

TEST BOOKLET
BOC 1002 - Measuring and Benchmarking Energy Performance
Edition 1.40

TEST INSTRUCTIONS

A period of one hour is available for the test, but it will not be strictly timed. This is an open book test. You may use any notes or handout materials of your own. Mark all answers *only* on the ANSWER SHEET. Make *no marks* in the TEST BOOKLET.

For multiple choice questions, *make only one choice* by circling the corresponding letter on the ANSWER SHEET. Where it appears that two answers may be correct, choose the one *better* answer. There are no questions that require the circling of more than one choice.

For questions of the matching type, write in the numbers that correspond to the answers on the blanks on the ANSWER SHEET. Each number should be used only once; in other words, once you have used a number in a blank, it shouldn't be used in another blank.

Below are some sample questions:

- Example:** In the past, asbestos fibers were commonly used in numerous building materials, including which of the following:
- A. Pipe insulation
 - B. Furnishings
 - C. Window coverings, such as drapes
 - D. All of the above.

While all three could have contained asbestos, it was *commonly used* in only one of these – pipe insulation. The answer should be marked by drawing a circle around letter “A” on the ANSWER SHEET.

(Note: In the preceding example question, only pipe insulation was included as a material that commonly contained asbestos. That *does not mean* that *only* pipe insulation contained asbestos. It should be understood that the items covered in this test have been chosen to *sample* the operator's knowledge.)

**BEGINNING OF TEST
EDITION 1.40**

Mark all answers on *only* the ANSWER SHEET. Make *no* marks in the TEST BOOKLET.

1. **A utility company charges 10¢/kWh. Customer-A has a 10-hp motor that consumed 60 kWh in ten hours. How much will Customer-A pay for consuming 60 kWh?**
 - A. \$.10
 - B. \$ 4.50
 - C. \$ 6.00
 - D. \$ 75.00

2. **A reactive charge may appear on commercial or industrial utility bills if _____**
 - A. apparent power (KVA) is less than working power (kW).
 - B. power factor correction capacitors are used in the facility.
 - C. the power factor drops below the minimum value set by the utility.
 - D. equipment with a high power factor is operated at full capacity.

3. **Which of the following is true about data logging?**
 - A. It is an outdated practice that has been replaced by smart metering.
 - B. It can help determine energy consumption from specific end uses.
 - C. It is a difficult process to perform.
 - D. All of the above.

4. **Which of the following is a *base load* item?**
 - A. Air conditioning
 - B. Heating
 - C. Cooling towers
 - D. Interior lighting.

5. **What is the base temperature used to calculate heating degree-days?**
 - A. 50° F
 - B. 55° F
 - C. 60° F
 - D. 65° F

Use the following problem to answer questions 6 and 7.

You collected the following information for a building:

Building Type:	Office
Total Area:	50,000 ft ²
Electricity Consumption:	925,000 kWh/year
Natural Gas Consumption:	8,800 Therms/year

6. Calculate the Annual Electric Energy Use Index in kWh/ft²/year.
- A. 18.5
 - B. 54.1
 - C. 5.7
 - D. .2
7. Calculate the Energy Use Index (both electric and natural gas consumption) in kBtu/ft²/year.
- A. 63
 - B. 17
 - C. 81
 - D. 19
8. Which of the following is a seasonal load item?
- A. Interior lighting
 - B. Office equipment
 - C. Domestic hot water
 - D. Air conditioning
9. Electric utilities often use different rate schedules depending on what they are trying to accomplish. Which of the following is a common type of rate schedule?
- A. Time-of-use
 - B. Inverted block
 - C. Seasonal
 - D. All of the above.
10. One kWh of electricity is an amount of energy equal to how many Btu?
- A. 8500
 - B. 3412
 - C. 1150
 - D. 1 Therm.

11. After review of historical energy use and a preliminary site assessment, an operator identified four O&M measures in her 300,000 square foot building and is ready to present an action plan to management. What order is often used to prioritize energy efficiency actions? Select the answer that lists the actions accordingly.

	Action	Cost	Rebate	Annual Savings	Payback
1	Convert 75 W incandescent high-ceiling lights to 16 W fluorescent floods	\$2,161	\$350	\$4,834	5-6 mos.
2	Install motion sensor controls for lighting in file storage areas	\$2,100	\$1,084	\$2,820	4 months
3	Optimized chilled water system staging and sequencing – 50% reduction	\$575	N/A	\$12,272	17 days
4	Reduced operating hours on fountains from 119 to 60 hrs/week	Negligible	\$926	\$6,706	Immediate
	TOTALS	\$4,836	\$2,360	\$26,632	

- A. 4, 3, 1, 2
 B. 2, 4, 1, 3
 C. 3, 4, 1, 2
 D. 4, 3, 2, 1
12. Which statement about energy accounting is true?
- A. Energy accounting is a method of tracking energy changes and identifying energy consumption issues.
 B. Energy accounting is a method for tracking all the costs associated with running a business.
 C. Only energy related data needs to be identified, measured, and accounted for.
 D. Six to eight months-worth of data needs to be collected including local weather.
13. Which of the following is a typical building end-use?
- A. Solar PV generation.
 B. Submetering.
 C. Cooling.
 D. All of the above.

14. **Benchmarking a building allows a facility manager to _____**
- A. determine if a meter or sub-meter is operating correctly.
 - B. compare the size of one building to that of another.
 - C. identify good and poor energy performance of a building.
 - D. calculate the total area (square footage) of a building.
15. **Energy Use Intensity (EUI) is _____**
- A. a common unit of measurement used to benchmark a building's energy use.
 - B. used by the utility to determine charges for coal, natural gas, and/or uranium.
 - C. a typical electric or gas rate schedule found on commercial utility bills.
 - D. geographically independent, so Utah will have the same EUI index as Boston.
16. **What is baseline data?**
- A. Data collected to compare and understand energy use after energy efficiency or operational measures were taken.
 - B. Data collected to establish annual energy consumption which is used to evaluate energy efficiency measures.
 - C. Data collected to compare and understand energy use of a building to that of another building the same size.
 - D. Data collected to establish and understand the energy use of a building in a geographic region to that of another.
17. **If the heating degree days for a given building were 4,000 during the baseline year, what would you expect to happen to the heating energy use in a year for which the degree days were 5,000?**
- A. The heating will stay the same since degree days do not affect heating.
 - B. The heating will go down since there are more heating degree days.
 - C. Heating energy use will increase because the heating season was colder.
 - D. None of the above.
18. **Which of the following statements is true?**
- A. Seasonal loads consume the same amount of energy all year long.
 - B. Baseloads are end-use loads that are year round and not seasonal.
 - C. Lighting systems consume the same amount of energy all year long.
 - D. None of the above.

19. The maximum demand for the month was 40 kW. If the demand charge is \$10 per kW, what would be the additional charge for the demand?
- A. \$ 10.00
 - B. \$ 40.00
 - C. \$ 400.00
 - D. \$1,600.00
20. Which of the following are operational strategies that can be used to reduce energy consumption in your facility?
- A. Use occupant sensors to control lights.
 - B. Perform preventative maintenance.
 - C. Set heating controls to meet occupancy load.
 - D. All of the above.

END OF TEST

Please return the TEST BOOKLET and your ANSWER SHEET to the administrator.