**TEST BOOKLET**
# BOC 1003 – Efficient Lighting Fundamentals
**Edition 3.40**

INSTRUCTIONS FOR THE TEST

A period of 1 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 on only 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 best 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.

Follow through the following sample question:

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 would have been 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 3.30**

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

**1. Energy savings for lighting systems are generated by the following?**
   A. Exceeding recommended lighting levels
   B. Long lamp Life
   C. Lumen depreciation
   D. Lowering operating hours and using efficient equipment

**2. The total amount of light that a bulb or tube produces is measured in:**
   A. Foot candles (FC)
   B. Watts
   C. Lumens
   D. CRI

**3. The industry standard for the overall diameter of a fluorescent tube is:**
   A. Measured in eighths of an inch.
   B. Dependent on the length of the tube.
   C. Used to measure the base of the tube.
   D. Measured in mm (millimeters).

**4. Average rated life for a fluorescent tube is <u>defined</u> as:**
   A. The average time the tube is on and burning at rated watts.
   B. The point in time where half of a large group of tubes have failed.
   C. The point in time where all of a large group of tubes have failed.
   D. The point in time when the lumen output of the lamp drops by 10%.

**5. Which of the following statements about color temperature is true?**
   A. Low color temperature ratings are used for bulbs or tubes with cool appearance.
   B. High color temperature ratings are used for bulbs or tubes with warm appearance.
   C. Bulbs or tubes with a high color temperature typically have a shorter life span than those with a low color temperature because they produce more heat.
   D. Low color temperature ratings are used for bulbs or tubes with a warm appearance.

**6. Lighting Power Density (LPD):**
   A. Is rated in watts per square foot.
   B. Is a measure of lighting system performance used in codes and standards.
   C. Is primarily concerned with high color temperature lamps.
   D. Is calculated by determining the volume of a room and number of fixtures.

**7. The Illuminating Engineering Society (IES) recommended light levels are expressed in:**

A. watts
B. average maintained foot candles
C. candelas
D. meters

**8. A classroom measures 30-ft long by 15-ft wide and has six fluorescent fixtures estimated at 90 watts each. What is the Lighting Power Density (LPD)?**

A. .27 W/SF
B. 1.2 W/SF
C. .83 W/SF
D. 1.6 W/SF

**9. What statement regarding Solid-State (SSL) fixtures is true?**

A. They are inefficient and typically have a slow payback.
B. They generate less heat than other types because LEDS use lower wattage.
C. Their short lamp life increases maintenance costs.
D. They work well in low temperature application like freezers and exterior lighting.

**10. Which statement about recycling is true?**

A. Electronic ballasts do not need to be recycled.
B. Magnetic ballasts manufactured after 1979 do not need to be recycled.
C. All fluorescent tubes contain mercury and should be recycled properly.
D. Capacitors in electronic ballasts have PCB and need to be recycled.

**11. The function of a fluorescent ballast is to:**

A. provide the correct voltage to start the arc discharge.
B. limit lamp current to design value.
C. provide energy to heat cathodes.
D. all of the above.

**12. The performance of fixtures declines during their time in service because:**

A. the lumen output of the bulbs or tubes decreases and dirt builds up on the reflecting surfaces.
B. the input watts increase due to ballast aging.
C. the input voltage increases due to ballast aging.
D. none of the above.

**13. Which of the following statements is *true* about cleaning lighting equipment?**

A. Use white gloves when touching the specular surfaces of parabolic fixtures or reflectors to avoid fingerprints.
B. Cleaning reflecting surfaces helps maintain intended lighting levels.
C. Dust on either side of lenses, louvers, etc. can affect lighting performance.
D. All of the above.

**14. Which statement is true?**

A. To upgrade a lighting system to LED, the fixtures must be replaced.
B. LED is the best solution for accent lighting.
C. LEDs aren't recommended for can lighting because they produce too much heat.
D. All of the above.

**15. Which of the following ways does ***NOT*** increase fixture efficiency?**

A. Fixture cleaning.
B. De-lamping fluorescent fixtures and leaving existing ballasts in place.
C. Retrofitting recessed downlights with LED.
D. Converting fluorescent troffers to SSL.

**16. Which of the statements about the cost of lighting is true?**

A. The labor cost for re-lamping is a large part of the operating cost of lighting systems.
B. Lighting systems cost less to operate than other building energy systems.
C. Electricity consumption is the largest component of lighting operation costs.
D. The initial cost of a retrofit or re-lighting project does not affect the simple payback.

**17. According to the Illuminating Engineering Society (IES), the recommended light levels (foot candles) for lobbies, stairways, and corridors is:**

A. 10-40
B. 30
C. 50
D. 50-100

**18. Which of the following statements is ***true*** about lighting controls?**

A. Energy can be saved by turning off or turning down lighting.
B. Switching and scheduling are lighting control strategies.
C. Switching lighting circuits with circuit breakers is a safety problem.
D. All of the above.

**19. Which statement most accurately describes an LED light source used in SSL fixtures?**

A. LEDs operate cool and do not need any added means of cooling.
B. LEDs should be compared with traditional light sources in terms of lumens per watt.
C. LM 70 is the point in time when the light output of LED's has declined to 70% of initial light output.
D. Uniformity is not a benefit of SSL fixtures used in exterior applications.

**20. Select the statement that accurately describes lighting surveys.**

A. Includes detailed measurements of lighting levels and operating hours using specialized tools and data loggers.
B. Involve simple gathering of information about existing lighting systems.
C. Include extensive data collection and analysis of lighting upgrade options.
D. Are often fee-based and performed by lighting contractors or consultants.

**END OF TEST**

Please return the Test Booklet and your Answer Sheet to the administrator.