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Continuing Education Course #394
Motor Control Part 3
AC Variable Speed Drives

1. What is the synchronous speed (Ns) of a 50 HP, 460 VAC, 6-pole, totally enclosed fan cooled motor (TEFC) running on a 460 VAC, 60 Hz system?

- a. 3600
- b. 1800
- c. 1750
- d. 1200

2. What is the torque produced by a 50 HP, 460 VAC, 4-pole motor running on a 460 VAC, 60 Hz system?

- a. 145.8 ft-lbs.
- b. 1800.0 ft-lbs.
- c. 291.7 ft-lbs.
- d. 87.5 ft-lbs.

3. For an IEC motor rated at 100 HP, 1500 RPM, 380 VAC, 50 Hz operating on a VFD. If the frequency is reduced to 40 Hz what should the voltage be to produce 100% of the rated torque?

- a. 307 VAC
- b. 153 VAC
- c. 304 VAC
- d. 332 VAC

4. For a motor rated 100 HP, 1800 RPM, 460 VAC, 60 Hz operated on a VFD, which of the following voltage and frequency combination will have the motor produce 100 HP?

- a. 460 VAC, 60 Hz
- b. 230 VAC, 30 Hz
- c. 460 VAC, 80 Hz
- d. A and C

5. What type of load requires less torque as the speed increases?

- a. Constant horsepower load
- b. Constant torque load
- c. Variable torque load
- d. b and c

6. If a motor rated 100 HP, 1800 RPM, 460 VAC, 60 Hz is connected to a load requiring 100HP at 1800 RPM and the motor is operated on a VFD with an output of 230 VAC, 30 Hz and the power required by the load is 50% of the motor's full load rating. What type of load is the motor connected to?

- a. Constant horsepower
- b. Constant torque
- c. Variable torque

7. Which of the following is not a reason to use a variable speed drive?
- ○ a. Energy savings
- ○ b. Reduced mechanical stress
- ○ c. Improved process control
- ○ d. Increase the power of a motor

8. For a given load profile, which type of load will have the highest energy savings?
- ○ a. Constant horsepower
- ○ b. Constant torque load
- ○ c. Variable torque load
- ○ d. They all would be equal

9. For a 50 HP motor connected to a constant torque load operating on a VFD at 100% speed, the energy consumed in 4 hours is closest to? Assume 1 HP = 0.746 kW
- ○ a. 37 kWh
- ○ b. 50 kWh
- ○ c. 150 kWh
- ○ d. 200 kWh

10. For a 50 HP motor connected to a variable torque load operating on a VFD at 80% speed, the energy consumed in 8 hours is closest to? Assume 1 HP = 0.746 kW
- ○ a. 37 kWh
- ○ b. 50 kWh
- ○ c. 150 kWh
- ○ d. 200 kWh

11. What are the major hardware components of a variable frequency drive?
- ○ a. Converter, Inverter
- ○ b. Converter, DC Link, Inverter
- ○ c. PWM, DC Link, Inverter
- ○ d. DC Link, Inverter, Vector control

12. What type of control algorithm provides the tightest speed regulation and torque control?
- ○ a. PWM Output
- ○ b. Vector control
- ○ c. IGBT Output

13. Which of the following is not a possible source to control the speed of a VFD?
- ○ a. Analog inputs
- ○ b. Accelerator
- ○ c. Operator panel
- ○ d. Serial Communication

14. What standard makes recommendations regarding acceptable levels of electrical system voltage and current harmonics?
- ○ a. IEEE 802.3
- ○ b. RS-485
- ○ c. IEEE 519
- ○ d. NEMA MG1 Part 31

15. What is the standard that can be referenced when specifying motors for use with VFDs?

- ○ a. IEEE 802.3
- ○ b. RS-485
- ○ c. IEEE 519
- ○ d. NEMA MG1 Part 31