes       | 27,000,000   |
| At-risk target normal cost for IRC 404 purposes   | 1,000,000    |
| Minimum required contribution                     | 2,300,000    |
| Effective interest rate                           | 3.00%        |

Question 27

In what range is the deduction limit for 2012?

- (A) Less than \$18,500,000
- (B) \$18,500,000 but less than \$20,000,000
- (C) \$20,000,000 but less than \$21,500,000
- (D) \$21,500,000 but less than \$23,000,000
- (E) \$23,000,000 or more

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Data for Question 28 (5 points)

Normal retirement benefit: \$150 per month per year of service.

Valuation date for defined benefit plan: 12/31.

Data for all participants:

|       | <u>Date of birth</u> | <u>Date of hire</u> | <u>Profit sharing account<br/>balance on 12/31/2011</u> | <u>Key employee</u> |
|-------|----------------------|---------------------|---|---------------------|
| Smith | 12/31/1964           | 1/1/2005            | \$20,500  | Yes                 |
| Jones | 12/31/1969           | 1/1/2009            | 10,000  | Yes                 |
| Brown | 12/31/1958           | 1/1/2010            | 15,000  | No                  |
| Green | 12/31/1971           | 1/1/2010            | 8,000   | No                  |
| Black | 12/31/1974           | 1/1/2010            | 3,000   | No                  |

Rate of return on profit sharing plan balances for 2012: 6.0%.

Selected annuity factors:

| <u>Age</u> | <u><math>{}_{65-x}  \ddot{a}_x^{(12)}</math></u> | <u>Age</u> | <u><math>{}_{65-x}  \ddot{a}_x^{(12)}</math></u> | <u>Age</u> | <u><math>{}_{65-x}  \ddot{a}_x^{(12)}</math></u> |
|------------|--|------------|--|------------|--|
| 37         | 1.02   | 43         | 1.59   | 49         | 2.49   |
| 38         | 1.10   | 44         | 1.71   | 50         | 2.69   |
| 39         | 1.18   | 45         | 1.85   | 51         | 2.90   |
| 40         | 1.28   | 46         | 1.99   | 52         | 3.13   |
| 41         | 1.37   | 47         | 2.14   | 53         | 3.38   |
| 42         | 1.48   | 48         | 2.31   | 54         | 3.65   |

There are no distributions from the profit sharing plan, and no contributions are made for any participant except Smith, during 2012.

Considering only top-heavy requirements,  $\$X$  is the maximum contribution that can be made to the profit sharing plan for Smith in 2012 on 12/31/2012 without making the plan top-heavy for 2013.

Question 28

In what range is  $\$X$ ?

- (A) Less than \$4,000
- (B) \$4,000 but less than \$7,000
- (C) \$7,000 but less than \$10,000
- (D) \$10,000 but less than \$13,000
- (E) \$13,000 or more

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Data for Question 29 (1 point)

Normal form of payment: Life annuity with ten years certain.

The plan's actuary has certified the 2011 AFTAP of 50.00% on July 1, 2011.

Data for participant Smith:

|                         |   |
|-------------------------|---|
| Marital status          | Single  |
| Date of retirement      | September 1, 2011   |
| Form of payment elected | Single life annuity that is actuarially equivalent to the normal form |

Consider the following statement:

The plan may pay Smith's benefit in the form elected in 2011.

Question 29

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 30 (4 points)

Plan type: Multiemployer.

Valuation date: 1/1/2012.

Normal retirement benefit: 1.25% of final year compensation times years of service.

Actuarial cost method: Frozen initial liability.

As of 1/1/2012, assumptions were changed.

The unfunded liability is adjusted as of 1/1/2012 to reflect the change in assumptions.

The 12/31/2011 credit balance is \$0.

Selected valuation results as of 1/1/2012:

|                                    | <u>Old assumptions</u> | <u>New assumptions</u> |
|------------------------------------|------------------------|------------------------|
| Present value of future benefits   | \$7,700,000            | \$8,900,000            |
| Present value of future salaries   | 43,400,000             | 41,000,000             |
| Unfunded liability                 | 1,500,000              |                        |
| Actuarial value of assets          | 3,400,000              | 3,400,000              |
| Normal cost as of 1/1              | 165,000                |                        |
| Entry age normal accrued liability | 5,300,000              | 6,100,000              |

Question 30

In what range is the normal cost as of 1/1/2012 based on the new assumptions?

- (A) Less than \$190,000
- (B) \$190,000 but less than \$200,000
- (C) \$200,000 but less than \$210,000
- (D) \$210,000 but less than \$220,000
- (E) \$220,000 or more

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Data for Question 31 (5 points)

Effective date: 1/1/2009.

Normal retirement benefit: 2% of final-year compensation per year of service.

Early retirement benefit: Accrued benefit reduced by 2.5% for each year prior to age 65.

Early retirement eligibility: Age 45.

Preretirement decrements: None.

Segment rates: {5.0%, 6.0%, 7.0%}.

Data for plan participant Smith:

|                    |           |
|--------------------|-----------|
| Date of birth      | 1/1/1967  |
| Date of hire       | 1/1/2003  |
| Date of retirement | 1/1/2012  |
| 2011 compensation  | \$120,000 |

Selected commutation functions:

| Age | <u>Segment rate 1</u> |        | <u>Segment rate 2</u> |        | <u>Segment rate 3</u> |        |
|-----|-----------------------|--------|-----------------------|--------|-----------------------|--------|
|     | $N_x^{(12)}$          | $D_x$  | $N_x^{(12)}$          | $D_x$  | $N_x^{(12)}$          | $D_x$  |
| 45  | 984,873               | 66,478 | 526,954               | 39,470 | 285,466               | 23,549 |
| 50  | 691,251               | 51,243 | 356,431               | 29,016 | 185,907               | 16,518 |
| 55  | 466,449               | 38,856 | 231,910               | 20,984 | 116,537               | 11,398 |
| 60  | 298,073               | 28,646 | 142,952               | 14,754 | 69,245                | 7,646  |
| 65  | 176,044               | 20,282 | 81,453                | 9,963  | 38,046                | 4,926  |

$\$X$  is the funding target at 1/1/2012.

$\$Y$  is the funding target that would have existed at 1/1/2012 if Smith had not retired.

Question 31

What is the absolute value of  $\$X - \$Y$ ?

- (A) Less than \$100,000
- (B) \$100,000 but less than \$105,000
- (C) \$105,000 but less than \$110,000
- (D) \$110,000 but less than \$115,000
- (E) \$115,000 or more

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Data for Question 32 (2 points)

Effective date: 1/1/2002.

Data for plan participant Smith:

|                     |            |
|---------------------|------------|
| Date of birth       | 1/1/1956   |
| Date of hire        | 1/1/2004   |
| Date of termination | 12/31/2006 |
| Date of rehire      | 1/1/2009   |

Compensation history:

|      |           |
|------|-----------|
| 2004 | \$100,000 |
| 2005 | 106,000   |
| 2006 | 116,000   |
| 2007 | 0         |
| 2008 | 0         |
| 2009 | 118,000   |
| 2010 | 104,000   |
| 2011 | 106,000   |

Question 32

What is the average compensation used for Smith as of 12/31/2011 for purposes of IRC section 415?

- (A) Less than \$110,000
- (B) \$110,000 but less than \$111,000
- (C) \$111,000 but less than \$112,000
- (D) \$112,000 but less than \$113,000
- (E) \$113,000 or more

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Data for Question 33 (3 points)

A plan sponsor sponsors a defined benefit (DB) and defined contribution (DC) plan.

Plan year for DB plan: 10/1 to 9/30.

Valuation date for DB plan: 10/1.

Plan year for DC plan: Calendar year.

Selected data:

|   | <u>Key employees</u> | <u>Non-key employees</u> |
|---|----------------------|--------------------------|
| PVAB in DB plan as of 10/1/2010             | \$200,000            | \$100,000                |
| PVAB in DB plan as of 10/1/2011             | 225,000              | 90,000                   |
| PVAB in DB plan as of 10/1/2012             | 190,000              | 160,000                  |
| Account balance in DC plan as of 12/31/2010 | \$80,000             | \$50,000                 |
| Account balance in DC plan as of 12/31/2011 | 130,000              | 60,000                   |

Question 33

In what range is the top-heavy ratio that will be used to determine whether the defined contribution plan is top-heavy for 2012?

- (A) Less than 0.60
- (B) 0.60 but less than 0.63
- (C) 0.63 but less than 0.66
- (D) 0.66 but less than 0.69
- (E) 0.69 or more

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Data for Question 34 (3 points)

2011 effective interest rate: 7.00%.

2012 effective interest rate: 6.00%.

Funding standard carryover balance as of 1/1/2011: \$2,500.

Prefunding balance as of 1/1/2011: \$1,000.

Minimum required contribution as of 1/1/2011: \$150,000.

Minimum required contribution as of 1/1/2012: \$50,000.

Contributions:

\$150,000 deposited on 12/31/2011

\$40,000 deposited on 12/31/2012

There are no unpaid minimum required contributions prior to 2011.

Question 34

In what range is the initial excise tax on the unpaid minimum required contribution for the 2012 tax year?

- (A) Less than \$1,800
- (B) \$1,800 but less than \$1,900
- (C) \$1,900 but less than \$2,000
- (D) \$2,000 but less than \$2,100
- (E) \$2,100 or more

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Data for Question 35 (3 points)

Type of plan: Multiemployer.

Plan effective date: 1/1/2000.

Actuarial cost method: Aggregate.

Valuation interest rate: 7.0%.

Credit balance as of 12/31/2011: \$2,250,000.

Selected valuation results as of 1/1/2012:

|  |              |
|--|--------------|
| Present value of future benefits                               | \$50,000,000 |
| Actuarial (market) value of assets                             | 40,000,000   |
| Outstanding balance of waiver amounts required to be amortized | 1,500,000    |
| Present value of future compensation                           | 175,000,000  |
| Total 2012 expected compensation                               | 21,000,000   |

Question 35

In what range is the normal cost for 2012 as of 1/1/2012?

- (A) Less than \$1,250,000
- (B) \$1,250,000 but less than \$1,400,000
- (C) \$1,400,000 but less than \$1,550,000
- (D) \$1,550,000 but less than \$1,700,000
- (E) \$1,700,000 or more

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Data for Question 36 (5 points)

The plan sponsor elects to use the full corporate bond yield curve.

Selected values from 2012 full corporate bond yield curve:

| <u>Maturity</u> | <u>Yield</u> |
|-----------------|--------------|
| 1               | 1.0%         |
| 2               | 2.5%         |
| 3               | 3.5%         |
| 4               | 4.5%         |
| 5               | 5.5%         |
| 6               | 6.5%         |

2011 shortfall amortization installment: \$200,000.

There were no shortfall amortization bases established before 2011.

Funding standard carryover balance as of 1/1/2012: \$0.

Prefunding balance as of 1/1/2012: \$500,000.

Selected valuation results as of 1/1/2012 using the full corporate bond yield curve:

|                           |             |
|---------------------------|-------------|
| Actuarial value of assets | \$7,000,000 |
| Funding target            | 7,000,000   |
| Target normal cost        | 160,000     |
| Effective interest rate   | 5.50%       |

Actual asset return for 2012: 7.5%.

The plan sponsor elects to use the prefunding balance to satisfy the minimum required contribution for the 2012 plan year.

Question 36

In what range is the prefunding balance as of 1/1/2013?

- (A) Less than \$240,000
- (B) \$240,000 but less than \$250,000
- (C) \$250,000 but less than \$260,000
- (D) \$260,000 but less than \$270,000
- (E) \$270,000 or more

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Data for Question 37 (1 point)

Plan effective date: 1/1/2008.

2011 AFTAP (certified 8/1/2011): 65.00%.

There were no funding balances as of 1/1/2011.

As of 4/1/2012, the enrolled actuary had not certified the actual AFTAP for the 2012 plan year.

Consider the following statement:

Benefit accruals must cease beginning 4/1/2012.

Question 37

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 38 (3 points)

2011 FTAP: 85.00%.

2011 shortfall amortization installment: \$25,000.

2012 segment rates: {5.0%, 6.0%, 7.0%}.

Funding standard carryover balance as of 1/1/2012: \$40,000.

Prefunding balance as of 1/1/2012: \$140,000.

Selected valuation results as of 1/1/2012:

|                                    |             |
|------------------------------------|-------------|
| Actuarial (market) value of assets | \$1,100,000 |
| Funding target                     | 1,000,000   |
| Target normal cost                 | 40,000      |
| Effective interest rate            | 6.00%       |

Rate of return on assets during 2012: 1.50%.

Shortfall amortization factors for 2012:

|        |        |
|--------|--------|
| 7-year | 5.9982 |
| 6-year | 5.2932 |

The plan did not have any shortfall amortization bases before the 2011 plan year.

The plan sponsor did not make any contributions for the 2012 plan year and elects to apply balances to satisfy the minimum required contribution.

Question 38

In what range is the prefunding balance as of 1/1/2013?

- (A) Less than \$100,000
- (B) \$100,000 but less than \$110,000
- (C) \$110,000 but less than \$120,000
- (D) \$120,000 but less than \$130,000
- (E) \$130,000 or more

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Data for Question 39 (5 points)

Valuation date: 1/1/2013.

Funding standard carryover balance as of 1/1/2013: \$0.

Prefunding balance as of 1/1/2013: \$0.

Effective interest rate for 2013: 6.00%.

A funding shortfall exists as of 1/1/2012.

2012 minimum required contribution: \$1,000,000.

2013 minimum required contribution: \$1,200,000.

Contributions for 2013 plan year:

| <u>Date</u> | <u>Contribution</u> | <u>Days from 1/1/2013</u> |
|-------------|---------------------|---------------------------|
| 4/15/2013   | \$250,000           | 104                       |
| 7/15/2013   | 0                   | 195                       |
| 8/10/2013   | 250,000             | 221                       |
| 10/15/2013  | 0                   | 287                       |
| 11/10/2013  | 350,000             | 313                       |
| 1/15/2014   | 150,000             | 379                       |
| 9/15/2014   |                     | 622                       |

Question 39

In what range is the remaining contribution required on 9/15/2014 to meet the minimum funding standard for 2013?

- (A) Less than \$239,000
- (B) \$239,000 but less than \$247,500
- (C) \$247,500 but less than \$256,000
- (D) \$256,000 but less than \$264,500
- (E) \$264,500 or more

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Data for Question 40 (2 points)

Selected valuation data:

|                                    |              |
|------------------------------------|--------------|
| Actuarial (market) value of assets | \$90,000,000 |
| Funding target                     | 100,000,000  |
| Funding standard carryover balance | 10,000,000   |
| Prefunding balance                 | 10,000,000   |

Consider the following statement:

If the plan does not offer an optional form of benefit subject to benefit restrictions and, therefore, no benefit restrictions can apply, there is no deemed election under IRC section 436 to reduce the funding balances.

Question 40

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 41 (3 points)

Selected historical valuation information:

|                        | <u>2008</u> | <u>2009</u> | <u>2010</u> | <u>2011</u> | <u>2012</u> |
|------------------------|-------------|-------------|-------------|-------------|-------------|
| At-risk for plan year? | Yes         | No          | Yes         | Yes         | Yes         |

Selected valuation results as of 1/1/2012:

|  |               |
|--|---------------|
| Actuarial (market) value of assets                             | \$430,000,000 |
| Funding target disregarding At-risk assumptions                | 600,000,000   |
| At-risk funding target disregarding 5-year transition and load | 660,000,000   |
| Present value of prior shortfall bases                         | 29,000,000    |
| Participant count  | 20,000        |
| 7-year shortfall amortization factor                           | 5.9982        |

There are no funding balances as of January 1, 2012.

Question 41

In what range is the shortfall amortization installment for the shortfall amortization base established in 2012?

- (A) Less than \$30,500,000
- (B) \$30,500,000 but less than \$33,500,000
- (C) \$33,500,000 but less than \$36,500,000
- (D) \$36,500,000 but less than \$39,500,000
- (E) \$39,500,000 or more

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Data for Question 42 (4 points)

Plan type: Multiemployer.

Plan effective date: 1/1/1985.

The plan was amended effective 1/1/2012.

Actuarial cost method: Frozen initial liability.

Valuation interest rate: 7%.

Initial unfunded accrued liability: \$25,000,000.

Credit balance as of 12/31/2011: \$1,000,000.

Selected valuation results as of 1/1/2012:

|  |              |
|--|--------------|
| Actuarial (market) value of assets                 | \$40,000,000 |
| Present value of future benefits after plan change | 50,000,000   |
| Present value future of future compensation        | 150,000,000  |
| Covered payroll                                    | 20,000,000   |
| Entry age accrued liability before plan change     | 41,000,000   |
| Entry age accrued liability after plan change      | 46,000,000   |

Question 42

In what range is the **smallest amount that satisfies the minimum funding standard** for 2012 as of 12/31/2012?

- (A) Less than \$1,500,000
- (B) \$1,500,000 but less than \$1,600,000
- (C) \$1,600,000 but less than \$1,700,000
- (D) \$1,700,000 but less than \$1,800,000
- (E) \$1,800,000 or more

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Data for Question 43 (2 points)

Consider the following three tax rates:

*X* is the tax rate on reversions of qualified plan assets (provided there is a qualified replacement plan).

*Y* is the tax rate on failure to pay the excess of the liquidity shortfall over the liquid assets (assuming a timely correction is subsequently made).

*Z* is the tax rate for multiemployer plans on the amount of accumulated funding deficiency (assuming a timely correction is subsequently made).

Question 43

Which is the correct ordering of *X*, *Y* and *Z*?

- (A)  $X < Z < Y$
- (B)  $Y < X < Z$
- (C)  $Y < Z < X$
- (D)  $Z < X < Y$
- (E)  $Z < Y < X$

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Data for Question 44 (3 points)

Funding standard carryover balance as of 1/1/2012: \$5,000.

Prefunding balance as of 1/1/2012: \$3,000.

Selected valuation results as of 1/1/2012:

|   |           |
|---|-----------|
| Market value of assets                            | \$153,000 |
| Actuarial value of assets                         | 155,000   |
| Funding target (disregarding at-risk assumptions) | 180,000   |
| Funding target                                    | 185,000   |

In the prior two plan years, annuities were purchased in the following amounts:

|           |         |
|-----------|---------|
| For NHCEs | \$8,000 |
| For HCEs  | 2,000   |

Question 44

In what range is the AFTAP under IRC section 436 as of 1/1/2012?

- (A) Less than 81.00%
- (B) 81.00% but less than 82.00%
- (C) 82.00% but less than 83.00%
- (D) 83.00% but less than 84.00%
- (E) 84.00% or more

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Data for Question 45 (4 points)

Asset valuation method: Smoothed average value using assets on the valuation date and the two previous valuation dates.

Segment rates used for 2010 and 2011 valuation: {6.0%, 7.0%, 8.0%}.

Selected asset information:

|  | <u>2010</u> | <u>2011</u> | <u>2012</u> |
|--|-------------|-------------|-------------|
| Expected rate of return  | 6.75%       | 6.75%       |             |
| Market value of assets 1/1                                     | \$330,000   | \$270,000   | \$290,000   |
| Contributions made 7/1 of current<br>year for the current year | 44,000      | 6,000       |             |
| Benefit payments made 7/1                                      | 27,000      | 30,000      |             |
| Expenses paid from the trust                                   | 0           | 0           | 0           |

Question 45

In what range is the actuarial value of assets as of 1/1/2012?

- (A) Less than \$288,000
- (B) \$288,000 but less than \$294,000
- (C) \$294,000 but less than \$300,000
- (D) \$300,000 but less than \$306,000
- (E) \$306,000 or more

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Data for Question 46 (5 points)

Plan type: Multiemployer.

Valuation interest rate: 7%.

Benefits are paid annually as of 1/1.

Data for sole participants as of 1/1/2011:

|       | <u>Age</u> | <u>Spouse age</u> | <u>Annual benefit</u> | <u>Form of benefit</u> |
|-------|------------|-------------------|-----------------------|------------------------|
| Smith | 65         | 65                | \$20,000              | 100% J&S               |
| Jones | 65         | 65                | 20,000                | 100% J&S               |

Smith's spouse dies on 10/1/2011.

Selected commutation functions:

|          |         |          |        |             |         |             |        |
|----------|---------|----------|--------|-------------|---------|-------------|--------|
| $N_{65}$ | 339,200 | $D_{65}$ | 31,600 | $N_{65:65}$ | 272,000 | $D_{65:65}$ | 29,400 |
| $N_{66}$ | 307,600 | $D_{66}$ | 29,200 | $N_{66:66}$ | 242,600 | $D_{66:66}$ | 27,000 |
| $N_{67}$ | 278,400 |          |        | $N_{67:67}$ | 215,600 |             |        |

Question 46

In what range is the absolute value of the total mortality gain or loss experienced in 2011?

- (A) Less than \$29,000
- (B) \$29,000 but less than \$32,000
- (C) \$32,000 but less than \$35,000
- (D) \$35,000 but less than \$38,000
- (E) \$38,000 or more

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Data for Question 47 (3 points)

Valuation date: 1/1/2012.

Funding standard carryover balance as of 1/1/2011: \$15,000.

Prefunding balance as of 1/1/2011: \$1,000.

Effective interest rate for 2011: 4.00%.

Actual rate of return during 2011: 8.50%.

The minimum required contribution for the 2011 plan year is \$10,000.

The plan sponsor elected to apply \$10,000 of the carryover balance towards the 2011 minimum required contribution on 1/1/2011.

The plan sponsor made a single contribution of \$16,000 on 12/31/2011 for the 2011 plan year.

Question 47

In what range is the prefunding balance on 1/1/2012?

- (A) Less than \$16,150
- (B) \$16,150 but less than \$16,650
- (C) \$16,650 but less than \$17,150
- (D) \$17,150 but less than \$17,650
- (E) \$17,650 or more

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Data for Question 48 (3 points)

Plan year: 4/1 – 3/31.

The plan is a defined benefit plan with 50 participants.

Monthly normal retirement benefit: 3.29% of final 36-month average compensation per year of service.

Data for participant Smith as of 4/1/2012:

|                      |                         |
|----------------------|-------------------------|
| Date of birth        | 4/1/1947                |
| Date of hire         | 1/1/2006                |
| Date of termination  | 12/31/2008              |
| Monthly compensation | \$40,000 for all months |
| Vested percentage    | 100%                    |

Lump sum factors at attained age on 4/1/2012:

|   |       |
|---|-------|
| 12/2011 using applicable interest and mortality | 12.82 |
| 3/2012 using applicable interest and mortality  | 13.05 |

Applicable lookback month: The month preceding the first day of the stability period.

Stability period: One calendar quarter.

Question 48

In what range is the lump sum benefit payable to Smith on 4/1/2012?

- (A) Less than \$285,000
- (B) \$285,000 but less than \$295,000
- (C) \$295,000 but less than \$305,000
- (D) \$305,000 but less than \$315,000
- (E) \$315,000 or more

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Data for Question 49 (2 points)

A defined benefit plan covers 10 highly compensated and 40 non-highly compensated employees. There are no inactive participants.

The benefit formula is amended on 1/1/2011 to increase plan benefits effective 1/1/2012.

The plan has a funding standard carryover balance and a prefunding balance on 1/1/2012.

Consider the following statements for the 2012 plan year for purposes of IRC section 404:

- I. The cushion amount will be calculated by applying the amended formula to all participants.
- II. The plan's target normal cost will be calculated by applying the amended formula to all participants.
- III. The actuarial value of assets will be reduced by the funding standard carryover balance and prefunding balance to calculate the deduction limit.

Question 49

Which, if any, of the above statements is (are) true?

- (A) None
- (B) I only
- (C) II only
- (D) III only
- (E) The correct answer is not given by (A), (B), (C), or (D) above.

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Data for Question 50 (4 points)

Number of participants in 2011: 150.

Effective interest rate in 2012: 6.00%.

Funding standard carryover balance as of 1/1/2011: \$35,000.

Funding standard carryover balance as of 1/1/2012: \$38,000.

Liquidity shortfall on 3/31/2012: \$115,000.

Contribution on 3/31/2012 that would increase the 2012 FTAP to 100.00% if FTAP were determined taking into account benefits accruing during the plan year: \$100,000.

Selected valuation results:

|                                      | <u>1/1/2011</u> | <u>1/1/2012</u> |
|--------------------------------------|-----------------|-----------------|
| Funding target attainment percentage | 76.00%          |                 |
| Minimum required contribution        | \$85,000        | \$150,000       |

The first and second quarterly installments and the liquidity shortfall contributions were made on 7/15/2012. No funding balances were applied or contributions were made before 7/15/2012.

Question 50

In what range is the discounted value on 1/1/2012 of the contributions made on 7/15/2012?

- (A) Less than \$106,500
- (B) \$106,500 but less than \$116,500
- (C) \$116,500 but less than \$126,500
- (D) \$126,500 but less than \$136,500
- (E) \$136,500 or more

**\*\*END OF EXAMINATION\*\***

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## Solutions to EA-2(A) Examination Fall, 2011

### Question 1

The minimum required contribution under IRC section 430(a)(1)(i) is equal to the sum of the target normal cost, the shortfall amortization charge, and the waiver amortization charge (if any waiver exists). The target normal cost is reduced by any mandatory employee contributions (there are none in this question) and increased by the expected plan expenses (Treasury regulation 1.430(d)-1(b)(1)(iii)).

The funding shortfall is equal to the funding target less the actuarial value of the assets (reduced by the funding standard carryover balance and the prefunding balance).

$$\text{Funding shortfall as of 1/1/2012} = 850,000 - (685,000 - 5,000) = 170,000$$

The new 2012 shortfall amortization base is equal to the 2012 funding shortfall reduced by the outstanding balance of the prior shortfall amortization bases. The only prior shortfall amortization base is from 2011, with an amortization installment of \$8,000. Shortfall bases are amortized over 7 years, so there are 6 years remaining to fully amortize the 2011 base.

$$\text{Outstanding balance of 2011 shortfall amortization base} = 8,000 \times 5.0167 = 40,134$$

$$\text{2012 shortfall amortization base} = 170,000 - 40,134 = 129,866$$

This is amortized over 7 years.

$$\text{2012 shortfall amortization installment} = 129,866 \div 5.6354 = 23,045$$

$$\text{Minimum required contribution} = (50,000 + 22,500) + 23,045 + 8,000 = 103,545$$

The smallest amount that satisfies the minimum funding standard (X) is equal to the minimum required contribution reduced by any funding standard carryover and prefunding balance elected to be used by the employer. The general exam conditions state that it is assumed that the employer elects to use the balance.

$$X = 103,545 - 5,000 = 98,545$$

Answer is D.

## Question 2

Compensation used to determine plan benefits must be limited to the IRC section 401(a)(17) limit for each year before averaging the compensation. The highest 3 consecutive years of compensation are from 2006 through 2008, and the 401(a)(17) limits for those years are 220,000, 225,000, and 230,000, respectively. The 2006 compensation paid of 255,000 must be limited to 220,000, and the 2007 and 2008 compensation paid is not limited (because in each year it is below the 401(a)(17) limit).

Smith has 35 years of service as of 1/1/2012.

$$\begin{aligned}\text{Accrued benefit on 1/1/2012} &= 1\% \times \frac{220,000 + 220,000 + 225,000}{3} \times 35 \text{ years} \\ &= 77,583\end{aligned}$$

Answer is C.

Note that Smith is age 65, and the accrued benefit is well below the IRC section 415(b) limit.

### Question 3

The deductible limit for a single employer plan under IRC section 404(o)(2)(A) is equal to the sum of the funding target, the target normal cost, and the cushion amount, with the sum being reduced by the actuarial value of assets. The cushion amount under IRC section 404(o)(3)(A) is equal to the sum of 50% of the funding target plus the increase in the funding target if future compensation increases were taken into account. The plan is not at-risk, so the not at-risk numbers should be used.

$$\text{Cushion amount} = (50\% \times 10,000,000) + (11,500,000 - 10,000,000) = 6,500,000$$

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

$$435,000 + 10,000,000 + 6,500,000 - 16,500,000 = 435,000$$

For plans that are not at-risk, the deductible limit can be determined under IRC section 404(o)(2)(B), if that gives a larger result than the deductible limit under IRC section 404(o)(2)(A). The deductible limit under IRC section 404(o)(2)(B) is equal to the sum of the funding target and target normal cost, if each were determined as if the plan was at-risk, with the sum being reduced by the actuarial value of assets.

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

$$500,000 + 16,500,000 - 16,500,000 = 500,000$$

The deductible limit is the larger of the IRC section 404(o)(2)(A) and 404(o)(2)(B) limits, which is 500,000.

Answer is B.

## Question 4

The minimum required contribution under IRC section 430(a)(1)(i) is equal to the sum of the target normal cost, the shortfall amortization charge, and the waiver amortization charge (if any waiver exists).

The funding shortfall is equal to the funding target less the actuarial value of the assets (reduced by the funding standard carryover balance and the prefunding balance).

$$\text{Funding shortfall as of 1/1/2012} = 100,000 - (94,000 - 5,500) = 11,500$$

Since there were no shortfall amortization bases prior to 2012, the 1/1/2012 funding shortfall is the shortfall amortization base for 2012. This is amortized over 7 years.

$$\text{2012 shortfall amortization installment} = 11,500 \div 5.9982 = 1,917$$

$$\text{Minimum required contribution} = 8,000 + 1,917 = 9,917$$

The contributions for 2012 must be interest adjusted using the 2012 plan effective rate from the date they were contributed to 1/1/2012.

$$\begin{aligned} \text{Interest adjusted 2012 contributions} &= (8,400 \div 1.0652^{3/12}) + (10,000 \div 1.0652^{15/12}) \\ &= 8,268 + 9,241 = 17,509 \end{aligned}$$

$$\text{Excess contribution for 2012} = 17,509 - 9,917 = 7,592$$

The excess contribution is added to the prefunding balance in 2013 (this must be elected by the employer, and the exam general conditions state that the employer makes that election). The excess contribution is increased with interest to 1/1/2013 using the 2012 plan effective rate. (Note that once the excess contribution has been added to the prefunding balance, it is given interest using the actual plan rate of return. But for the year in which the excess contribution is made, the excess contribution is not yet part of the prefunding balance and is thus given interest at the current year plan effective rate.)

In addition, \$4,000 of the funding standard carryover balance is used to pay for the 2012 plan contribution, resulting in an additional \$4,000 of excess contribution. Because it was not necessary to apply the \$4,000 to the minimum, it simply moves over from the funding standard carryover balance to the prefunding balance. If it had not been applied, it would have been increased with interest to 1/1/2013 using the 2012 asset rate of return. The addition to the prefunding balance is applied in the same manner.

$$\text{1/1/2013 prefunding balance} = (7,592 \times 1.0652) + (4,000 \times 1.03) = 12,207$$

Answer is C.

## Question 5

Treasury regulation 1.430(h)(2)-1(e)(1) states that once an election with regard to the use of segment rates or the full yield curve is made, a change can only be made with regard to the interest rate (including the lookback month for the segment rates) with consent of the Commissioner. If a plan sponsor first elects to use the segment rates, and then wants to change to the full yield curve, there is an exception in the regulations that allows this change with no required approval. However, once the plan sponsor has elected to use the full yield curve, a change back to the segment rates requires consent of the Commissioner.

Treasury regulation 1.430(g)-1(f)(3) provides approval without consent of the Commissioner of a change in the asset valuation method, provided the change occurs in the plan year beginning in 2008, 2009, or 2010. A change in the asset valuation method requires consent of the Commissioner for plan years beginning in 2011 or later.

I. This statement is false because approval is required for a change from the full yield curve to the segment rates under Treasury regulation 1.430(h)(2)-1(e)(1).

II. This statement is false because approval is required for a change in the asset valuation method that occurs after 2010 under Treasury regulation 1.430(g)-1(f)(3).

III. This statement is false because approval is required for a change in the segment rate lookback month under Treasury regulation 1.430(h)(2)-1(e)(1).

Answer is A.

## Question 6

In 2012, the presumed AFTAP is 92% (the certified 2011 AFTAP) from 1/1/2012 until 3/31/2012. The presumed AFTAP reduces by 10 percentage points to 82% from 4/1/2012 until 9/30/2012 (because the 2012 AFTAP has not yet been certified).

The restriction on accelerated distributions (such as lump sums) does not apply if the AFTAP (or presumed AFTAP) is at least 80%. The statement is true.

Answer is A.

## Question 7

The funding target of \$93,900,000 is less than the actuarial value of the assets reduced by the funding standard carryover balance and prefunding balance ( $\$95,700,000 - \$1,685,000 = \$94,015,000$ ), resulting in a funding shortfall of zero. IRC section 430(c)(6) states that when the funding shortfall is zero, all shortfall amortization bases from preceding years are deemed to be zero. As a result, there are no shortfall amortization bases in 2012.

The target normal cost of \$2,750,000 is reduced by the excess of the actuarial value of assets (reduced by the funding standard carryover and prefunding balances) over the funding target (as required by IRC section 430(a)(2)). The reduced target normal cost is:

$$\$2,750,000 - (\$94,015,000 - \$93,900,000) = \$2,635,000$$

That is the minimum required contribution as of 1/1/2012.

The \$200,000 deposited on 7/1/2012 must be interest adjusted to 1/1/2012 using the 2012 plan effective rate of 6%:

$$\$200,000 \div 1.06^{6/12} = \$194,257$$

The exam general conditions state that the employer elects to use the funding standard carryover balance to reduce the minimum required contribution. The smallest amount that satisfies the minimum funding standard as of the 1/1/2012 valuation date is:

$$\$2,635,000 - \$194,257 - \$1,685,000 = \$755,743$$

The contribution, \$X, is made on 12/31/2012, so this amount must be increased with interest using the 2012 plan effective rate.

$$\$X = \$755,743 \times 1.06 = \$801,088$$

Answer is B.

### **Question 8**

An election by the employer to add an excess contribution to the prefunding balance must be made by the minimum funding due date (not the end of the plan year). See Treasury regulation 1.430(f)-1(f)(2)(i). The statement is false.

Answer is B.

### **Question 9**

IRC section 404(o)(3)(B) provides that for a plan covered by the PBGC, the portion of the cushion amount that reflects the increase in the funding target if future salary increases are taken into account can include salary increases above the current IRC section 401(a)(17) salary limitation. However, increases above the current IRC section 415(b) limit cannot be taken into account. The statement is false.

Answer is B.

## Question 10

Treasury regulation 1.430(d)-1(c)(1)(ii) provides rules with regard to the allocation of benefits that are not earned based upon years of service, such as the postretirement death benefit in this question. Specifically, the benefit is allocated based on proportional years of service with the employer. For purposes of the funding target, Smith has 21 years of past service, and will have 41 years of service at retirement age 65. Therefore, Smith must be allocated  $21/41$  of the present value of the death benefit as the funding target associated with that death benefit.

Recall from life contingencies that the present value (at age 65) of the \$5,000 death benefit payable at the end of the year of death is  $5000A_{65}$ . The commutation functions provided relate to annuities rather than insurance functions. However, the following formula from life contingencies can be used:

$A_{65} = 1 - d\ddot{a}_{65}$ , where  $d$  is the rate of discount

Note that Smith is currently age 45, so all death benefit payments will be made more than 20 years from 1/1/2012 – resulting in the use of only the segment 3 interest rate of 7%.

$$d = \frac{i}{1+i} = \frac{.07}{1.07} = 0.0654$$

$$\ddot{a}_{65} = \frac{N_{65}}{D_{65}} = \frac{122,078}{11,408} = 10.7011$$

$$A_{65} = 1 - (0.0654 \times 10.7011) = 0.3$$

The postretirement death benefit is not payable unless Smith survives to age 65, so preretirement mortality must be taken into account.

$$\text{Present value of death benefit} = 5,000 \times A_{65} \times \frac{D_{65}}{D_{45}} = 5,000 \times 0.3 \times \frac{11,408}{46,958} = 364.41$$

$$X = 364.41 \times (21/41) = 186.65$$

Answer is A.

## Question 11

The \$22 benefit level must be taken into account in the 2012 valuation, but the \$24 benefit level is ignored because it does not become effective until 2013.

The target normal cost for Smith for 2012 as of 1/1/2012 is equal to the present value of the difference between the 12/31/2012 accrued benefit and the 1/1/2012 accrued benefit. The benefit formula provides a flat benefit of \$22 per month per year of service, so the increase in the 2012 accrued benefit is \$22.

In determining the present value, the segment interest rates must be used. Smith is 60 as of 1/1/2012. The segment 2 interest rate (applicable to payments that begin at least 5 years and no more than 20 years from the valuation date) is applicable for Smith's payments beginning at age 65 and prior to age 80. The segment 3 interest rate (applicable to payments that begin at least 20 years from the valuation date) is applicable for Smith's benefit payments beginning at age 80. Note that age 65 is the assumed retirement age under the general conditions of the exam.

$$\begin{aligned}\text{Smith target normal cost}_{1/1/2012} &= 22 \times 12 \times \left[ \frac{N_{65@6\%}^{(12)} - N_{80@6\%}^{(12)}}{D_{60@6\%}} + \frac{N_{80@7\%}^{(12)}}{D_{60@7\%}} \right] \\ &= 264 \times \left[ \frac{232,565 - 41,453}{29,032} + \frac{18,666}{16,527} \right] = 2,036\end{aligned}$$

The funding target for Smith for 2012 as of 1/1/2012 is equal to the present value of the 1/1/2012 accrued benefit (again, using the \$22 benefit level).

Smith accrued benefit on 1/1/2012 = \$22 × 25 years of service = \$550

$$\text{Smith funding target}_{1/1/2012} = 550 \times 12 \times \left[ \frac{N_{65@6\%}^{(12)} - N_{80@6\%}^{(12)}}{D_{60@6\%}} + \frac{N_{80@7\%}^{(12)}}{D_{60@7\%}} \right] = 50,901$$

$$X = 2,036 + 50,901 = 52,937$$

Answer is B.

## Question 12

Accrued benefit for Smith =  $200 \times 13$  years of service = 2,600

This is far below the IRC section 415(b) dollar limit, even though Smith is only age 40. Therefore, this solution will ignore the determination of the 415 limit.

The segment 3 interest rate is the only rate that applies because Smith is more than 20 years from the retirement age of 65 (assumed per general exam conditions).

$$\text{Lump sum} = 2,600 \times 12 \times \frac{N_{65@7\%}^{(12)}}{D_{65@7\%}} \times v_{@7\%}^{25} = 31,200 \times \frac{116,222}{11,387} \times 0.184249 = 58,673$$

Answer is B.

## Question 13

IRC section 430(i)(4) provides that a plan is in at-risk status if the funding target attainment percentage for the prior year is less than 80% and the funding target attainment percentage for the prior year (using the additional at-risk actuarial assumptions) is less than 70%. In addition, the plan must have more than 500 participants on each day of the prior plan year (see IRC section 430(i)(6)). For purposes of the participant count, all plans of the employer other than multiemployer plans are combined.

This plan had only 450 single employer plan participants in 2011, and is therefore not at-risk in 2012. The statement is false.

Answer is B.

## Question 14

The top heavy minimum benefit for a defined benefit plan as required under IRC section 416(c)(1) is equal to 2% of the high consecutive 5-year average compensation for each year of top heavy participation that the participant has, up to a maximum of 10 years. This is an alternative to the plan accrued benefit, so that the participant receives the greater of the top heavy minimum, or the accrued benefit under the plan benefit formula. Only non-key employees are required to receive the top heavy minimum benefit.

Smith is a key employee, and is only entitled to the plan benefit of \$42,000.

$$X = \$42,000$$

The top heavy minimum benefit for Jones is:

$$2\% \times \$185,000 \times 10 \text{ years of top heavy participation} = \$37,000$$

Note that the top heavy service for Jones was limited to 10 years. The top heavy minimum for Jones is greater than the plan accrued benefit of \$35,000.

$$Y = \$37,000$$

The top heavy minimum benefit for Brown is:

$$2\% \times \$110,000 \times 4 \text{ years of top heavy participation} = \$8,800$$

The top heavy minimum for Brown is smaller than the plan accrued benefit of \$11,000.

$$Z = \$11,000$$

$$X + Y + Z = \$42,000 + \$37,000 + \$11,000 = \$90,000$$

Answer is B.

## Question 15

In order for a plan to be considered at-risk under IRC section 430(i)(4) and (6), the plan must have more than 500 participants in the prior year, the FTAP (determined without at-risk assumptions) for the prior year must be less than 80%, and the FTAP (determined with the at-risk assumptions) for the prior year must be less than 70%. Prior to 2012, the plan was not at-risk because the FTAP was always greater than 100%. However, the plan is at-risk in 2012 because the 2011 FTAP (determined without at-risk assumptions) is 69% -- and it can thus be assumed that the 2011 FTAP (determined with the at-risk assumptions) would be less than or equal to 69%.

In the first year that a plan is at-risk, there is no load under IRC section 430(i)(1) and (2), because the plan has not been at-risk in at least 2 of the last 4 years. In the first year that the plan is at-risk, the funding target and target normal cost are determined by combining 80% of the not at-risk number and 20% of the at-risk number (IRC section 430(i)(5)).

$$2012 \text{ funding target} = (80\% \times \$10,000,000) + (20\% \times \$12,000,000) = \$10,400,000$$

$$2012 \text{ target normal cost} = (80\% \times \$1,000,000) + (20\% \times \$1,200,000) = \$1,040,000$$

The funding shortfall as of 1/1/2012 is equal to the funding target less the actuarial value of the assets (reduced by the funding standard carryover balance and the prefunding balance).

$$\text{Funding shortfall} = \$10,400,000 - (\$7,900,000 - \$200,000) = \$2,700,000$$

The 2012 shortfall amortization base is equal to the difference between the 2012 funding shortfall and the outstanding balance of the prior amortization bases. The only prior amortization base is the 2011 shortfall amortization base. There are 6 years left to amortize that base.

$$\text{Outstanding balance of 2011 base as of 1/1/2012} = \$75,000 \times 5.2932 = \$396,990$$

$$2012 \text{ shortfall amortization base} = \$2,700,000 - \$396,990 = \$2,303,010$$

$$7\text{-year amortization of 2012 shortfall base} = \$2,303,010 \div 5.9982 = \$383,950$$

The minimum required contribution is equal to the sum of the target normal cost and the amortization of the bases.

$$2012 \text{ minimum required contribution} = \$1,040,000 + \$75,000 + \$383,950 = \$1,498,950$$

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution, less the amount of the funding standard carryover balance and prefunding balance elected by the employer to be applied towards the minimum. The exam general conditions state that the employer is assumed to elect the maximum amount that can be applied towards the minimum in order to avoid a funding deficiency. IRC section 430(f)(3)(C) provides that none of the funding standard carryover and prefunding balance may be applied towards the minimum if the FTAP (determined without regard to the funding standard carryover balance) for the prior year is less than 80%. That is the case in this question (note that there is no funding standard carryover balance in 2012 – if there had been one, then the FTAP without this carryover balance would have been greater than 69%), so none of the \$200,000 prefunding balance may be used to reduce the minimum.

As a result, the smallest amount that satisfies the minimum funding standard is \$1,498,950.

Answer is C.

## Question 16

The normal cost under the unit credit cost method is equal to the present value of the increase in the accrued benefit in the current year. The plan is amended to change that accrual from \$25 to \$30. As a result, the 2012 normal cost will increase pro-rata (using a multiplier of 30/25). Note that only active participants have a normal cost.

$$1/1/2012 \text{ normal cost} = \$500,000 \times (30/25) = \$600,000$$

The experience gain or loss under the unit credit method is equal to the difference between the actual unfunded accrued liability (determined before the amendment is taken into account) and the expected unfunded accrued liability. The actual unfunded accrued liability (UAL) is the difference between the accrued liability for all participants and the actuarial value of the assets.

$$1/1/2012 \text{ actual UAL} = (\$7,500,000 + \$7,500,000) - \$12,000,000 = \$3,000,000$$

The expected unfunded accrued liability can be determined by using the balance equation:

$$\text{Unfunded liability} = \text{Outstanding balance} - \text{Credit balance}$$

The outstanding balance is equal to the present value of the future payments with regard to the prior amortization bases.

$$\begin{aligned} \text{Outstanding balance} &= (\$150,000 \times \ddot{a}_{\overline{13}|}) + (\$125,000 \times \ddot{a}_{\overline{14}|}) \\ &= \$1,341,403 + \$1,169,706 = \$2,511,109 \end{aligned}$$

$$1/1/2012 \text{ expected unfunded liability} = \$2,511,109 - \$500,000 = \$2,011,109$$

The actual unfunded liability is greater than the expected unfunded liability, so the difference is the 2011 experience loss.

$$2011 \text{ experience loss} = \$3,000,000 - \$2,011,109 = \$988,891$$

This is amortized over 15 years under IRC section 431(b)(2)(iii).

An amortization base must also be created under IRC section 431(b)(2)(ii), to be amortized over a period of 15 years, due to the plan amendment increasing benefits. This base is equal to the increase in the accrued liability due to the plan amendment. The amendment only affects accruals after 2011, so there is no change in the accrued liability, and no new base is needed.

The minimum required contribution is equal to the sum of the normal cost and the amortization charges associated with the bases.

$$\begin{aligned} \text{Minimum required contribution}_{1/1/2012} &= \$600,000 + \$150,000 + \$125,000 + \frac{\$988,891}{\ddot{a}_{\overline{15}|}} \\ &= \$600,000 + \$150,000 + \$125,000 + \$101,472 \\ &= \$976,472 \end{aligned}$$

The smallest amount that satisfies the minimum funding standard (\$X) is equal to the minimum required contribution less the credit balance. The question is asking for this as of the end of the year, so the difference must be increased with valuation interest to the end of the year.

$$\$X = (\$976,472 - \$500,000) \times 1.07 = \$509,825$$

Answer is C.

## Question 17

The entry age normal cost method includes a normal cost (given as \$250,000 for 2012) and amortization charges associated with amortization bases. There is an initial base of \$1,000,000 (the accrued liability from the plan effective date of 1/1/2011) that is amortized over 15 years (IRC section 431(b)(2)(i)). Each year, there is an experience gain/loss base that is also amortized over 15 years (the 2011 loss is given as \$200,000). In addition, there is a new amortization base created on 1/1/2012 due to the change in actuarial assumptions (IRC section 431(b)(2)(iv)) also amortized over 15 years. The assumption change base is equal to the difference between the accrued liability under the new assumptions and what the accrued liability would have been under the old assumptions.

The accrued liability is provided under the new assumptions, but not the old assumptions. However it can be developed from the 2011 gain/loss analysis. The experience gain or loss is equal to the difference between the actual unfunded accrued liability (determined before the assumption change is taken into account) and the expected unfunded accrued liability. The actual unfunded accrued liability (UAL) is the difference between the accrued liability for all participants and the actuarial value of the assets. The expected unfunded liability can be determined by adding the 2011 accrued liability and normal cost, increasing the result with interest from 1/1/2011 to 1/1/2012, and reducing this by the contribution for 2011.

$$\text{Actual UAL} = 1/1/2012 \text{ AL} - \$400,000$$

$$\text{Expected UAL} = [(\$1,000,000 + \$200,000) \times 1.07] - \$400,000 = \$884,000$$

There was a \$200,000 loss in 2011, so the actual UAL should exceed the expected UAL by \$200,000.

$$1/1/2012 \text{ AL} - \$400,000 = \$884,000 + \$200,000$$

$$1/1/2012 \text{ AL} = \$1,484,000$$

The accrued liability after the interest rate change is \$1,800,000, so the new base due to the change in the interest assumption is:

$$\$1,800,000 - \$1,484,000 = \$316,000$$

The initial amortization base was originally amortized using an interest rate of 7%, and it must now be re-amortized over the remaining 14 years at the new rate of 6% (the new experience loss and assumption change bases are amortized over 15 years at the new 6% interest rate). The outstanding balance of the initial base (determined prior to the interest rate change) is:

$$\$1,000,000 \times \frac{\ddot{a}_{14,07}^-}{\ddot{a}_{15,07}^-} = \$960,205$$

The minimum required contribution (MRC) is equal to the sum of the normal cost and the amortization charges associated with the bases.

$$\begin{aligned} \text{MRC}_{1/1/2012} &= \$250,000 + \frac{\$960,205}{\ddot{a}_{14,06}^-} + \frac{\$200,000}{\ddot{a}_{15,06}^-} + \frac{\$316,000}{\ddot{a}_{15,06}^-} \\ &= \$250,000 + \$97,456 + \$19,427 + \$30,695 \\ &= \$397,578 \end{aligned}$$

The smallest amount that satisfies the minimum funding standard (\$X) is equal to the minimum required contribution less the credit balance. The question is asking for the minimum as of the end of the year, so the difference must be increased with valuation interest to the end of the year. The credit balance as of 1/1/2012 is equal to the difference between the 2011 contribution and the 2011 minimum required contribution (normal cost plus 15-year amortization of the initial base at 7% interest – rolled forward to the end of 2011 with interest at 7%).

$$\begin{aligned} \text{Credit balance}_{12/31/2011} &= \$400,000 - \left[ (\$200,000 + \frac{\$1,000,000}{\ddot{a}_{15,07}^-}) \times 1.07 \right] \\ &= \$400,000 - [(\$200,000 + \$102,612) \times 1.07] = \$76,205 \end{aligned}$$

$$\$X = (\$397,578 - \$76,205) \times 1.06 = \$340,655$$

Answer is C.

## Question 18

The minimum required contribution under IRC section 430(a)(1)(i) is equal to the sum of the target normal cost, the shortfall amortization charge, and the waiver amortization charge (if any waiver exists).

The funding shortfall is the excess of the funding target over the actuarial value of assets (reduced by the funding standard carryover balance and the prefunding balance).

$$\text{Funding shortfall}_{1/1/2011} = \$140,000 - (\$130,000 - \$10,000) = \$20,000$$

A shortfall amortization base of \$20,000 (amortized over 15 years, as elected) was created in 2011.

$$\text{2011 shortfall amortization installment} = \$20,000/10.7931 = \$1,853$$

$$\text{Funding shortfall}_{1/1/2012} = \$155,000 - \$130,000 = \$25,000$$

The new shortfall amortization base for 2012 is equal to the 2012 funding shortfall less the outstanding balance of the 2011 shortfall base (14 years remaining).

$$1/1/2012 \text{ outstanding balance of 2011 shortfall base} = \$1,853 \times 10.4775 = \$19,415$$

$$\text{2012 shortfall amortization base} = \$25,000 - \$19,415 = \$5,585$$

This is amortized over 7 years (no special 15-year election is made for 2012).

$$\text{2012 shortfall installment} = \$5,585/6.1596 = \$907$$

$$\text{Minimum required contribution} = \$7,000 + \$1,853 + \$907 = \$9,760$$

The smallest amount that satisfies the minimum funding standard (\$X) is equal to the minimum required contribution less the funding standard carryover and prefunding balances. Since there are no funding balances as of 1/1/2012, \$X is equal to \$9,760.

Answer is C.

## Question 19

The minimum required contribution is equal to the sum of the target normal cost and the amortization of any shortfall or waived deficiency bases. There are no prior shortfall bases, and the current funding shortfall (the difference between the funding target and the actuarial value of the assets) is \$0. As a result, the minimum required contribution is simply equal to the target normal cost.

The target normal cost is equal to the present value of the increase in the accrued benefit for the year. For this purpose, the beginning of year accrued benefit uses salary history through the end of the prior year, and the end of year accrued benefit includes any assumed salary increase for the current year. Prior to the change in actuarial assumptions, there is no assumed salary increase – so that the high consecutive 3-year average salary is \$240,000. This results in a target normal cost of \$36,240. The accrued benefit used to determine that target normal cost is equal to 5% of \$240,000, which is \$12,000.

Using the new assumption of 10% salary increases (resulting in a projected salary for 2012 of \$264,000 – which must be limited to the 401(a)(17) limit of \$245,000), the beginning and end of year accrued benefits for 2012 are:

$$\begin{aligned} 1/1/2012 \text{ accrued benefit} &= 5\% \times \$240,000 \times 3 \text{ years of service} = \$36,000 \\ 12/31/2012 \text{ accrued benefit} &= 5\% \times \frac{240,000 + 240,000 + 245,000}{3} \times 4 \text{ years of service} \\ &= \$48,333 \end{aligned}$$

The revised benefit to be used for the 2012 target normal cost is \$12,333 (\$48,333 - \$36,000).

$$X = \$36,240 \times (12,333/12,000) = \$37,246$$

Answer is C.

## Question 20

Smith's compensation must be limited to the IRC section 401(a)(17) maximum for each year. Treasury regulation 1.401(a)(17)-1(b)(3)(ii) indicates that for plans using compensation based on consecutive 12-month periods, compensation for each 12-month period is limited to the annual compensation limit using the limit in effect as of the first day of the 12-month period. The 12-month periods representing the plan year compensation are 1/1/2007 – 6/30/2007, 7/1/2007 - 6/30/2008, and so on for each plan year. Note that although Smith only received 6 months of compensation during the first half of 2007, the compensation (and 401(a)(17) limit) are not pro-rated because the compensation limit is only pro-rated for a short plan year; also, the compensation limit for that period is the limit in effect in 2006, because that is the year that the plan year begins in. Using the table provided with the exam, Smith's compensation history and limitation history is:

| <u>Period</u>    | <u>Salary</u>                       | <u>401(a)(17) limitation</u> |
|------------------|-------------------------------------|------------------------------|
| 1/1/07 – 6/30/07 | 245,000/2 = 122,600                 | 220,000                      |
| 7/1/07 – 6/30/08 | (245,000/2) + (220,000/2) = 232,500 | 225,000                      |
| 7/1/08 – 6/30/09 | (220,000/2) + (150,000/2) = 185,000 | 230,000                      |
| 7/1/09 – 6/30/10 | (150,000/2) + (300,000/2) = 225,000 | 245,000                      |
| 7/1/10 – 6/30/11 | (300,000/2) + (90,000/2) = 195,000  | 245,000                      |
| 7/1/11 – 6/30/12 | (90,000/2) + 173,000 = 218,000      | 245,000                      |

Smith's high consecutive 3-year average compensation (limiting each year's salary to the IRC section 401(a)(17) maximum) is from 7/1/09 through 6/30/12:

$$\frac{\$225,000 + \$195,000 + \$218,000}{3} = \$212,667$$

Answer is C.

## Question 21

The minimum required contribution under the unit credit cost method is equal to the normal cost plus the amortization of the various bases. The plan was established in 2008, so each amortization base is amortized over a period of 15 years using the valuation interest rate.

There is an initial base of \$2,000,000 established on 1/1/2008. The experience loss bases are positive bases, and the 2011 experience gain base is a negative base.

$$\begin{aligned} X &= 2,000,000 + \frac{2,000,000}{\ddot{a}_{15}} + \frac{600,000}{\ddot{a}_{15}} + \frac{900,000}{\ddot{a}_{15}} + \frac{100,000}{\ddot{a}_{15}} + \frac{150,000}{\ddot{a}_{15}} - \frac{789,312}{\ddot{a}_{15}} \\ &= 2,000,000 + 194,269 + 58,281 + 87,421 + 9,713 + 14,570 - 76,670 \\ &= 2,287,585 \end{aligned}$$

Answer is B.

Note that since there is no credit balance, the smallest amount that satisfies the minimum funding standard is the same as the minimum required contribution.

## Question 22

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

The adjusted fair market value from a particular valuation date is the fair market value on that date, adjusted for all contributions, benefit payments and administrative expenses that occurred between that valuation date and the current valuation date, and further adjusted for expected earnings based upon the actuary's best estimate of the asset rate of return for the year. If this expected rate of return is larger than the segment 3 interest rate, then the segment 3 interest rate is used. In this question, the segment 3 interest rate for 2011 of 7.5% is used to determine the expected earnings for that year (the assumed rate of return of 8.5% is larger).

In addition, the receivable contribution for the prior year must be included in the beginning asset value. That receivable contribution is interest adjusted from the date of contribution to the beginning of the year in which it was contributed using the plan effective rate for the year for which it was contributed (the prior year plan effective rate). It can be assumed that there is no receivable contribution for 2010 since no information is provided with regard to a 2010 receivable. However, there is a receivable contribution of \$1,000,000 for the 2011 plan year, so it must be included (interest adjusted using the 2011 plan effective rate of 6.5%) in both the 1/1/2012 market value of assets and the adjusted assets from 1/1/2011.

The expected earnings for 2011 are:

$$[(34,000,000 + 500,000) \times .075] - [(2,000,000 + 200,000) \times .0375] = 2,505,000$$

Note the use of simple interest in the determination of the expected earnings. The regulations do not require simple or compound interest, so either method is acceptable (although using compound interest would result in a slightly different numerical answer – but within the same answer range).

$$2011 \text{ receivable contribution as of } 1/1/2012 = 1,000,000 \div 1.065^{8/12} = 958,886$$

$$\begin{aligned} 1/1/2011 \text{ adjusted fair market value} \\ &= 34,000,000 + 500,000 - 2,000,000 - 200,000 + 2,505,000 + 958,886 \\ &= 35,763,886 \end{aligned}$$

$$\begin{aligned} 1/1/2012 \text{ fair market value (with receivable contribution)} \\ &= 44,000,000 + 958,886 = 44,958,886 \end{aligned}$$

$$1/1/2012 \text{ actuarial value} = (35,763,886 + 44,958,886)/2 = 40,361,386$$

Under IRC section 430(g)(3)(B)(iii), the actuarial value cannot be less than 90% of the market value of the assets. 90% of 44,958,886 is equal to 40,462,997. That is the actuarial value of assets.

Answer is D.

### Question 23

The minimum required contribution is equal to the sum of the target normal cost and the amortization of the shortfall bases. There are no shortfall bases from prior years, and there is no shortfall base in the current year because the funding target is equal to the actuarial value of the assets.

The present value of the benefit expected to accrue during the year is the target normal cost. When there are mandatory employee contributions, this is reduced by the amount of the employee contributions. In addition, the target normal cost is increased by the value of plan-related expenses expected to be paid for the year. See IRC section 430(b).

The mandatory employee contributions are 2% of total compensation:

$$2\% \times \$20,000,000 = \$400,000$$

The plan-related expenses are \$125,000.

There is no funding standard carryover balance or prefunding balance, so the smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution.

$$X = 2,000,000 - 400,000 + 125,000 = 1,725,000$$

Answer is B.

## Question 24

- I. Form 5500 must continue to be filed even though no contributions are made and benefit accruals have ceased. The instructions to Form 5500 make it clear that the form must continue to be filed as long as the plan still has assets. The statement is true.
- II. Revenue Ruling 79-237 indicates that the final Schedule B (or SB in the case of a single employer plan) is filed for the year of plan termination. The statement is false.
- III. If the plan termination does not occur, then Revenue Ruling 79-237 does not apply. The Schedule SB instructions would then require the continued filing of the Schedule SB. The statement is true.

Answer is C.

## Question 25

The AFTAP, as defined in IRC section 436(j)(1) and determined on the plan valuation date, is equal to the ratio of the actuarial value of assets (reduced by the funding standard carryover balance and prefunding balance) to the funding target, with both the numerator and denominator increased by the total purchases of annuities for the NHCEs during the last 2 years. Note that it can be assumed in this question that there were no annuities purchased because that information is not provided.

$$2012 \text{ AFTAP} = \frac{3,079,450 - (80,000 + 150,000)}{3,850,000} = 74.01\%$$

IRC section 436(d), relating to limitations on accelerated distributions, states that accelerated distributions, such as a lump sum in excess of \$5,000, are subject to limitation if the AFTAP is less than 80%. IRC section 436(f)(3) requires reduction of the funding balances to the extent that such reduction would increase the AFTAP to the point where the restriction on accelerated distributions does not apply. If a reduction of all of the funding balances would still result in the restriction applying, then there is no reduction in the funding balances.

If both the funding standard carryover and prefunding balances were reduced to 0, then the 2012 AFTAP would be:

$$\frac{3,079,450}{3,850,000} = 79.9857\%$$

The restriction would still apply because the AFTAP is still less than 80%. There is no deemed reduction in the funding balances, and  $X = 0$ .

Answer is A.

## Question 26

The normal cost under the projected unit credit cost method is equal to the present value of the increase in the accrued benefit for the plan year, taking into account future assumed salary increases for purposes of both the beginning of year and end of year accrued benefit.

Smith was hired in 2008 at age 37. Smith will have 25 years of service at age 62, and will therefore be eligible at that time for the enhanced early retirement benefit. It is assumed that there is a 50% probability of retirement at age 62, and a 50% probability of retirement at age 65. The normal cost is therefore the sum of 50% of the present value of the 2012 accrual if Smith elected to retire at age 62 and 50% of the present value of the 2012 accrual if Smith elected to retire at age 65.

The benefit formula is based upon the final 5-year average compensation. Using the 2.5% salary scale, the final 5-year average can be determined at the two assumed retirement ages of 62 and 65:

Final average compensation at age 62

$$= \$44,000 \times \frac{1.025^{17} + 1.025^{18} + 1.025^{19} + 1.025^{20} + 1.025^{21}}{5} = \$70,384$$

Final average compensation at age 65

$$= \$44,000 \times \frac{1.025^{20} + 1.025^{21} + 1.025^{22} + 1.025^{23} + 1.025^{24}}{5} = \$75,795$$

The annual accrual is 1% of the 5-year average compensation, so the 2012 accrual for each assumed retirement age is:

$$\text{Age 62: } 1\% \times \$70,384 = \$703.84$$

$$\text{Age 65: } 1\% \times \$75,795 = \$757.95$$

Note that the age 62 benefit is unreduced for early retirement due to the enhanced benefit feature.

The present values assume no preretirement decrements, since the question does not state that there are any decrements, and the exam general conditions provide for no preretirement decrements unless it is otherwise provided for in the question.

The present values are:

$$\begin{aligned}\text{Age 62 benefit: } \$703.84 \times \ddot{a}_{62}^{(12)} \times v^{21} &= \$703.84 \times (2,079,449/210,916) \times 0.2190 \\ &= \$1,520\end{aligned}$$

$$\begin{aligned}\text{Age 62 benefit: } \$757.95 \times \ddot{a}_{65}^{(12)} \times v^{24} &= \$757.95 \times (1,517,247/163,979) \times 0.1763 \\ &= \$1,236\end{aligned}$$

$$\text{Normal cost} = (50\% \times \$1,520) + (50\% \times \$1,236) = \$1,378$$

Answer is C.

## Question 27

The deductible limit for a single employer plan under IRC section 404(o)(2)(A) is equal to the sum of the funding target, the target normal cost, and the cushion amount, with the sum being reduced by the actuarial value of assets. The cushion amount under IRC section 404(o)(3)(A) is equal to the sum of 50% of the funding target plus the increase in the funding target if future compensation increases were taken into account. The plan is not at-risk (exam general condition), so the not at-risk numbers should be used.

$$\text{Cushion amount} = (50\% \times 24,000,000) + (26,000,000 - 24,000,000) = 14,000,000$$

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

$$700,000 + 24,000,000 + 14,000,000 - 17,000,000 = 21,700,000$$

For plans that are not at-risk, the deductible limit can be determined under IRC section 404(o)(2)(B), if that gives a larger result than the deductible limit under IRC section 404(o)(2)(A). The deductible limit under IRC section 404(o)(2)(B) is equal to the sum of the funding target and target normal cost, if each were determined as if the plan was at-risk, with the sum being reduced by the actuarial value of assets.

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

$$1,000,000 + 27,000,000 - 17,000,000 = 11,000,000$$

The deductible limit is the larger of the IRC section 404(o)(2)(A) and 404(o)(2)(B) limits, which is 21,700,000. (Note that the minimum required contribution of 2,300,000 could be deducted if that had been larger than the otherwise deductible limit.)

Answer is D.

## Question 28

A plan is top heavy under IRC section 416 if the top heavy ratio exceeds 60% for the year. The top heavy ratio is determined based upon the prior year present value of accrued benefits, determined on the valuation date for the prior year (12/31 in this question). All plans of the employer that have a key employee must be aggregated for purposes of the top heavy ratio – so the defined benefit plan and the profit sharing plan are aggregated, with the profit sharing account balances considered as the present value of accrued benefit in the profit sharing plan.

The present value of the accrued benefit for each participant must be calculated as of 12/31/2012. Note that age 65 is the assumed retirement age per the exam general conditions.

$$\text{Smith: } \$150 \times 12 \times {}_{17}\ddot{a}_{48}^{(12)} \times 8 \text{ years of service} = \$150 \times 12 \times 2.31 \times 8 = 33,264$$

$$\text{Jones: } \$150 \times 12 \times {}_{22}\ddot{a}_{43}^{(12)} \times 4 \text{ years of service} = \$150 \times 12 \times 1.59 \times 4 = 11,448$$

$$\text{Brown: } \$150 \times 12 \times {}_{11}\ddot{a}_{54}^{(12)} \times 3 \text{ years of service} = \$150 \times 12 \times 3.65 \times 3 = 19,710$$

$$\text{Green: } \$150 \times 12 \times {}_{24}\ddot{a}_{41}^{(12)} \times 3 \text{ years of service} = \$150 \times 12 \times 1.37 \times 3 = 7,398$$

$$\text{Black: } \$150 \times 12 \times {}_{27}\ddot{a}_{38}^{(12)} \times 3 \text{ years of service} = \$150 \times 12 \times 1.10 \times 3 = 5,940$$

$$\text{Total DB plan PVAB} = 33,264 + 11,448 + 19,710 + 7,398 + 5,940 = 77,760$$

The profit sharing plan account balances increased by 6% in 2012.

$$12/31/2012 \text{ key employee profit sharing balance} = (20,500 + 10,000) \times 1.06 = 32,330$$

$$\begin{aligned} 12/31/2012 \text{ non-key employee profit sharing balance} \\ = (15,000 + 8,000 + 3,000) \times 1.06 = 27,560 \end{aligned}$$

12/31/2012 top heavy ratio:

$$\frac{33,264 + 11,448 + 32,330 + X}{77,760 + 32,330 + 27,560 + X} = 60\% \quad \rightarrow \quad X = 13,870$$

Answer is E.

## Question 29

IRC section 436(d), relating to limitations on accelerated distributions, states that accelerated distributions, such as a lump sum in excess of \$5,000, is subject to limitation if the AFTAP is less than 80% (which is the case in this question). A benefit payment in the form of a life annuity is not subject to the limitation on accelerated distributions. Therefore, the statement is true.

Answer is A.

### Question 30

The frozen initial liability cost method consists of a normal cost and various amortization charges and credits. The amortization bases generally consist only of an initial accrued liability determined under the entry age normal method. However, when there is a plan amendment or an assumption change, the unfunded liability is increased (or decreased) by the change in the entry age normal accrued liability due to the amendment or assumption change. In this question, the 1/1/2012 unfunded liability is adjusted to reflect the increase in the entry age normal accrued liability due to the change in actuarial assumptions:

$$\text{Unfunded liability} = 1,500,000 + (6,100,000 - 5,300,000) = 2,300,000$$

The normal cost under the frozen initial liability cost method is equal to:

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

When the plan benefits are based upon compensation, the temporary annuity is equal to the ratio of the present value of future compensation to current compensation. Current compensation is not provided in the data for this question. However, the above formula can be used to determine the compensation used to calculate the normal cost under the old assumptions:

$$165,000 = \frac{7,700,000 - 3,400,000 - 1,500,000}{43,400,000 / \text{Compensation}} \rightarrow \text{Compensation} = 2,557,500$$

The normal cost based on the new assumptions is:

$$\text{NC} = \frac{8,900,000 - 3,400,000 - 2,300,000}{41,000,000 / 2,557,500} = 199,610$$

Answer is B.

### Question 31

The funding target is equal to the present value of the accrued benefit in effect at the beginning of the year. Smith has 9 years of service as of 1/1/2012, with an accrued benefit of:

$$2\% \times \$120,000 \times 9 \text{ years of service} = \$21,600$$

It is assumed based upon the general conditions of the exam that normal retirement age is 65. Smith actually retires on 1/1/2012 at age 45. The early retirement benefit payable to Smith is the accrued benefit reduced by 2.5% for the 20 years prior to age 65 that Smith has retired early.

$$\text{Early retirement benefit} = \$21,600 \times [1 - (2.5\%)(20 \text{ years})] = \$10,800$$

The actual funding target (\$X) as of 1/1/2012 is equal to the present value of the early retirement benefit. Using the segment interest rates, the segment 1 rate is used for each of the first 5 years of payments (age 45 through 50), segment 2 is used for the next 15 years of payments (age 50 through 65), and segment 3 is used for ages 65 and later. All payments must be discounted with interest and mortality because Smith is in pay status and is receiving a life annuity (exam general condition).

$$\begin{aligned} \$X &= \$10,800 \times \left[ \frac{N_{45@seg1}^{(12)} - N_{50@seg1}^{(12)}}{D_{45@seg1}} + \frac{N_{50@seg2}^{(12)} - N_{65@seg2}^{(12)}}{D_{45@seg2}} + \frac{N_{65@seg3}^{(12)}}{D_{45@seg3}} \right] \\ &= \$10,800 \times \left[ \frac{984,873 - 691,251}{66,478} + \frac{356,431 - 81,453}{39,470} + \frac{38,046}{23,549} \right] \\ &= \$140,391 \end{aligned}$$

The funding target if Smith had not retired (\$Y) is equal to the present value of the accrued benefit payable at age 65 as a life annuity. There are no preretirement decrements assumed in this question, so the discount from age 65 to age 45 is interest only. The segment 3 rate would be used for the funding target because Smith is 20 years from retirement.

$$\$Y = \$21,600 \times \left[ \frac{N_{65@seg3}^{(12)}}{D_{65@seg3}} \right] \times v_{seg3}^{20} = \$21,600 \times \left[ \frac{38,046}{4,926} \right] \times 0.2584 = \$43,111$$

$$\$X - \$Y = \$140,391 - \$43,111 = \$97,280$$

Answer is A.

### Question 32

Smith terminated employment on 12/31/2006 and had a 2-year break in service in 2007 and 2008 before being rehired on 1/1/2009. Treasury regulation 1.415(b)-1(a)(5)(iii) states that the break years are disregarded for purposes of IRC section 415 compensation, and the years 2006 and 2009 are thus considered as consecutive years. Average compensation under IRC section 415 is a high consecutive 3-year average. The high 3 consecutive years for Smith are 2005, 2006, and 2009.

$$\text{415 compensation} = \frac{106,000 + 116,000 + 118,000}{3} = 113,333$$

Answer is E.

### Question 33

The top heavy ratio under IRC section 416 is determined based upon the prior year present value of accrued benefits, determined on the valuation date for the prior year. All plans of the employer that have a key employee must be aggregated for purposes of the top heavy ratio – so the defined benefit plan and the DC plan are aggregated, with the DC account balances considered as the present value of accrued benefit in the DC plan. When the plan years of the plans being aggregated are different, Treasury regulation 1.416-1, Q&A T-23 addresses the method to be used to determine the top heavy ratio.

This question is asking for the top heavy ratio used to determine whether the DC plan is top heavy for 2012. The top heavy determination date for the 2012 DC plan year is 12/31/2011 (the determination date is always the last day of the prior year). The DC plan account balances to be used in the top heavy determination are from the most recent valuation during the 12-month period ending on 12/31/2011 – which is the 12/31/2011 account balance.

For the defined benefit plan, with a plan year that begins on 10/1 each year, the determination date is always 9/30 (the last day of the prior year). The determination date that must be considered here for the DB plan is 9/30/2011, because it occurs in the same calendar year as the determination date for the DC plan. The most recent valuation date during the 12-month period ending on 9/30/2011 is the 10/1/2010 valuation date – so that is the date for which the PVAB from the DB plan is used.

$$\text{TH ratio} = \frac{200,000 + 130,000}{200,000 + 130,000 + 100,000 + 60,000} = 67.35\%$$

Answer is D.

### Question 34

The minimum required contribution for 2011 as of 1/1/2011 is \$150,000. The only contribution available to pay for this in order to avoid a funding deficiency (paid within 8½ months after the end of 2011 – September 15, 2012) is the \$150,000 contribution paid on 12/31/2011. This is interest adjusted to the beginning of 2011 using the 2011 plan effective rate of 7%.

$$\text{Interest adjusted 12/31/2011 contribution} = 150,000/1.07 = 140,187$$

The general conditions state that the employer elects to use the funding standard carryover balance and prefunding balance to help to avoid a funding deficiency, when necessary. Therefore, the 1/1/2011 funding balances are also used to help pay for the 2011 minimum required contribution.

$$\text{Funding deficiency for 2011} = 150,000 - 140,187 - 2,500 - 1,000 = 6,313$$

Subsequent contributions must be applied towards the payment of the 2011 funding deficiency before they may be applied to future year minimum required contributions. The next chronological contribution is the \$40,000 deposited on 12/31/2012. Increasing the 2011 funding deficiency with interest at the 2011 plan effective rate to the date of the contribution on 12/31/2012:

$$6,313 \times 1.07^2 = 7,228$$

As a result, \$7,228 of the \$40,000 contribution must be used to pay off the 2011 funding deficiency. The remaining \$32,772 is available to be credited towards the 2012 minimum required contribution of \$50,000. The contribution is interest adjusted using the 2012 plan effective rate of 6%.

$$\text{Interest adjusted 12/31/2012 contribution} = 32,772/1.06 = 30,917$$

There are no longer any funding balances because they were used to help pay for the 2011 minimum required contribution.

$$\text{Funding deficiency for 2012} = 50,000 - 30,917 = 19,083$$

The excise tax for a single employer plan on an unpaid funding deficiency under IRC section 4971 is 10% of the amount of the funding deficiency.

$$\text{Excise tax for 2012} = \$19,083 \times 10\% = \$1,908$$

Answer is C.

### Question 35

The normal cost under the Aggregate cost method is generally equal to:

$$\frac{\text{Present value of future benefits} - \text{Actuarial value of assets (reduced by the credit balance)}}{\text{Temporary annuity}}$$

When the plan benefits are based upon compensation, the temporary annuity is equal to the ratio of the present value of future compensation to current compensation. It is not clear how plan benefits are being determined in this question, but the only data available to determine the temporary annuity is the compensation data, so that should be used.

In general, the aggregate method does not have amortization bases. However, in the case of a waived deficiency, the deficiency is amortized over a period of 15 years. The outstanding balance of the waived deficiency should be an additional subtraction item from the present value of future benefits in the above formula.

$$\text{Normal cost}_{1/1/2012} = \frac{50,000,000 - (40,000,000 - 2,250,000) - 1,500,000}{175,000,000 / 21,000,000} = 1,290,000$$

Answer is B.

### Question 36

The funding shortfall for 2012 is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the prefunding balance and the funding standard carryover balance). Note that there is no funding standard carryover balance.

The funding shortfall as of 1/1/2012 is:

$$\$7,000,000 - (\$7,000,000 - \$500,000) = \$500,000$$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the total pre-funding balance if the employer elects to use any part of it to reduce the minimum contribution requirement, but not reduced by the funding standard carryover balance) is at least as large as the funding target. It is given that the employer elects to use the prefunding balance in 2012 to satisfy the minimum required contribution, so the plan is not exempt from creating a new shortfall base because the assets reduced by the prefunding balance are less than the funding target. The new base is equal to the funding shortfall, less the outstanding balance of the prior shortfall amortization base.

The outstanding balance of the 1/1/2011 shortfall amortization base must be determined using the 2012 full yield curve rates that are provided. There are 6 payments left to fully amortize the 2011 base.

Outstanding balance of 1/1/2011 shortfall amortization base on 1/1/2012

$$= \$200,000 \times \left( 1 + \frac{1}{1.01} + \frac{1}{1.025^2} + \frac{1}{1.035^3} + \frac{1}{1.045^4} + \frac{1}{1.055^5} \right) = \$1,089,510$$

New 2012 shortfall amortization base = \$500,000 - \$1,089,510 = -\$589,510

Amortization of 2012 shortfall base (amortized over 7 years using full yield curve):

$$-\$589,510 \div \left( 1 + \frac{1}{1.01} + \frac{1}{1.025^2} + \frac{1}{1.035^3} + \frac{1}{1.045^4} + \frac{1}{1.055^5} + \frac{1}{1.065^6} \right) \\ = -\$96,123$$

The minimum required contribution is equal to the target normal cost plus/minus the amortization of each shortfall amortization base.

Minimum required contribution<sub>1/1/2012</sub> = \$160,000 + \$200,000 - \$96,123 = \$263,877

The minimum required contribution is reduced by the prefunding balance since no contribution is made for 2012. The remaining prefunding balance is increased to 1/1/2013 using the actual asset rate of return for 2012 (IRC section 430(f)(8)).

$$\text{Prefunding balance}_{1/1/2013} = (\$500,000 - \$263,877) \times 1.075 = \$253,832$$

Answer is C.

Note: It was assumed in this solution that the given yield curve rates were annual effective rates. However, it could be interpreted (although likely not intended) that the yield curve rates reflected the yield for the entire period to maturity. If that were the case, the amortization factors used to determine the outstanding balance of the 2011 shortfall amortization base and to amortize the 2012 shortfall base would be different. The following reflects the solution with that interpretation of the given data.

Outstanding balance of 1/1/2011 shortfall amortization base on 1/1/2012

$$= \$200,000 \times \left(1 + \frac{1}{1.01} + \frac{1}{1.025} + \frac{1}{1.035} + \frac{1}{1.045} + \frac{1}{1.055}\right) = \$1,167,339$$

$$\text{New 2012 shortfall amortization base} = \$500,000 - \$1,167,339 = -\$667,339$$

Amortization of 2012 shortfall base (amortized over 7 years using full yield curve):

$$-\$667,339 \div \left(1 + \frac{1}{1.01} + \frac{1}{1.025} + \frac{1}{1.035} + \frac{1}{1.045} + \frac{1}{1.055} + \frac{1}{1.065}\right)$$

$$= -\$98,491$$

$$\text{Minimum required contribution}_{1/1/2012} = \$160,000 + \$200,000 - \$98,491 = \$261,509$$

$$\text{Prefunding balance} = (\$500,000 - \$261,509) \times 1.075 = \$256,378$$

This is still in answer range C.

### Question 37

IRC section 436(e) provides that benefit accruals must cease if the AFTAP for the year falls below 60%. However, IRC section 436(g) provides that IRC section 436(e) does not apply to a plan during the first 5 plan years.

The plan effective date is 1/1/2008, so IRC section 436(e) does not apply to this plan until 1/1/2013. Accruals do not need to cease at any time during 2012, making the statement false.

Answer is B.

### Question 38

The funding shortfall for 2012 is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the prefunding balance and the funding standard carryover balance).

The funding shortfall as of 1/1/2012 is:

$$\$1,000,000 - (\$1,100,000 - \$40,000 - \$140,000) = \$80,000$$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the total pre-funding balance if the employer elects to use any part of it to reduce the minimum contribution requirement, but not reduced by the funding standard carryover balance) is at least as large as the funding target. It is given that the employer elects to use the prefunding balance in 2012 to satisfy the minimum required contribution, so the plan is not exempt from creating a new shortfall base because the assets reduced by the prefunding balance are less than the funding target. The new base is equal to the funding shortfall, less the outstanding balance of the prior shortfall amortization base.

The outstanding balance of the 1/1/2011 shortfall amortization base must be determined. There are 6 payments left to fully amortize the 2011 base, and the 2012 6-year amortization factor is used.

Outstanding balance of 1/1/2011 shortfall amortization base on 1/1/2012:

$$\$25,000 \times 5.2932 = \$132,330$$

$$\text{New 2012 shortfall amortization base} = \$80,000 - \$132,330 = -\$52,330$$

Amortization of 2012 shortfall base (amortized over 7 years):

$$-\$52,330 \div 5.9982 = -\$8,724$$

The minimum required contribution is equal to the target normal cost plus/minus the amortization of each shortfall amortization base.

$$\text{Minimum required contribution}_{1/1/2012} = \$40,000 + \$25,000 - \$8,724 = \$56,276$$

The minimum required contribution is reduced by the funding standard and prefunding balances since no contribution is made for 2012. The entire \$40,000 funding standard carryover balance is used (this must be used first – see IRC section 436(f)(3)(B)), and \$16,276 of the prefunding balance is used. The remaining prefunding balance is increased to 1/1/2013 using the actual asset rate of return for 2012 (IRC section 430(f)(8)).

$$\text{Prefunding balance}_{1/1/2013} = (\$140,000 - \$16,276) \times 1.015 = \$125,580$$

Answer is D.

### Question 39

Each contribution must be discounted with interest at the plan effective rate from the date the contribution is made to the first day of the plan year (valuation date) to determine the interest adjusted value to be used to pay for the minimum required contribution for 2013 of \$1,200,000.

The quarterly contribution requirement of IRC section 430(j)(3) applies when a plan has a funding shortfall in the prior year. Therefore, the quarterly contribution requirement applies for 2013. The required quarterly installment is equal to 25% of the smaller of the 2012 minimum required contribution (\$1,000,000) or 90% of the 2013 minimum required contribution ( $90\% \times \$1,200,000 = \$1,080,000$ ). The 2013 quarterly contribution is:

$$25\% \times \$1,000,000 = \$250,000$$

The due dates for the quarterly contributions are 4/15/2013, 7/15/2013, 10/15/2013, and 1/15/2014. If a quarterly contribution is paid late, then the interest used to adjust the contribution to 1/1/2013 must be increased by 5% from the date the contribution is actually paid to the quarterly contribution due date (and then adjusted at the plan effective rate for the remainder of the interest discounting period).

The \$250,000 contribution made on 4/15/2013 represents the 4/15/2013 required quarterly contribution, so it has been paid timely and can be interest adjusted using the 2013 plan effective rate of 6%, and the actual days given in the data.

$$\text{Interest adjusted 4/15/2013 contribution} = \$250,000 \div 1.06^{104/365} = \$245,884$$

The next \$250,000 contribution is made on 8/10/2013. The 7/15/2013 required quarterly contribution is late by 26 days, so when adjusting this contribution with interest to 1/1/2013, the first 26 days must use an interest rate of 11% (6% + 5%).

$$\text{Interest adjusted 8/10/2013 contribution} = \$250,000 \div 1.11^{26/365} \div 1.06^{195/365} = \$240,543$$

The next contribution of \$350,000 is made on 11/10/2013. \$250,000 of this represents the quarterly contribution that was due on 10/15/2013, and that is 26 days late. The remaining \$100,000 of the contribution can be used to pay for the 1/15/2014 quarterly contribution, and is not late (and can be discounted without any 5% interest penalty).

$$\begin{aligned} \text{Interest adjusted 11/10/2013 contribution} &= (\$250,000 \div 1.11^{26/365} \div 1.06^{287/365}) + (\$100,000 \div 1.06^{313/365}) \\ &= \$237,036 + \$95,126 \\ &= \$332,162 \end{aligned}$$

An additional \$150,000 is contributed on 1/15/2014. This, in addition to the \$100,000 from 11/10/2013, is sufficient to pay for the quarterly contribution due on 1/15/2014. The \$150,000 can be discounted using only the 6% plan effective rate.

$$\text{Interest adjusted 1/15/2014 contribution} = \$150,000 \div 1.06^{379/365} = \$141,194$$

The total of the discounted contributions is:

$$\$245,884 + \$240,543 + \$332,162 + \$141,194 = \$959,783$$

The remaining contribution due for 2013 is:

$$\$1,200,000 - \$959,783 = \$240,217$$

The final contribution for 2013 is made on 9/15/2014. In order to meet the minimum required contribution for 2013, this final contribution must be equal to the remaining required contribution, interest adjusted using the plan effective rate for 2013.

$$\$240,217 \times 1.06^{622/365} = \$265,294$$

Answer is E.

## Question 40

IRC section 436(f)(3) requires a deemed election to reduce the funding balances when the plan would be subject to a restriction under IRC section 436 if not for the reduction in the funding balances. However, for plans that are not collectively bargained, the only restriction for which the deemed election applies is the restriction on accelerated distributions. Note under the general conditions of the exam, the plan is not collectively bargained.

Treasury regulation 1.436-1(a)(5)(i) provides that if a plan does not offer an optional form of benefit to which the restriction on accelerated distributions could apply, then there is no deemed reduction of the funding balances. The statement is true.

Answer is A.

## Question 41

The plan is at-risk in 2012. In addition, a load applies to the funding target because the plan was at-risk in at least two of the past four years (IRC sections 430(i)(1)(A)(ii) and 430(i)(2)(B)). The load for the funding target is equal to 4% of the calculated funding target without the additional at-risk assumptions, plus \$700 per plan participant.

In addition, there is a phase-in on the funding target because the plan has not been at-risk for at least 5 consecutive years (IRC section 430(i)(5)). The phase-in is done after the load has been added to the at-risk funding target. The phased-in funding target for 2012 is equal to 40% of the not at-risk funding target plus 60% of the at-risk funding target. Note that the plan has been at-risk for 3 consecutive years, so this is the third year of the phase-in. Although the plan was at-risk in 2008 as well, it was not at-risk in 2009, and the phase-in restarts once the plan begins a new period of being at-risk.

At-risk funding target with load

$$= \$660,000,000 + (\$600,000,000 \times .04) + (20,000 \times \$700) = \$698,000,000$$

Funding target with phase-in

$$= (\$600,000,000 \times 40\%) + (\$698,000,000 \times 60\%) = \$658,800,000$$

The funding shortfall for 2012 is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the prefunding balance and the funding standard carryover balance). There are no funding balances in this question.

The funding shortfall as of 1/1/2012 is:

$$\$658,800,000 - \$430,000,000 = \$228,800,000$$

The new 2012 shortfall base is equal to the funding shortfall, less the outstanding balance of the prior shortfall amortization bases.

$$2012 \text{ shortfall amortization base} = \$228,800,000 - \$29,000,000 = \$199,800,000$$

$$2012 \text{ shortfall installment for new base} = \$199,800,000 / 5.9982 = \$33,309,993$$

Answer is B.

## Question 42

The frozen initial liability cost method consists of a normal cost and various amortization charges and credits. The amortization bases generally consist only of an initial accrued liability determined under the entry age normal method. However, when there is a plan amendment or an assumption change, the unfunded liability is increased (or decreased) by the change in the entry age normal accrued liability due to the amendment or assumption change. In this question, the plan was amended on 1/1/2012, so the unfunded liability must be adjusted to reflect the increase in the entry age normal accrued liability due to the change in actuarial assumptions. The unfunded liability is not provided in the data for the question. However, the balance equation can be used to determine the unfunded liability:

Unfunded liability = Outstanding balance – Credit balance

The outstanding balance of the initial amortization base can be determined using a factor equal to the ratio of the amortization factor reflecting the remaining payments to the amortization factor reflecting the original number of payments. For plans that were effective prior to 2008 and after ERISA, the initial base was amortized over a period of 30 years. This plan was effective on 1/1/1985, so the initial base of \$25,000,000 was amortized over 30 years, and there are 3 years remaining to pay it off.

$$\text{Outstanding balance} = \$25,000,000 \times \frac{\ddot{a}_{\overline{3}|}}{\ddot{a}_{\overline{30}|}} = \$5,287,105$$

$$\text{Unfunded liability (before amendment)} = \$5,287,205 - \$1,000,000 = \$4,287,105$$

The increase in the entry age normal accrued liability due to the amendment is:

$$\$46,000,000 - \$41,000,000 = \$5,000,000$$

$$\text{Unfunded liability (after amendment)} = \$4,287,105 + \$5,000,000 = \$9,287,105$$

The new \$5,000,000 amortization base is amortized over a period of 15 years (IRC section 431(b)(2)(B)(ii)).

The normal cost under the frozen initial liability cost method is equal to:

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

When the plan benefits are based upon compensation, the temporary annuity is equal to the ratio of the present value of future compensation to current compensation. The benefit formula is not provided in the data for this question, so it is impossible to determine whether the plan benefits are based upon compensation. However, the data includes information with regard to compensation, and there is no other way to determine a temporary annuity, so it can be assumed that the plan benefits are compensation based.

$$\text{Normal cost} = \frac{50,000,000 - 40,000,000 - 9,287,105}{150,000,000 / 20,000,000} = \$95,053$$

The minimum required contribution (MRC) is equal to the sum of the normal cost and the amortization charges associated with the bases.

$$\begin{aligned} \text{MRC}_{1/1/2012} &= \$95,053 + \frac{\$25,000,000}{\ddot{a}_{30}} + \frac{\$5,000,000}{\ddot{a}_{15}} \\ &= \$95,053 + \$1,882,860 + \$513,059 \\ &= \$2,490,972 \end{aligned}$$

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution less the credit balance. The question is asking for this as of the end of the year, so the difference must be increased with valuation interest to 12/31/2012. This is:

$$(\$2,490,972 - \$1,000,000) \times 1.07 = \$1,595,340$$

Answer is B.

### Question 43

IRC section 4980(a) provides for a 20% excise tax on any employer reversion when there is a qualified replacement plan.  $X = 20\%$ .

IRC section 4971(f) provides for a 10% excise tax on the failure to pay the liquidity shortfall.  $Y = 10\%$ .

IRC section 4971(a)(2) provides for a 5% excise tax when there is a funding deficiency in a multiemployer plan.  $Z = 5\%$ .

$$Z < Y < X$$

Answer is E.

Note: The excise tax on employer reversions is an EA-2B topic, not an EA-2A topic. Credit was given for all answers on this question.

### Question 44

The AFTAP, as defined in IRC section 436(j)(1) and determined on the plan valuation date, is equal to the ratio of the actuarial value of assets (reduced by the funding standard carryover balance and prefunding balance) to the funding target (determined without regard to at-risk assumptions), with both the numerator and denominator increased by the total purchases of annuities for the NHCEs during the last 2 years.

$$2012 \text{ AFTAP} = \frac{155,000 - (5,000 + 3,000) + 8,000}{180,000 + 8,000} = 82.45\%$$

Answer is C.

## Question 45

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

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

The expected earnings for 2010 are:

$$(330,000 \times .0675) + [(44,000 - 27,000) \times .0675 \times \frac{1}{2}] = 22,849$$

The expected earnings for 2011 are:

$$(270,000 \times .0675) - [(30,000 - 6,000) \times .0675 \times \frac{1}{2}] = 17,415$$

Note the use of simple interest in the determination of the expected earnings. The regulations do not require simple or compound interest, so either method is acceptable (although using compound interest would result in a slightly different numerical answer – but within the same answer range).

1/1/2010 adjusted fair market value

$$= 330,000 + (44,000 + 6,000) - (27,000 + 30,000) + (22,849 + 17,415) = 363,264$$

1/1/2011 adjusted fair market value

$$= 270,000 + 6,000 - 30,000 + 17,415 = 263,415$$

1/1/2012 actuarial value =  $(363,264 + 263,415 + 290,000)/3 = 305,560$

Under IRC section 430(g)(3)(B)(iii), the actuarial value cannot be more than 110% of the market value of the assets. 110% of 290,000 equals 319,000. The actuarial value of assets is \$305,560.

Answer is D.

## Question 46

Mortality gain or loss is determined by comparing the actual liability with the expected liability. The actual liability is the present value of the accrued benefit, and the expected liability is the expected present value of the accrued benefit if the assumed mortality had taken place.

The actual liability reflects the death of Smith's spouse and the fact that Jones' spouse is still alive on 1/1/2012. Note that each participant and surviving spouse is age 66 on 1/1/2012.

### Actual liability:

$$\text{Smith} = \$20,000 \times \ddot{a}_{66} = \$20,000 \times \frac{N_{66}}{D_{66}} = \$20,000 \times \frac{307,600}{29,200} = \$210,685$$

$$\begin{aligned} \text{Jones} &= \$20,000 \times (\ddot{a}_{66} + \ddot{a}_{66} - \ddot{a}_{66:66}) \\ &= \$20,000 \times \left( \frac{N_{66}}{D_{66}} + \frac{N_{66}}{D_{66}} - \frac{N_{66:66}}{D_{66:66}} \right) \\ &= \$20,000 \times \left( \frac{307,600}{29,200} + \frac{307,600}{29,200} - \frac{242,600}{27,000} \right) \\ &= \$241,666 \end{aligned}$$

$$\text{Total actual liability} = \$210,685 + \$241,666 = \$452,351$$

The expected liability is equal to the present value of the accrued benefit as of 1/1/2011, reduced by the benefit payment made on that date, and increased with interest at the valuation rate of 7% to 1/1/2012. Note that the expected mortality for 2011 is built into the annuity factors as of 1/1/2011.

### Expected liability:

$$\begin{aligned} \text{Smith} &= \{[\$20,000 \times (\ddot{a}_{65} + \ddot{a}_{65} - \ddot{a}_{65:65})] - \$20,000\} \times 1.07 \\ &= \{[\$20,000 \times \left( \frac{N_{65}}{D_{65}} + \frac{N_{65}}{D_{65}} - \frac{N_{65:65}}{D_{65:65}} \right)] - \$20,000\} \times 1.07 \\ &= \{[\$20,000 \times \left( \frac{339,200}{31,600} + \frac{339,200}{31,600} - \frac{272,000}{29,400} \right)] - \$20,000\} \times 1.07 \\ &= \$240,036 \end{aligned}$$

$$\begin{aligned}
\text{Jones} &= \{[\$20,000 \times (\ddot{a}_{65} + \ddot{a}_{65} - \ddot{a}_{65:65})] - \$20,000\} \times 1.07 \\
&= \{[\$20,000 \times \left(\frac{N_{65}}{D_{65}} + \frac{N_{65}}{D_{65}} - \frac{N_{65:65}}{D_{65:65}}\right)] - \$20,000\} \times 1.07 \\
&= \{[\$20,000 \times \left(\frac{339,200}{31,600} + \frac{339,200}{31,600} - \frac{272,000}{29,400}\right)] - \$20,000\} \times 1.07 \\
&= \$240,036
\end{aligned}$$

$$\text{Total expected liability} = \$240,036 + \$240,036 = \$480,072$$

There is a gain because the actual liability is less than the expected liability.

$$\text{Experience gain} = \$480,072 - \$452,351 = \$27,721$$

Answer is A.

## Question 47

The contribution for 2011, deposited on 12/31/2011, must be interest adjusted to 1/1/2011 at the 2011 plan effective rate to determine the value that is applied towards the minimum required contribution.

$$\text{Interest-adjusted contribution} = \$16,000/1.04 = \$15,385$$

This exceeds the minimum required contribution of \$10,000, so there is an excess contribution of \$5,385. The general conditions of the exam state that the plan sponsor elects to credit any excess contribution to the prefunding balance. Treasury regulation 1.430(f)-1(b)(1)(iv)(A) states that this addition to the prefunding balance is credited as of the first day of the next year (as of 1/1/2012) and is credited with interest at the current (2011) year's plan effective rate (4%).

The existing prefunding balance of \$1,000 has not been used, and is increased with interest to 1/1/2012 using the actual asset rate of return for 2011 (8.5%), as described in Treasury regulation 1.430(f)-1(b)(3).

Finally, the plan sponsor has elected to apply \$10,000 of the funding standard carryover balance towards the 2011 minimum required contribution. Treasury regulation 1.430(f)-1(b)(3)(iii) requires the \$10,000 to be increased with interest to 1/1/2012 using the actual asset rate of return for 2011, because the election actually was not needed to pay for the minimum required contribution (the election simply had the effect of moving part of the funding standard carryover balance to the prefunding balance).

$$\begin{aligned}\text{Prefunding balance}_{1/1/2012} &= (\$5,385 \times 1.04) + (\$1,000 \times 1.085) + (\$10,000 \times 1.085) \\ &= \$5,600 + \$1,085 + \$10,850 \\ &= \$17,535\end{aligned}$$

Answer is D.

## Question 48

Compensation for Smith must be limited to the maximum allowed under IRC section 401(a)(17). The limits for 2006, 2007 and 2008, respectively are \$220,000, \$225,000 and \$230,000.

$$\text{Average monthly salary} = \frac{220,000 + 225,000 + 230,000}{36} = 18,750$$

The accrued benefit for Smith at the termination date of 12/31/2008 is:

$$3.29\% \times \$18,750 \times 3 \text{ years of service} = \$1,850.63$$

The lump sum is determined based upon the stability period in which the distribution occurs. The distribution occurs on 4/1/2012, so the stability period is 4/1/2012 to 6/30/2012. The lookback month is the month before the stability period begins. That is March, 2012. The 3/2012 present value factor of 13.05 should be used to determine the lump sum value.

$$\text{Lump sum} = \$1,850.63 \times 12 \times 13.05 = \$289,809$$

Answer is B.

## Question 49

- I. There are 50 participants in the plan. IRC section 404(o)(4)(A) provides that for plans with 100 or fewer participants, the liability due to increases in benefit from a plan amendment within the last 2 years is not taken into account for highly compensated employees for purposes of the cushion amount. The amended formula cannot be applied to the 10 highly compensated employees, so the statement is false.
- II. The target normal cost for 2012 must take into account any amendment effective for 2012 and adopted on or before the 2012 valuation date. The amendment was made in 2011, so it satisfies this requirement, and the amendment must be used for the 2012 target normal cost. The statement is true.
- III. The funding balances are not included with regard to deduction limits, so the assets are not reduced by the funding standard carryover and prefunding balances for purposes of the deduction limit. The statement is false. Note that there currently are no regulations with regard to IRC section 404(o). However, past regulation with regard to IRC section 404 have consistently stated that credit balances are not used to reduce the assets for deduction purposes under IRC section 404.

Answer is C.

## Question 50

Quarterly contributions are required under IRC section 430(j)(3) if a plan had a funding shortfall in the previous year. In addition, there is a liquidity requirement under IRC section 430(j)(4) if the plan had more than 100 participants on at least one day in the prior plan year. There were more than 100 participants in 2011. The funding shortfall for 2011 is not given; however, it can be assumed there was a funding shortfall because the question indicates that a quarterly contribution is required for 2012.

The quarterly contribution under IRC section 430(j)(3) required for 2012 is equal to 25% of the smaller of the minimum required contribution for 2011 or 90% of the minimum required contribution for 2012 (each minimum required contribution is not adjusted for any funding balances).

2012 quarterly contribution requirement =  $25\% \times \$85,000 = \$21,250$

The liquidity shortfall on 3/31/2012 is \$115,000. However, IRC section 430(j)(4)(D) limits any required liquidity payment to the amount that would increase the FTAP to 100% if it had been taken into account in the determination of the FTAP. That is \$100,000, so the liquidity shortfall is limited to \$100,000.

Quarterly contribution and liquidity payments for the first quarter of 2012 are due on 4/15/2012 (see IRC section 430(j)(3)(C)(ii)). These contributions are 3 months late because no contribution was made until 7/15/2012. In addition, the payments for the second quarter of 2012 are due on 7/15/2012. These payments are not late.

It must be assumed that there is no additional liquidity shortfall on 6/30/2012 since no information is given. The required payment for any quarter is equal to the greater of the quarterly contribution required or the liquidity shortfall (see IRC section 430(j)(4)(A)). Therefore, the required payment for each quarter is:

Due 4/15/2012: \$100,000 (\$21,250 for quarterly payment, and \$78,750 additional for liquidity shortfall)

Due 7/15/2012: \$21,250 for quarterly payment

Note that when quarterly contribution and liquidity shortfall payments are late, they are not increased. Instead, the contributions are discounted using an additional 5 percentage points added to the plan effective rate. To the extent that the quarterly contribution is late, the additional 5% is used for discounting from the actual contribution date to the contribution due date (the plan effective rate alone is used to discount from the due date back to the first day of the plan year). See proposed Treasury regulation 1.430(j)-1(c)(1)(iii)(A).

If there are additional liquidity shortfall payments that are late, the additional 5 percentage points are added to the plan effective rate for the first 2½ months of discounting (regardless of how late the contribution is), with the plan effective rate used to discount for the remainder of the period to the first day of the year. See proposed Treasury regulation 1.430(j)-1(d)(2)(i).

The quarterly contribution that was due on 7/15/2012 is discounted with interest at the plan effective rate of 6% to the beginning of 2012:

$$\$21,250 \div 1.06^{6.5/12} = \$20,590$$

The quarterly contribution that was due on 4/15/2012 is 3 months late, and is discounted with interest at the plan effective rate plus 5% (for a total of 11%) for the first 3 months of discounting, and the plan effective rate for the remaining period to the beginning of 2012:

$$\$21,250 \div 1.11^{3/12} \div 1.06^{3.5/12} = \$20,354$$

The additional liquidity payment that was due on 4/15/2012 is late, so it is discounted from the date of deposit at the plan effective rate plus 5% for 2½ months, and the plan effective rate for the remaining period to the beginning of 2012:

$$\$78,750 \div 1.11^{2.5/12} \div 1.06^{4/12} = \$75,574$$

The total discounted contribution is:

$$\$20,590 + \$20,354 + \$75,574 = \$116,518$$

Answer is C.



