TEST BOOKLET
BOC 1014 – Electrification and Building Operations
Edition 1.10

TEST INSTRUCTIONS

The test consists of 20 multiple choice questions. 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. You will work independently to answer the questions. Teaming up with a classmate is not permitted. Mark all answers only on the ANSWER SHEET. Make no marks in the TEST BOOKLET.

Select only one answer 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.

Below are some sample questions:

Example #1: Electric motors typically have an efficiency of approximately.
A. 95% to 99%
B. 78% to 93%
C. 50% to 75%
D. 40% to 48%

Standard motors are approximately 78% to 93% efficient, depending on size. High efficiency electric motors can have very high efficiencies, but even these special motors exceed 95% in only very large sizes. While there are specialized motors that can exceed 95%, this is not typical. The answer should be marked by drawing a circle around letter "B" on the ANSWER SHEET.

Example #2: 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 1.10

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

1. Heat pumps are very efficient because:

A. They combust fuel completely, with very little byproduct.
B. They have a low coefficient of performance.
C. They bypass the refrigeration cycle.
D. They move heat around rather than creating it.
E. None of the above

2. Which of the following is not considered a greenhouse gas?

A. Carbon dioxide
B. Methane
C. Ammonia
D. Nitrous oxide
E. These are all greenhouse gases

3. Which sector uses the most energy in the U.S.?

A. Industry
B. Transportation
C. Buildings
D. Agriculture
E. None of the above

4. Which of the following is true about air-source heat pump performance?

A. Heat pumps aren't cost effective in cold climates.
B. They typically have a coefficient of performance of 1.0.
C. They perform best when the outside air temperature is relatively low.
D. They perform best when the outside air temperature is relatively high.
E. None of the above

5. Which of the following is true about ductless heat pumps?

A. They are a culprit for dust allergies.
B. They aren't a good solution for spaces with varied conditioning loads.
C. They can be a good option in retrofits such as zone additions.
D. They aren't typically very useful in commercial buildings.
E. None of the above

6. Which of the following is a potential benefit of VRF systems?

A. They reduce the need for refrigerant piping.
B. They can perform very well in a wide range of climates.
C. They are relatively easy to submeter.
D. They are reliable because they use gas as a backup energy source.
E. None of the above

7. Which of the following is a potential benefit of electrification?

A. Creating jobs
B. Productivity gains
C. Better health outcomes
D. Reduced energy costs
E. All of the above

8. Which of the following is not considered a benefit of GEBs?

A. Energy savings from efficiency
B. Improved comfort and IAQ
C. Improved operations
D. Higher life cycle cost
E. None of the above

9. How much energy use in commercial buildings is attributed to HVAC?

A. 10 – 15%
B. More than 70%
C. 20%
D. 50%
E. None of the above

10. Which of the following should be considered when planning an electrification retrofit?

A. Total cost of ownership
B. Winter design temperature
C. Load reduction strategies
D. All of the above
E. None of the above

11. Which of the following is considered a DER?

A. Site solar photovoltaic system
B. Battery or thermal energy storage
C. Wind turbine
D. EV charging station
E. All of the above

12. Which is true about seasonal peak electrical load in most regions of the U.S.?

A. Peak load is expected to switch from summer to winter peaking.
B. Peak load is expected to switch from winter to summer peaking.
C. Peaking fluctuations cannot be met without fossil fuels.
D. All of the above
E. None of the above

13. Which of the following is true about refrigerants?

A. The Montreal Protocol solved the environmental problems caused by refrigerants.
B. Many commonly used refrigerants contribute significantly to global warming.
C. Natural refrigerants such as ammonia and hydrocarbons will be phased out by 2030 because of toxicity concerns.
D. Refrigerants have a distinct smell that makes leaks easy to detect.
E. None of the above

14. Which of the following should be included in a preventive maintenance plan for a water-source heat pump?

A. Cleaning strainers
B. Checking system discharge pressures
C. Descaling the heat exchanger
D. All of the above
E. None of the above

15. Which of the following is not a maintenance concern for VRF systems?

A. Checking for refrigerant leaks
B. Cleaning the air filter
C. Cleaning the heat exchanger
D. Checking the burners
E. Using care around copper tubing

16. Which of the following statements is false?

A. Meeting carbon reduction goals will require aggressive efforts in both existing buildings and new construction.
B. Conventional planning processes often fail to recognize the holistic nature of buildings as part of a complex system.
C. Integrated design is a process that can be applied in any phase of the life cycle of a building.
D. Building operators don't need to be involved in new construction planning.
E. All of the above

17. Which of the following can help determine savings from retrofit projects?

A. Utility bills
B. Comparing the nameplate voltage of the old and new equipment
C. Submetering
D. A and B
E. A and C

18. Which of the following is true about energy recovery?

A. Cooling systems can contribute to energy savings for heating loads.

B. Exhaust air streams can help preheat fresh ventilation air.
C. Energy recovery ventilators can help prevent IAQ issues.
D. All of the above
E. None of the above

19. Which can be a good solution to reduce the emissions impact from gas-fired chiller systems?

A. Replacing with heat recovery chillers
B. Replacing with heat pump RTUs
C. Adding thermal energy storage to shift loads
D. A and C
E. B and C

20. What are the four key characteristics of a Grid-interactive Efficient Building?

A. Efficient, sustainable, high performance, zero energy
B. Efficient, connected, smart, flexible
C. Zero energy, renewable energy, smart, green certified
D. Flexible, low power, integrated, smart
E. None of the above

END OF TEST

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