

# Professional Engineer Test

Principles of Engineering Economy

Florida Board of Professional Engineers Provider #0004744

North Carolina Board of Examiners for Engineers and Surveyors # S-0532

Louisiana Professional Engineering and Land Surveying Board CPD # 234

Eric H. Coffin, Registered PE Fla. – Green Energy Engineering, Inc.

Directions: Print test (from [www.GEEintl.com](http://www.GEEintl.com) web site, if you do not have a paper copy), complete it and return by mail, to Eric Coffin, 606 – 14<sup>th</sup> Avenue Northeast, St Petersburg, Florida 33701 for grading and posting. You must get 28 of the 40 questions (70%) correct to pass.

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Print your name as you want it to appear on certificate \_\_\_\_\_ PE in State of \_\_\_\_\_ PE # \_\_\_\_\_

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Mail certificate to address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

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Email \_\_\_\_\_ Area Code \_\_\_\_\_ Phone # \_\_\_\_\_

## **Introduction**

1. The lowest construction cost is? Please circle your answer.  
a. Peaking Turbines    b. Combined Cycle    c. Oil Plant    d. Coal Plant    e. Nuclear
2. The lowest operations cost is? Please circle your answer.  
a. Peaking Turbines    b. Combined Cycle    c. Oil Plant    d. Coal Plant    e. Nuclear
3. The lowest maintenance cost is? Please circle your answer.  
a. Peaking Turbines    b. Combined Cycle    c. Oil Plant    d. Coal Plant    e. Nuclear
4. The lowest fuel cost is? Please circle your answer.  
a. Peaking Turbines    b. Combined Cycle    c. Oil Plant    d. Coal Plant    e. Nuclear
5. The lowest (20-year Net Present Value) life-cycle cost is? Please circle your answer.  
a. Peaking Turbines    b. Combined Cycle    c. Oil Plant    d. Coal Plant    e. Nuclear

## **Chapter 1 Problem**

Read page 14 of your textbook or go to [GEEintl.com](http://GEEintl.com) web site. Read and answer question 1-1. Which of the following is not a cash flow? (Circle answer).

6. a. Car Purchase    b. Bus fare    c. Car Insurance    d. Convenience    e. Gasoline purchase

Which of the following is not an irreducible?

7. (Circle answer). a. Convenience    b. Parking ticket    c. Book storage    d. Dating transportation

## **Chapter 2 Problem**

Assume that you borrow \$1,000 today and that the interest rate is 10%. How much interest will you owe at the end of one year?

8. (Circle answer). a. \$1    b. \$10    c. \$100    d. \$200    e. \$1000

How much principal will you owe at the end of one year after the interest payment?

9. (Circle answer). a. \$1    b. \$10    c. \$900    d. \$1000    e. \$1100

### **Chapter 3 Problem**

You invest \$5,000 in a college fund for your child upon birth. If the account earns 5% per year, how much money will be in the account when your child turns 18? Hint: you are given P, and you are asked to solve for F  $n = 18$   $i = 5\%$

10. (Circle answer). a. \$5,018 b. \$5,180 c. \$12,033 d. \$13,107 e. \$90,000

### **Chapter 4 Problem**

A person can pick oranges from a tree for \$5,000 per year (short harvest season). A new piece of harvesting equipment that has a service life of 10 years with no salvage value, costs \$25,000.

One machine can replace one person in the field. What is the annual cost of this equipment if the interest rate ( $i$ ) = 10%.

Hint: you are asked to find A given P  $n = 10$   $i = 10\%$

11. (Circle answer). a. \$2,500 b. \$2,777 c. \$4,000 d. \$4,068 e. \$5,000

Should the farmer invest in the new orange picking equipment?

12. (Circle answer). a. Yes, invest in equipment. b. No, do not invest.

### **Chapter 5 Problem**

Prepare a present worth analysis of two options for using a new car.

A.) Buy the new car outright for \$20,000.

B.) Lease the car for three years and make payments of \$485 per month.

Using an interest rate of 7%, zero salvage value, and assuming zero down payment, which is the better deal?

13. (Circle answer). a. Buy the car b. Lease the car

### **Chapter 6 Problem**

You have seen three measures of comparing proposed investments.

Which is your favorite?

14. (Circle answer). a. Uniform Annual Cash Flow b. Present Worth c. Rate of Return

### **Chapter 7 Problem**

Your new laptop computer costs \$1,500. You estimate that the benefits would include increased productivity while traveling, tinkering in the evening, notepad for brainstorming, and last minute touchups before that big presentation and that these benefits would be worth \$3,000. Calculate the net benefit / cost ratio.

15. (Circle answer). a. 0.5 b. 0.75 c. 1.0 d. 1.5 e. 2.0

### **Chapter 8 Problem**

Your company buys a car for \$30,000 and depreciates the entire value with the straight-line method over a three-year period. What is the dollar amount of depreciation claimed in year two?

16. (Circle answer). a. \$3,000 b. \$5,000 c. \$10,000 d. \$20,000 e. \$30,000

### **Chapter 9 Problem**

Suppose that you are in the 33% tax bracket and that you donate \$1,000 to your University. Considering the reduction on your tax bill, how much will this donation really cost you?

17. (Circle answer).  
a. \$33    b. \$330    c. \$670    d. \$700    e. \$1,000

### **Chapter 10 Problem Conductor Sizing**

18. What is the size of a copper conductor per NEC?  
Please circle your answer. a. #10    b. #6    c. #4    d. #2    e. #1    f. 1/0
19. What is the size of a copper conductor per NEC and 3% VD?  
Please circle your answer. a. #10    b. #6    c. #4    d. #2    e. #1    f. 1/0
20. What is the size of a copper conductor per NEC and 2% VD?  
Please circle your answer. a. #10    b. #6    c. #4    d. #2    e. #1    f. 1/0
21. What is the size of a copper conductor per NEC, 2% VD, \$4 Cu, \$0.05/k/Wh electricity?  
Please circle your answer. a. #10    b. #6    c. #4    d. #2    e. #1    f. 1/0
22. What is the size of a copper conductor per NEC, 2% VD, \$2 Cu, \$0.15/k/Wh electricity??  
Please circle your answer. a. #10    b. #6    c. #4    d. #2    e. #1    f. 1/0

### **Chapter 10 Problem Pipe Insulation Thickness**

23. What is the thickness of pipe insulation in inches? Your guess.  
(Circle answer). 0    1    2    3    4    5    6    7    8    9    10
24. What is the thickness of pipe insulation in inches? With 8760 hour, \$19/mmBtu, 500°F  
(Circle answer). 0    1    2    3    4    5    6    7    8    9    10
25. What is the thickness of pipe insulation in inches? With 2000 hours  
(Circle answer). 0    1    2    3    4    5    6    7    8    9    10
26. What is the thickness of pipe insulation in inches? With 8760 hours, \$7/mmBtu  
(Circle answer). 0    1    2    3    4    5    6    7    8    9    10
27. What is the thickness of pipe insulation in inches? With 2000 hours, \$23/mmBtu, 115°F  
(Circle answer). 0    1    2    3    4    5    6    7    8    9    10

### **Chapter 10 Incremental Investment and Cost**

28. The correct answer to an economics problem is dependent on the data, assumptions, equations, and approach to analysis.  
(Circle answer). a. True    b. False

### **Chapter 11 Problem**

Retirement and replacement studies are very easy to do.

29. (Circle answer). a. True b. False

### **Chapter 12 Problem**

Read the opening quotation by Joel Dean on page 291 of the textbook or go to the [GEEintl.com](http://GEEintl.com) web site and answer the following true or false statement. “The source of capital funds and interest rate of money for all company projects should be thoroughly researched before undertaking any engineering economy study that has budget implications.”

30. (Circle answer). a. True b. False

### **Chapter 13 Problem**

Turn to page 325 or go to the [GEEintl.com](http://GEEintl.com) web site and read the six factors considered in setting  $i^*$ . Circle the ones that either you or your company have used in the past. (Circle all that you have personally used –this is a survey question for Eric Coffin to gather “typical” practices).

31. a. None (I haven’t done economic studies)      b. Competing investment opportunities.  
c. Risk      d. Time required for payback  
e. Prime Rate      f. Analysis before and after income taxes.

### **Chapter 14 Problem**

Turn to page 363 or go to the [GEEintl.com](http://GEEintl.com) web site and study figure 14-1 on the Consumer Price Index. Which year had the highest rate of change?

32. (Circle answer). a. 1950    b. 1970    c. 1974    d. 1980    e. 1987

Sensitivity analysis can help reduce the various opinions regarding the correct numbers to be used in an engineering economy study.

33. (Circle answer). a. True    b. False

### **Chapter 15 Problem**

Problem 15-10 (go to the [GEEintl.com](http://GEEintl.com) web site if you do not have the text book) deals with four options for a box culvert for a rural highway. This problem was covered and worked out in the DVD presentation. Please answer the following three questions regarding this problem which comes from page 413 of the textbook.

Which of the four options has the lowest capital cost?

34. (Circle answer). a. A    b. B    c. C    d. D

Which of the four options results in the lowest expected repair cost?

35. (Circle answer). a. A    b. B    c. C    d. D

Which of the four options yields the lowest expected annual cost?

36. (Circle answer). a. A    b. B    c. C    d. D

### **Chapter 16 Problem**

Turn to page 428 and read “Example 16-2” or read the quote of the two paragraphs below.

Example 16-2 \_\_\_\_\_

#### **An Unsound Analysis of a Public Works Proposal**

##### **Facts of the Case**

A certain consulting firm was employed to make a benefit-cost analysis of a proposed county expressway project. The conclusion was that annual benefits would be \$400,000 and annual costs would be \$1,000,000, yielding a B/C ratio of 0.4. On this basis, the project did not appear to be justified.

However, the firm had a bright idea. They proposed that the supervisors make an effort to have this expressway incorporated into the interstate highway system. If this could be done, 90% of the cost would be paid by the federal government. They advised the supervisors that this would reduce the local annual cost to \$100,000 and that the B/C ratio would then be  $\$400,000 / \$100,000 = 4.0$ .

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In the first part of the example the consulting firm calculated an annual cost to the County of \$1,000,000. Where is the money coming from?

37. (Circle answer). a. Taxpayers b. Some other Country c. Picked from money trees

In the second part of the example the consulting firm calculated an annual cost to the Federal Government of \$900,000. Where is the money coming from?

38. (Circle answer). a. Taxpayers b. Some other Country c. Picked from money trees

### **Chapter 17 Problem**

Turn to page 460, or go to the [GEEintl.com](http://GEEintl.com) web site and read the two paragraphs under the heading, “How Large Is the Cost of Regulation,” and answer the following question.

Have you spent time in the last year dealing with a regulation?

39. (Circle answer). a. Yes b. No

Please estimate (in hours) the total time spent on regulations during the past year.

40. (Circle answer). a. 10 b. 100 c. 500 d. 1,000 e. 2,000

