TEST BOOKLET
BOC 2011 – Motors in Facilities
Edition 1.00

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

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

1. **Which statement accurately describes the relationship of voltage, resistance and amperage in Ohm's Law when applied to an alternating current electric motor?**
   A. If voltage and resistance increase then amperage increases.
   B. If voltage increases and resistance remains the same then amperage will decrease.
   C. If voltage decreases and resistance remains the same then amperage will decrease.
   D. All of the above

2. **In which of the following circuits does the power factor become an issue?**
   A. Resistive circuits with heating elements and light bulbs
   B. All alternating circuits
   C. Inductive circuits with electric motors
   D. All direct current circuits

3. **In the United States, an alternating current cycles _____ times per second?**
   A. 60
   B. 30
   C. 90
   D. None of the above

4. **Parallel and series circuits in a motor are used to _____.**
   A. enable a three phase motor to change direction of rotation
   B. save electricity
   C. enable a three phase motor to run on either DC or AC power
   D. enable operation on lower or higher voltage without burning up

5. **When referring to an electric motor, TEFC means which of the following?**
   A. Timed External Frequency Converter
   B. Torque Extension Framed Components
   C. Totally Enclosed Fan Cooled
   D. Thermal Efficiency Factor Compliant

6. Capacitors rely on which of the following?

A. Amperage induced almost instantaneously.
B. Voltage builds with time.
C. All of the above.
D. None of the above.

7. On a motor nameplate, what does "Fr" or Frame mean?

A. It indicates the density or mass of the back iron.
B. It indicates the electrical starting characteristics.
C. It indicates the physical size or dimensions of the motor.
D. All of the above.

8. On a motor nameplate, what does "SF" or service factor of 1.15 indicate?

A. The weight is 15% more than a standard motor of the same HP.
B. De-rate the motor by a minimum of 15%.
C. The list price is 15% higher due to better motor efficiencies.
D. 15% more is available from the motor if needed for a short period of time.

9. On a motor nameplate, what does the term "code" mean?

A. indicates the starting current
B. the physical size of the motor
C. how hot the motor will run
D. if the motor is connected in series or in parallel

10. What does electric motor NEMA Nom Eff. or efficiency mean?

A. Amount of power regenerated back into the power line
B. Amount of insulation degradation allowable in this motor
C. An open circuit is allowable in this motor
D. Percentage of electric energy converted to mechanical power

11. How is a single-phase electric motor like a bumblebee?

A. They almost always sound like a large bee in flight.
B. They really shouldn't fly or in the motor's case; run.
C. The shaft is very much like a large stinger.
D. They are painted yellow and black to easily identify them.

12. Which of the following is included in motor management?

A. A pre-failure plan
B. Pre- qualification of vendors
C. Identification of performance indicators
D. All of the above

13. What task is included in the process of continuous improvement?

A. Plan, Do, Check, Quantify, Communicate and Plan
B. Setting personal conductive standards
C. Taking steps to establish long term bottlenecks
D. All of the above

14. What percentage of a motor's capacity defines its optimum, load-operating point?

A. 10%
B. 33%
C. 75%
D. 115%

15. Calculate the operating cost of a 100 HP motor that is 94% efficient, operating at 75% of its rated load for 3,000 hours at 10 cents per kWh.

A. $16,454.58
B. $17,856.38
C. $17,555.55
D. $18,458.54

16. Over-lubrication of motors causes _____.

A. high operating temperatures
B. winding insulation failure
C. motors to be filled with grease
D. All of the above

17. When lubricating a motor you should _____.

A. make safety your first priority
B. pump grease until it shows out the shaft end
C. pump grease into bearings as quickly as possible
D. follow lubrication instructions for general application machines

18. Which of the following measures should be taken to monitor and operate an electric motor with exposed power conductors?

A. Apply protective sunscreen to skin that may be exposed to electrical arc-flashes.
B. Ask a co-worker to keep an eye on it for you when you are unable.
C. Work only with a qualified electrician or electrical technician.
D. None of the above

19. When replacing a standard efficiency motor with a NEMA Premium efficiency motor, what feature should one pay particular attention to?

A. Color of paint in the junction box
B. Lamination tooth size
C. Revolutions per minute (RPM)
D. All of the above

20. Electric motor reliability improves when_____.

A. lubrication is applied per motor manufacturer's recommendation
B. it is properly aligned with driven equipment
C. voltage variation does not exceed 10% of nameplate
D. all of the above

END OF TEST

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