

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

Enrolled Actuaries Pension Examination, Segment F

EA-2, Segment F

Date: Tuesday, November 8, 2016

Time: 8:30 a.m. – 12:30 p.m.

INSTRUCTIONS TO CANDIDATES

1. Write your candidate number here _____. Your name must not appear.
2. Do not break the seal of this book until the supervisor tells you to do so.
3. Special conditions generally applicable to all questions on this examination are found at the front of this book.
4. All questions should be answered in accordance with laws, rules and regulations in effect as of May 31, 2016.
5. This examination consists of 51 multiple-choice questions of varying value. The point value for each question is shown in parentheses at the beginning of each question. Total point value is 160.
6. 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.
7. 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.
8. Up to 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.
9. 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.
10. Do not spend too much time on any one question. If a question seems too difficult, leave it and go on.
11. 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.
12. Clearly indicated answer choices in the test book can be an aid in grading examinations in the unlikely event of a lost answer sheet.
13. Use the blank portions of each page for your scratch work. Extra blank pages are provided at the back of the examination book.
14. When the supervisor tells you to do so, break the seal on the book and remove the answer sheet.

On the front of the answer sheet, space is provided to write and code candidate information. Complete the information requested by printing in the squares and blackening the circles (one in each column) corresponding to the letters or numbers printed. For each empty box blacken the small circle immediately above the "A" circle. Fill out the boxes titled:
 - (a) Name
(include last name, first name and middle initial)
 - (b) Candidate Number
(Candidate/Eligibility Number, use leading zeros if needed to make it a five digit number)
 - (c) Test Site Code
(the supervisor will supply the number)
 - (d) Examination Part
(code the examination that you are taking by blackening the circle to the left of "Course EA-2, Segment F")
 - (e) Booklet Number
(booklet number can be found in the upper right-hand corner of this examination book. Use leading zeros if needed to make it a four digit number.)

In box titled "Complete this section only if instructed to do so", fill in the circle to indicate if you are using a calculator and write in the make and model number.

In the box titled "Signature and Date" sign your name and write today's date. **If the answer sheet is not signed, it will not be graded.**

Leave the boxes titled "Test Code" and "Form Code" blank.

On the back of the answer sheet fill in the Booklet Number in the space provided.
15. 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.**

Answer Key EA-2F Fall 2016
August 18, 2016

Question	Answer		Question	Answer
1	B		31	B
2	B		32	C
3	C		33	A
4	D		34	B
5	D		35	A
6	C		36	C
7	B		37	C
8	B		38	B
9	A		39	C
10	D		40	B
11	D		41	B
12	C		42	C
13	D		43	B
14	B		44	C
15	A		45	C
16	B		46	D
17	C		47	C
18	B		48	A
19	B		49	C
20	A		50	B
21	D		51	A
22	D			
23	A			
24	C			
25	A			
26	B			
27	D			
28	C			
29	D			
30	D			

Data for Question 1 (2 points)

Unfunded vested benefits as of 12/31/2016: \$100,000,000.

Funding target as of 1/1/2017: \$1,000,000,000.

Reduction in funding target as of 1/1/2017 due to change in non-prescribed assumptions: \$40,000,000.

Consider the following statement with regard to the change in actuarial assumptions:

This change requires approval from the IRS.

Question 1

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 2 (2 points)

Type of plan: Multiemployer.

Valuation date: 1/1/2017.

The plan has a funded percentage of 83% on 1/1/2017.

Taking into account extensions of amortization periods under IRC section 431(d), the plan is projected to have an accumulated funding deficiency on 12/31/2023.

Ignoring extensions of amortization periods under IRC section 431(d), the plan is projected to have an accumulated funding deficiency on 12/31/2019.

Consider the following statement:

The plan is in endangered status for the 2017 plan year.

Question 2

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 3 (3 points)

Valuation date: 1/1/2017.

Temporary annual supplement: \$4,800 payable at the beginning of each year to participants who retire on or after age 60.

The temporary annual supplement is payable until the participant turns age 65.

Selected data for participant Smith:

Date of birth	1/1/1967
Date of hire	1/1/2002
Assumed retirement age	60

$\$X$ is the annual supplemental benefit for Smith at age 60 for purposes of the funding target.

$\$Y$ is the increase in the annual supplemental benefit for Smith at age 60 for purposes of the target normal cost.

Question 3

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

- (A) Less than \$2,000
- (B) \$2,000 but less than \$2,750
- (C) \$2,750 but less than \$3,500
- (D) \$3,500 but less than \$4,250
- (E) \$4,250 or more

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Data for Question 4 (3 points)

Segment rates for 2016 and 2017: {5.0%, 6.0%, 7.0%}.

Prefunding balance as of 1/1/2016: \$4,000.

Actual rate of return on assets for 2016: 15.0%.

Selected information:

	<u>1/1/2016</u>	<u>1/1/2017</u>
Actuarial value of assets	\$2,000,000	\$2,150,000
Funding target	2,300,000	2,400,000
Target normal cost	85,000	90,000
Effective interest rate	6.0%	6.5%

There were no shortfall amortization bases established prior to 1/1/2016.

The plan is exempt from quarterly contributions in 2016.

During 2016 the plan sponsor makes a contribution equal to the **smallest amount that satisfies the minimum funding standard** for the 2016 plan year.

\$X is the **smallest amount that satisfies the minimum funding standard** for the 2017 plan year if paid on 1/1/2017.

Question 4

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

- (A) Less than \$130,000
- (B) \$130,000 but less than \$133,000
- (C) \$133,000 but less than \$136,000
- (D) \$136,000 but less than \$139,000
- (E) \$139,000 or more

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Data for Question 5 (5 points)

Prefunding balance as of 1/1/2016: \$100,000.

Selected valuation results as of 1/1/2016:

Actuarial (market) value of assets	\$2,500,000
FTAP	75.00%
Effective interest rate	4.5%

No funding balance was applied to the 2016 minimum required contribution.

The 2016 minimum required contribution was met by depositing \$250,000 on each of the following dates: 1/1/2016, 4/1/2016, 7/1/2016 and 10/1/2016. No excess contributions were made for the 2016 plan year.

No benefits or expenses were paid from the plan during 2016.

Selected valuation results as of 1/1/2017:

Funding target	\$3,500,000
Target normal cost	350,000

\$X is the 2017 minimum required contribution if the actual return on assets was 8% throughout 2016.

\$Y is the 2017 minimum required contribution if the actual return on assets was 16% throughout 2016.

Question 5

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

- (A) Less than \$186,000
- (B) \$186,000 but less than \$196,000
- (C) \$196,000 but less than \$206,000
- (D) \$206,000 but less than \$216,000
- (E) \$216,000 or more

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Data for Question 6 (4 points)

Type of plan: Multiemployer.

Actuarial cost method: Unit credit.

Valuation interest rate: 7.0%.

Current liability interest rate: 5.0%.

Credit balance as of 12/31/2016: \$110,000.

Selected information as of 1/1/2017:

Market value of assets	\$3,780,000
Actuarial value of assets	3,900,000
Accrued liability	3,700,000
Normal cost	450,000
Current liability	4,300,000
Current liability normal cost	550,000
Expected benefit payments	0
Amortization charges	200,000
Amortization credits	50,000

$\$X$ is the **smallest amount that satisfies the minimum funding standard** as of 12/31/2017.

Question 6

In what range is $\$X$?

- (A) Less than \$200,000
- (B) \$200,000 but less than \$300,000
- (C) \$300,000 but less than \$400,000
- (D) \$400,000 but less than \$500,000
- (E) \$500,000 or more

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Data for Question 7 (3 points)

Type of plan: Multiemployer.

Valuation date: 1/1/2017.

Actuarial cost method: Frozen initial liability.

Normal retirement benefits: 2.0% of final three year average compensation for each year of service.

Valuation interest rate: 7.0%

Selected information as of 1/1/2016:

Unfunded accrued liability	\$2,500,000
Normal cost	185,000

Contributions for 2016 plan year:

<u>Date</u>	<u>Amount</u>
1/1/2016	\$200,000
4/1/2016	100,000
10/1/2016	100,000

Credit balance as of 12/31/2016: \$0.

Selected information as of 1/1/2017:

Actuarial (market) value of assets	\$8,000,000
Present value of future benefits	12,000,000
Present value of expected 2017 compensation	5,850,000
Present value of expected future compensation	50,000,000

Question 7

In what range is the normal cost as of 1/1/2017?

- (A) Less than \$180,000
- (B) \$180,000 but less than \$185,000
- (C) \$185,000 but less than \$190,000
- (D) \$190,000 but less than \$195,000
- (E) \$195,000 or more

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Data for Question 8 (1 point)

A plan is in at-risk status for only the following plan years: 2013, 2015, 2016, and 2017.

Consider the following statement:

For the 2017 plan year, the transition percentage for determining the funding target is 80%.

Question 8

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 9 (3 points)

Type of plan: Multiemployer.

Valuation date: 1/1/2017.

Asset valuation method: Smoothed market value with a 5-year smoothing period (smoothing of difference between expected and actual market value of assets), as described in Rev. Proc. 2000-40.

Market value of assets as of 1/1/2017: \$361,776.

Asset gain and loss amounts on market value of assets:

Loss during 2012	\$13,427
Gain during 2013	5,327
Loss during 2014	22,885
Gain during 2015	29,336
Gain during 2016	14,160

There are no contributions receivable as of 1/1/2017.

Question 9

In what range is the actuarial value of assets as of 1/1/2017?

- (A) Less than \$345,000
- (B) \$345,000 but less than \$358,000
- (C) \$358,000 but less than \$371,000
- (D) \$371,000 but less than \$384,000
- (E) \$384,000 or more

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Data for Question 10 (3 points)

Type of plan: Multiemployer.

Valuation interest rate: 7.0%.

Credit balance as of 12/31/2015: \$500,000.

Selected information as of 1/1/2016:

Employer normal cost	\$150,000
Amortization charges	750,000
Amortization credits	475,000

Contributions for the 2016 plan year:

Withdrawal liability payments on 4/1/2016	\$170,000
Employee contributions on 7/1/2016	100,000
Employer contributions on 9/1/2016	180,000

Question 10

In what range is the credit balance as of 12/31/2016?

- (A) Less than \$270,000
- (B) \$270,000 but less than \$350,000
- (C) \$350,000 but less than \$430,000
- (D) \$430,000 but less than \$510,000
- (E) \$510,000 or more

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Data for Question 11 (3 points)

Plan type: Statutory hybrid (cash balance).

The plan permits an immediate lump sum payment equal to the participant's hypothetical account balance upon termination of employment.

Selected assumptions as of 1/1/2017:

Segment rates	{3.0%, 4.0%, 5.0% }
Interest crediting rate	4.5%
Normal form of payment	Single life annuity

Data for participant Smith as of 1/1/2017:

Gender	Male
Age	40
Account balance	\$50,000

Fixed plan conversion factor for account balance to single life annuity at normal retirement age: 11.5.

Assumed selection of optional forms:

Single life annuity	20%
Lump sum	80%

Question 11

In what range is the 2017 funding target for Smith?

- (A) Less than \$42,500
- (B) \$42,500 but less than \$43,500
- (C) \$43,500 but less than \$44,500
- (D) \$44,500 but less than \$45,500
- (E) \$45,500 or more

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Data for Question 12 (5 points)

Valuation date: 1/1/2017.

Asset valuation method: The average of the market value of assets on the valuation date and the adjusted market value of assets for the dates that are 12 and 24 months before the valuation date.

	<u>2015 plan year</u>	<u>2016 plan year</u>	<u>2017 plan year</u>
Segment rates	{3.0%, 4.0%, 5.0% }	{4.5%, 5.5%, 6.5% }	{4.5%, 5.5%, 6.5% }
Effective interest rate	4.5%	5.5%	5.5%

Assumed rate of return on assets for all plan years: 7.0%.

Selected asset information:

	<u>2015</u>	<u>2016</u>	<u>2017</u>
Market value of assets (excluding receivables)	\$2,300,000	\$2,500,000	\$2,825,000
Benefit payments (assumed paid mid-year)	65,000	65,000	
Plan-related expenses (assumed paid mid-year)	17,500	20,000	

Contribution information:

<u>Date</u>	<u>Amount</u>	<u>Plan year</u>
6/30/2015	\$75,000	2015
6/30/2016	80,000	2016

Question 12

In what range is the actuarial value of assets as of 1/1/2017?

- (A) Less than \$2,660,000
- (B) \$2,660,000 but less than \$2,680,000
- (C) \$2,680,000 but less than \$2,700,000
- (D) \$2,700,000 but less than \$2,720,000
- (E) \$2,720,000 or more

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Data for Question 13 (3 points)

Valuation date: 1/1/2017.

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

Minimum required contribution for 2017 plan year: \$190,000.

A waiver of the minimum required contribution was granted for the 2017 plan year.

Question 13

In what range is the waiver amortization installment?

- (A) Less than \$38,000
- (B) \$38,000 but less than \$41,000
- (C) \$41,000 but less than \$44,000
- (D) \$44,000 but less than \$47,000
- (E) \$47,000 or more

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Data for Question 14 (3 points)

Type of plan: Multiemployer.

Actuarial cost method: Entry age normal.

Valuation interest rate: 7.0%.

Actual rate of return on assets during 2016 and 2017: 3.0%.

Credit balance as of 12/31/2015: \$10,000.

Selected information:

	<u>1/1/2016</u>	<u>1/1/2017</u>
Normal cost	\$50,000	\$75,000
Total amortization charges	20,000	25,000
Total amortization credits	15,000	10,000

Contribution information:

<u>Date</u>	<u>Amount</u>	<u>Plan year</u>
7/1/2016	\$50,000	2016
7/1/2017	150,000	2017

Question 14

In what range is the credit balance as of 12/31/2017?

- (A) Less than \$61,000
- (B) \$61,000 but less than \$63,000
- (C) \$63,000 but less than \$65,000
- (D) \$65,000 but less than \$67,000
- (E) \$67,000 or more

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Data for Question 15 (4 points)

Type of plan: Multiemployer.

Normal retirement benefit: \$540 per year of service, payable beginning of year.

Valuation interest rate: 7.0%.

Selected data for participant Smith:

Gender	Male
Date of birth	1/1/1956
Date of hire	1/1/2011

There are no preretirement decrements other than death.

Selected commutation functions:

<u>Age</u>	<u>N_x</u>	<u>D_x</u>
55	301,094	23,710
61	175,572	15,356
65	120,394	11,394

For the 1/1/2017 valuation, the cost method changed from unit credit to entry age normal.

$\$X$ is the absolute value of the change in accrued liability as of 1/1/2017 for Smith due to the change in actuarial cost method.

Question 15

In what range is $\$X$?

- (A) Less than \$4,100
- (B) \$4,100 but less than \$5,300
- (C) \$5,300 but less than \$6,500
- (D) \$6,500 but less than \$7,700
- (E) \$7,700 or more

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Data for Question 16 (1 point)

Type of plan: Multiemployer.

The plan was certified to be in critical status at 1/1/2017.

Consider the following statement:

If the plan has an accumulated funding deficiency as of 12/31/2017, an excise tax of 5% of the accumulated funding deficiency will be imposed.

Question 16

Is the above statement true or false?

(A) True

(B) False

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Data for Question 17 (3 points)

Valuation date: 1/1/2017.

Selected information as of 1/1/2017:

Actuarial (market) value of assets	\$25,200,000
Minimum required contribution	2,880,000
Effective interest rate	5.0%
Valuation results calculated for IRC section 404 purposes:	
Funding target	\$28,800,000
Target normal cost	2,160,000
Funding target with future compensation increases	34,200,000
At-risk funding target	32,400,000
At-risk target normal cost	2,520,000
At-risk funding target with future earnings increases	37,800,000

The plan is not in at-risk status for 2017 and has always had over 500 participants.

Question 17

In what range is the deduction limit for 2017?

- (A) Less than \$22,500,000
- (B) \$22,500,000 but less than \$25,000,000
- (C) \$25,000,000 but less than \$27,500,000
- (D) \$27,500,000 but less than \$30,000,000
- (E) \$30,000,000 or more

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Data for Question 18 (4 points)

Pre-retirement death supplement: \$25,000 per year, payable as a 10-year certain only annuity.
The supplement is paid annually, starting in the year of death,
at the end of the year.

Supplement eligibility: 25 years of service and participant death occurring prior to age 65.

Segment rates for 2017: {5.0%, 6.0%, 7.0% }.

Assumed pre-retirement decrements other than death: None.

Selected data for sole participant Smith as of 1/1/2017:

Status	Active
Gender	Male
Age	59
Service	20 years

Selected commutation factors:

	<u>5%</u>	<u>6%</u>
D_{59}	54,068	30,616

$\$X$ is the funding target associated with this supplement as of 1/1/2017.

Question 18

In what range is $\$X$?

- (A) Less than \$815
- (B) \$815 but less than \$915
- (C) \$915 but less than \$1,015
- (D) \$1,015 but less than \$1,115
- (E) \$1,115 or more

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Data for Question 19 (3 points)

Funding standard carryover balance as of 1/1/2017: \$25,000.

Prefunding balance as of 1/1/2017: \$65,000.

Actual rate of return on assets during 2017: -10.0%.

Selected information:

	<u>1/1/2016</u>	<u>1/1/2017</u>
Minimum required contribution	\$160,000	\$200,000
Effective interest rate	5.50%	5.00%

There is a quarterly requirement for 2017. The plan sponsor elects to apply funding balances toward the first two quarterly installments on 4/15/2017 and 7/15/2017.

The sole contribution for the 2017 plan year, made on 9/1/2017: \$200,000.

$\$X$ is the prefunding balance as of 1/1/2018.

Question 19

In what range is $\$X$?

- (A) Less than \$75,000
- (B) \$75,000 but less than \$79,000
- (C) \$79,000 but less than \$83,000
- (D) \$83,000 but less than \$87,000
- (E) \$87,000 or more

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Data for Question 20 (3 points)

Type of plan: Multiemployer.

Valuation date: 1/1/2017.

Plan effective date: 1/1/2005.

Actuarial cost method: Projected unit credit.

Benefit formula: 1.3% of final three-year average compensation per year of service.

Valuation interest rate: 7.0%.

There are no pre-retirement decrements other than mortality.

Assumed rate of compensation increases: 5.0% per year.

Selected information for participant Smith as of 1/1/2017:

Gender	Female
Date of birth	1/1/1955
Date of hire	1/1/1989
2016 compensation	\$63,000

Question 20

In what range is Smith's normal cost as of 1/1/2017?

- (A) Less than \$8,000
- (B) \$8,000 but less than \$10,500
- (C) \$10,500 but less than \$13,000
- (D) \$13,000 but less than \$15,500
- (E) \$15,500 or more

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Data for Question 21 (3 points)

Type of plan: Multiemployer.

Valuation date: 1/1/2017.

Normal retirement benefit: 1.5% of final year's compensation per year of service.

Actuarial cost method: Projected unit credit.

Valuation interest rate: 5.0%.

Assumed compensation increases: 3.5% per year.

Selected data for participant Smith:

Gender	Female
Date of birth	1/1/1956
Date of hire	1/1/2000
2015 compensation	\$60,000
2016 compensation	70,000

$\$X$ is the change in the accrued liability for Smith due to actual 2016 compensation experience being different from assumed.

Question 21

In what range is $\$X$?

- (A) Less than \$21,000
- (B) \$21,000 but less than \$22,000
- (C) \$22,000 but less than \$23,000
- (D) \$23,000 but less than \$24,000
- (E) \$24,000 or more

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Data for Question 22 (5 points)

Valuation date: 1/1/2017.

Number of plan participants as of 1/1/2016: 250.

FTAP for the 2016 and 2017 plan years: 85%.

Selected information:

Required quarterly contributions for 2017	\$100,000
Liquid assets as of 3/31/2017	1,200,000
Illiquid assets as of 3/31/2017	1,250,000

Disbursements for the twelve months ending 3/31/2017:

Regular monthly annuity payments	\$400,000
Single lump sum distributions	45,000
Annuity purchases	125,000
Administrative expenses	35,000

The amount of contribution on 3/31/2017 that would increase the plan's 2017 FTAP to 100%, taking into account the expected increase in the funding target due to benefits accruing during the plan year, is \$250,000.

Adjusted disbursements in the amount of \$800,000 were made for the 36-month period ending on 3/31/2017.

A contribution of \$25,000 was deposited on 3/1/2017.

$\$X$ is the amount of liquid assets that must be deposited on 4/15/2017 to satisfy the quarterly contribution requirement.

Question 22

In what range is $\$X$?

- (A) Less than \$125,000
- (B) \$125,000 but less than \$150,000
- (C) \$150,000 but less than \$175,000
- (D) \$175,000 but less than \$200,000
- (E) \$200,000 or more

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Data for Question 23 (4 points)

Valuation date: 1/1/2017.

Normal retirement benefit: 2.00% of final three-year average compensation per year of service.

Segment rates for 2016 and 2017: {5.0%, 6.0%, 7.0% }.

Assumed rate of compensation increases: 5.0% per year.

Selected information for sole participant Smith:

Gender	Male
Date of birth	1/1/1975
Date of hire	1/1/2002
2013 compensation	\$60,000
2014 compensation	63,000
2015 compensation	66,000
2016 compensation	63,000

$\$X$ is the reduction in funding target as of 1/1/2017 due to actual compensation experience during 2016 being different than assumed.

Question 23

In what range is $\$X$?

- (A) Less than \$2,000
- (B) \$2,000 but less than \$4,000
- (C) \$4,000 but less than \$6,000
- (D) \$6,000 but less than \$8,000
- (E) \$8,000 or more

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Data for Question 24 (2 points)

Asset valuation method: Fair market value.

Effective interest rate for 1/1/2016 valuation: 6.0%.

Rate of return on assets during 2016: 20.0%.

Value of assets as of 1/1/2017 (excluding receivables): \$1,470,000.

The employer makes a single contribution of \$300,000 on 7/1/2017 for the 2016 plan year.

Question 24

In what range is the actuarial value of assets as of 1/1/2017?

- (A) Less than \$1,725,000
- (B) \$1,725,000 but less than \$1,745,000
- (C) \$1,745,000 but less than \$1,765,000
- (D) \$1,765,000 but less than \$1,785,000
- (E) \$1,785,000 or more

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Data for Question 25 (2 points)

Valuation date: 1/1/2017.

Selected information:

Funding standard carryover balance	\$800,000
Prefunding balance	0
Actuarial (market) value of assets	6,500,000
Funding target	5,800,000

Consider the following statement:

The plan is exempt from the creation of a new shortfall amortization base for the 2017 plan year.

Question 25

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 26 (3 points)

Type of plan: Multiemployer.

Actuarial cost method: Aggregate.

Credit balance as of 12/31/2016: \$500,000.

Valuation interest rate: 7.0%.

Selected information as of 1/1/2017:

Market value of assets	\$30,000,000
Actuarial value of assets	28,000,000
Present value of future benefits	40,000,000
Present value of expected 2017 compensation	8,000,000
Present value of expected future compensation	60,000,000

$\$X$ is the **smallest amount that satisfies the minimum funding standard** for the 2017 plan year as of 12/31/2017.

Question 26

In what range is $\$X$?

- (A) Less than \$1,200,000
- (B) \$1,200,000 but less than \$1,400,000
- (C) \$1,400,000 but less than \$1,600,000
- (D) \$1,600,000 but less than \$1,800,000
- (E) \$1,800,000 or more

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Data for Question 27 (3 points)

Valuation date: 1/1/2017.

Actuarial equivalence is based on applicable interest rates and mortality under IRC section 417(e).

Selected assumptions:

Pre-retirement decrements other than mortality	None
Assumed election percentage for lump sum	100%

Selected data for participant Smith as of 1/1/2017:

Age	40
Accrued annual benefit amount	\$58,800

Selected commutation functions and annuity factors using indicated mortality and IRC section 430 3rd segment rates:

	Funding <u>mortality</u>	IRC section 417(e) <u>mortality</u>
D_{40}	65,983	66,155
D_{65}	11,394	11,458
$\ddot{a}_{65}^{(12)}$	10.11	10.33

Question 27

In what range is the 2017 funding target for Smith?

- (A) Less than \$102,000
- (B) \$102,000 but less than \$103,000
- (C) \$103,000 but less than \$104,000
- (D) \$104,000 but less than \$105,000
- (E) \$105,000 or more

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Data for Question 28 (5 points)

Valuation date: 1/1/2017.

Normal retirement benefit: 2.0% of final three-year average compensation per year of service up to 25 years.

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

Assumed rate of compensation increases: 2.0%.

Actuarial (market) value of assets as of 1/1/2017: \$380,000.

2017 prefunding balance: \$0.

There were no shortfall amortization bases established before 2017.

Selected information for sole participant Smith:

Gender	Male
Date of birth	1/1/1957
Date of hire	1/1/1992
2014 compensation	\$88,000
2015 compensation	97,000
2016 compensation	100,000

Question 28

In what range is the **minimum required contribution** for 2017?

- (A) Less than \$6,000
- (B) \$6,000 but less than \$11,000
- (C) \$11,000 but less than \$16,000
- (D) \$16,000 but less than \$21,000
- (E) \$21,000 or more

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Data for Question 29 (3 points)

Selected valuation results as of 1/1/2017:

Minimum required contribution	\$500,000
Required quarterly installments	100,000
Effective interest rate	6.0%

The employer makes a single contribution of \$200,000 on 12/31/2017 for the 2017 plan year.

$\$X$ is the amount of the initial excise tax on the unpaid minimum required contribution for the 2017 plan year.

Question 29

In what range is $\$X$?

- (A) Less than \$29,500
- (B) \$29,500 but less than \$30,500
- (C) \$30,500 but less than \$31,500
- (D) \$31,500 but less than \$32,500
- (E) \$32,500 or more

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Data for Question 30 (5 points)

Valuation date: 12/31/2016.

Normal retirement benefit: \$400 per month per year of service.

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

Assumed form of payment: Single life annuity.

Actuarial (market) value of assets: \$30,000.

Prefunding balance as of 1/1/2016: \$0.

There were no shortfall amortization bases established prior to 2016.

Data for sole participant Smith:

Gender	Female
Date of birth	1/1/1971
Date of hire	1/1/2014

An amendment is signed on 12/1/2016, effective 1/1/2016, to increase the normal retirement benefit to \$500 per month for each year of service.

$\$X$ is the increase in the **minimum required contribution** as of 12/31/2016 due to the amendment.

Question 30

In what range is $\$X$?

- (A) Less than \$3,800
- (B) \$3,800 but less than \$4,800
- (C) \$4,800 but less than \$5,800
- (D) \$5,800 but less than \$6,800
- (E) \$6,800 or more

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Data for Question 31 (1 point)

Funding standard carryover balance as of 1/1/2017: \$74,000.

Prefunding balance as of 1/1/2017: \$127,000.

2016 FTAP: 102.00%.

Consider the following statement:

The plan sponsor may elect to use only the prefunding balance to reduce the 2017 minimum required contribution.

Question 31

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 32 (4 points)

Type of plan: Multiemployer.

Actuarial cost method: Unit credit.

The plan is amended effective 1/1/2017 for active participants.

Normal retirement benefit:

Before plan amendment	\$25.00 per month per year of service for all service
After plan amendment	\$27.50 per month per year of service for all service

Valuation interest rate: 7.0%.

Credit balance as of 12/31/2016: \$50,000.

Selected valuation results as of 1/1/2017 before plan amendment:

Accrued liability for active participants	\$1,000,000
Accrued liability for inactive participants	1,500,000
Normal cost	125,000
Amortization charges	85,000
Amortization credits	15,000

The sole contribution for the 2017 plan year, made on 12/31/2017: \$200,000.

Question 32

In what range is the credit balance as of 12/31/2017?

- (A) Less than \$10,000
- (B) \$10,000 but less than \$20,000
- (C) \$20,000 but less than \$30,000
- (D) \$30,000 but less than \$40,000
- (E) \$40,000 or more

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Data for Question 33 (3 points)

Type of plan: Multiemployer.

Actuarial value of assets: Smoothed market value with a 5-year smoothing period (smoothing of difference between expected and actual market value of assets), as described in Rev. Proc. 2000-40.

Valuation date: 1/1/2017.

Selected information:

	<u>1/1/2016</u>	<u>1/1/2017</u>
Market value of assets	\$8,300,000	\$9,300,000
Actuarial value of assets	9,850,000	

Valuation interest rate: 7.5%.

2016 plan year contribution paid on 7/1/2016: \$350,000.

Annual benefit payments paid on 7/1/2016: \$225,000.

Asset gain or loss amounts on market value of assets:

Gain during 2015	\$146,000
Loss during 2014	330,000
Gain during 2013	120,000

Question 33

In what range is the actuarial value of assets on 1/1/2017?

- (A) Less than \$9,125,000
- (B) \$9,125,000 but less than \$9,225,000
- (C) \$9,225,000 but less than \$9,325,000
- (D) \$9,325,000 but less than \$9,425,000
- (E) \$9,425,000 or more

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Data for Question 34 (5 points)

Type of plan: Multiemployer.

Actuarial cost method: Unit credit.

Normal retirement benefit: \$50 per month for each year of service.

Disability benefit: Unreduced benefit commencing at age 55 based on service to date of disability.

Valuation interest rate: 6.5%.

There are no pre-retirement decrements other than disability.

Assumed annual rates of disability:

Prior to age 55	3.0%
After age 54	0.0%

Selected data for participant Smith:

Date of birth	1/1/1967
Date of hire	1/1/1992

Selected annuity factors:

	$\ddot{a}_{55}^{(12)}$	$\ddot{a}_{65}^{(12)}$
Healthy life mortality	12.61	10.93
Disabled life mortality	11.12	9.34

Question 34

In what range is Smith's accrued liability as of 1/1/2017?

- (A) Less than \$70,000
- (B) \$70,000 but less than \$77,500
- (C) \$77,500 but less than \$85,000
- (D) \$85,000 but less than \$92,500
- (E) \$92,500 or more

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Data for Question 35 (2 points)

Valuation date: 1/1/2017.

2017 minimum required contribution: \$60,000.

2017 plan year contributions of \$12,500 each are paid on 4/15/2017, 7/15/2017 and 10/15/2017.

A contribution of \$20,000 is made on 1/1/2018.

Consider the following statement:

The entire 1/1/2018 contribution may be applied toward the 2018 minimum required contribution.

Question 35

Is the above statement true or false?

(A) True

(B) False

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Data for Question 36 (3 points)

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

Selected information as of 1/1/2017:

Prefunding balance	\$1,000
Actuarial value of assets	496,000
Funding target	505,000
Target normal cost	50,000

Shortfall amortization installments for bases established prior to 1/1/2017:

<u>Date established</u>	<u>Installment</u>
1/1/2015	\$40,000
1/1/2016	(5,000)

There have been no deemed elections to reduce the prefunding balance.

$\$X$ is the **smallest amount that satisfies the minimum funding standard** as of 1/1/2017.

Question 36

In what range is $\$X$?

- (A) Less than \$59,500
- (B) \$59,500 but less than \$59,750
- (C) \$59,750 but less than \$60,000
- (D) \$60,000 but less than \$60,250
- (E) \$60,250 or more

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Data for Question 37 (4 points)

There was no funding shortfall as of 1/1/2015.

Selected information as of 1/1/2016:

Funding standard carryover balance	\$7,500
Prefunding balance	500
Minimum required contribution	95,000
Effective interest rate	5.00%

On 12/31/2016 the plan sponsor elects to apply \$6,000 of the funding balances toward the 2016 minimum required contribution.

The plan sponsor makes a single contribution of \$110,000 for the 2016 plan year on 1/1/2017.

Actual rate of return on assets for 2016: 15.0%.

Selected information as of 1/1/2017:

Actuarial (market) value of assets	\$200,000
Funding target	195,000

$X\%$ is the funding percentage used to determine if the prefunding balance may be used to reduce the 2018 minimum required contribution.

Question 37

In what range is $X\%$?

- (A) Less than 93.00%
- (B) 93.00% but less than 93.25%
- (C) 93.25% but less than 93.50%
- (D) 93.50% but less than 93.75%
- (E) 93.75% or more

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Data for Question 38 (1 point)

Consider the following statement:

An actuary must apply non-zero assumed rates of mortality prior to the assumed retirement date.

Question 38

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 39 (4 points)

Valuation date: 1/1/2017.

Plan effective date: 1/1/2013.

Normal retirement benefit: 12.5% of final three-year average compensation for each year of service, maximum 8 years.

Segment rates for 2017: {5.0%, 6.0%, 7.0% }.

There are no pre-retirement decrements other than mortality.

Assumed compensation increases: 10.0% per year.

Assume the 2017 IRC section 415 limit is \$215,000.

Selected data for participant Smith:

Gender	Female
Date of birth	1/1/1957
Date of hire	1/1/2010
2013-2016 annual compensation	\$125,000

Question 39

In what range is the 2017 target normal cost for Smith?

- (A) Less than \$120,000
- (B) \$120,000 but less than \$135,000
- (C) \$135,000 but less than \$150,000
- (D) \$150,000 but less than \$165,000
- (E) \$165,000 or more

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Data for Question 40 (4 points)

Funding standard carryover balance as of 1/1/2016: \$10,000.

Prefunding balance as of 1/1/2016: \$90,000.

Selected information as of 1/1/2016:

Actuarial (market) value of assets	\$1,100,000
Funding target	1,000,000
Minimum required contribution	100,000
Required quarterly installments	22,500
Effective interest rate for 2016	6.0%

Actual rate of return on assets for 2016: 2.00%.

There are standing elections in effect that funding balances are to be used to the extent necessary to meet minimum contribution requirements, including quarterly contribution requirements.

2016 plan year contribution made on 3/1/2017: \$120,000.

$\$X$ is the maximum prefunding balance as of 1/1/2017 after the contribution is made.

Question 40

In what range is $\$X$?

- (A) Less than \$114,000
- (B) \$114,000 but less than \$116,000
- (C) \$116,000 but less than \$118,000
- (D) \$118,000 but less than \$120,000
- (E) \$120,000 or more

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Data for Question 41 (4 points)

Type of plan: Multiemployer.

Actuarial cost method: Entry age normal.

Normal retirement benefit: \$125 per month per year of service.

Selected information as of 1/1/2017:

Actuarial value of assets	\$190,000
Valuation interest rate	7.0%

Number of participants: 10.

Selected data for each plan participant:

Gender	Male
Date of birth	1/1/1955
Date of hire	1/1/2015
Status	Active

On 7/1/2017, a contribution is made in an amount equal to the normal cost.

On 12/1/2017, an additional contribution of \$60,000 is made.

$\$X$ is the expected unfunded actuarial accrued liability as of 1/1/2018.

Question 41

In what range is $\$X$?

- (A) Less than \$30,500
- (B) \$30,500 but less than \$33,000
- (C) \$33,000 but less than \$35,500
- (D) \$35,500 but less than \$38,000
- (E) \$38,000 or more

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Data for Question 42 (4 points)

2017 segment rates: {5.0%, 6.0%, 7.0% }.

Normal form of payment: 20-year certain and life annuity.

Selected data for participant Smith as of 1/1/2017:

Gender	Male
Date of birth	1/1/1952
Date of retirement	1/1/2017
Normal form monthly benefit amount	\$3,200
Elected form of payment	Single life annuity
Elected form monthly benefit	\$4,000

$\$X$ is the absolute value of the change in the 2017 funding target due to Smith's election.

Question 42

In what range is $\$X$?

- (A) Less than \$25,000
- (B) \$25,000 but less than \$37,000
- (C) \$37,000 but less than \$49,000
- (D) \$49,000 but less than \$61,000
- (E) \$61,000 or more

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Data for Question 43 (1 point)

Type of plan: Multiemployer.

Valuation date: 1/1/2017.

Actuarial cost method: Entry age normal.

Normal retirement benefit: \$35 per month for each year of service.

The plan sponsor adopts an amendment on 12/15/2016 to increase the benefit rate to \$40 per month for service completed after 6/30/2017, effective 1/1/2017.

Consider the following statement:

The plan amendment will not increase the accrued liability as of 1/1/2017.

Question 43

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 44 (3 points)

Valuation date: 1/1/2017.

Effective interest rate: 6.0%.

2017 minimum required contribution: \$2,000,000.

2017 plan year required quarterly installment: \$440,000.

The required quarterly installment due on 4/15/2017 was paid on 6/30/2017.

The remaining quarterly installments were paid on their respective due dates.

$\$X$ is the increase in the amount required as of 9/15/2018 due solely to the late quarterly installment.

Question 44

In what range is $\$X$?

- (A) Less than \$7,000
- (B) \$7,000 but less than \$9,500
- (C) \$9,500 but less than \$12,000
- (D) \$12,000 but less than \$14,500
- (E) \$14,500 or more

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Data for Question 45 (4 points)

Type of Plan: Multiemployer.

Valuation date: 1/1/2017.

Normal retirement benefit: \$83.33 per month for each year of service, maximum 12 years of service.

Pre-retirement death benefit: \$30,000, payable on the first day of the plan year following the date of death.

Probability of death at age 64: 0.004.

Valuation interest rate: 5.0%.

There are no pre-retirement decrements other than mortality.

Selected data for participant Smith as of 1/1/2016:

Gender	Male
Age	64
Years of service	12
Marital status	Single

Smith died on 12/31/2016.

$\$X$ is the absolute value of the experience gain or loss for 2016 due to Smith's death.

Question 45

In what range is $\$X$?

- (A) Less than \$108,000
- (B) \$108,000 but less than \$110,000
- (C) \$110,000 but less than \$112,000
- (D) \$112,000 but less than \$114,000
- (E) \$114,000 or more

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Data for Question 46 (4 points)

Valuation date: 1/1/2017.

Asset valuation method: The average of the market value of assets on the valuation date and the adjusted market value of assets for the dates that are 12 and 24 months before the valuation date.

	<u>2015 plan year</u>	<u>2016 plan year</u>
Segment rates	{ 3.0%, 4.0%, 5.0% }	{ 4.0%, 5.0%, 6.0% }
Effective interest rate	4.5%	5.5%

Assumed rate of return on assets: 7.0%.

Selected asset information:

	<u>2015</u>	<u>2016</u>	<u>2017</u>
Market value as of 1/1	\$53,800	\$66,200	\$78,600
Contributions	2,000	2,000	
Benefit payments (assumed paid mid-year)	2,300	2,400	
Expenses (assumed paid mid-year)	200	200	
Investment income	12,900	13,000	

All contributions for a plan year are made 8 1/2 months after the beginning of that plan year.

Question 46

In what range is the actuarial value of assets as of 1/1/2017?

- (A) Less than \$69,000
- (B) \$69,000 but less than \$69,750
- (C) \$69,750 but less than \$70,500
- (D) \$70,500 but less than \$71,250
- (E) \$71,250 or more

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Data for Question 47 (4 points)

Type of plan: Multiemployer.

Valuation date: 1/1/2017.

Actuarial cost method: Projected unit credit.

Valuation interest rate: 7.0%.

All funding standard account bases from the 1/1/2016 valuation:

	<u>Years remaining</u>	<u>Outstanding balance</u>
Combined charge base	9	\$700,000
Actuarial gain	14	80,000
Actuarial loss	15	120,000

Actuarial loss during 2016: \$800,000.

An application is approved for an automatic 5-year extension of amortization periods as of 1/1/2017 for eligible bases established before 2017.

$\$X$ is the absolute value of the change in the minimum required contribution as of 12/31/2017 due to the amortization extension.

Question 47

In what range is $\$X$?

- (A) Less than \$30,000
- (B) \$30,000 but less than \$32,000
- (C) \$32,000 but less than \$34,000
- (D) \$34,000 but less than \$36,000
- (E) \$36,000 or more

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Data for Question 48 (1 point)

A plan's minimum required contribution remains unpaid as of the close of the taxable period, and the initial tax is imposed under IRC section 4971.

Consider the following statement:

An additional tax equal to 100% of the unpaid minimum required contribution may be imposed.

Question 48

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 49 (4 points)

Type of plan: Multiemployer.

Actuarial cost method: Unit credit.

Valuation date: 1/1/2017.

Normal retirement benefit: \$50 per month for each year of service.

Early retirement eligibility: Age 60.

Early retirement reduction: 2% per year prior to age 62.

Actuarial assumptions for the 1/1/2017 valuation:

Interest rate	6.0%
Probability of retirement:	
Ages under 62	0%
Age 62	25%
Ages 63 and 64	0%
Age 65	100%

Data for participant Smith as of 1/1/2017:

Gender	Male
Date of birth	1/1/1957
Date of hire	1/1/1992
Date of retirement	1/1/2017

$\$X$ is the absolute value as of 1/1/2017 of the total gain or loss attributable to Smith's retirement.

Question 49

In what range is $\$X$?

- (A) Less than \$35,000
- (B) \$35,000 but less than \$40,000
- (C) \$40,000 but less than \$45,000
- (D) \$45,000 but less than \$50,000
- (E) \$50,000 or more

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Data for Question 50 (3 points)

The plan is not in at-risk status for 2017 and has always had over 500 participants.

Selected information as of 1/1/2017:

Actuarial (market) value of assets	\$12,750,000
Valuation results calculated for IRC section 404 purposes	
Funding target	\$7,500,000
Target normal cost	350,000
Funding target with expected compensation increases	9,250,000
At-risk funding target	13,000,000
At-risk target normal cost	500,000
Effective interest rate	5.0%

Question 50

In what range is the deduction limit for 2017?

- (A) Less than \$650,000
- (B) \$650,000 but less than \$950,000
- (C) \$950,000 but less than \$1,250,000
- (D) \$1,250,000 but less than \$1,550,000
- (E) \$1,550,000 or more

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Data for Question 51 (1 point)

Consider the following statement with respect to a 2017 plan year:

An election to reduce funding balances must be made no later than the end of the 2017 plan year.

Question 51

Is the above statement true or false?

- (A) True
- (B) False

****END OF EXAMINATION****

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