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AE 363 - Exam 2

Part 1 Closed Book

Multiple Choice: 2 pt. each

1. An electric motor is controlled by a start-stop station through a magnetic motor starter. When the stop button is pushed, the motor stops, but re-starts when the button is released. Probable cause:
 - a) an overload switch stuck open.
 - b) coil short-circuited.
 - c) auxiliary contacts stuck closed.
 - d) auxiliary contacts stuck open.
 - e) none of the above

2. The breakdown torque of an electric motor is:
 - a) the torque at which the motor shaft may twist off.
 - b) the torque at the last point on the torque - speed curve where a decrease in speed will result in an increase in torque.
 - c) the torque at which the stator field suddenly breaks down
 - d) another term for the locked rotor torque.

3. On a motor circuit, a current higher than the full-load current, but less than the locked rotor current would be regarded as:
 - a) a short circuit
 - b) a ground fault
 - c) an overcurrent
 - d) a, b, or c

4. The no-load efficiency of a single phase motor is
 - a) zero percent
 - b) usually 5-20%
 - c) usually 25-50%
 - d) usually over 60%

5. The synchronous speed of an induction motor is NOT dependent on:

- a) the number of stator poles per phase.
 - b) the frequency of the power source.
 - c) the amount of friction in the motor bearings.
6. Loading an induction motor to double its nameplate rating
- a) is acceptable if the time is short enough so that motor windings are not overheated.
 - b) cannot be done because of motor characteristics.
 - c) is acceptable if the time is long enough so that the motor can come to a constant temperature.
 - d) will usually cause motor failure.
7. An electric motor has a power factor which
- a) is usually leading.
 - b) is usually lagging.
 - c) is usually 1.
 - d) (a), (b), or (c) depending on the motor load.
8. The purpose of branch circuit overcurrent protection on a branch circuit for a motor is to:
- a) protect the motor from short circuits and ground faults.
 - b) protect the motor from overload damage.
 - c) protect circuit conductors from short circuits and ground faults.
 - d) a and c
 - e) protect circuit conductors from overload
9. Which is NOT a required component of a motor circuit?
- a) short circuit protection
 - b) disconnect device
 - c) control device
 - d) lightning protection device
10. When calculating conductor size needed to supply a single motor, use this amperage:
- a) locked rotor current.
 - b) 125% of locked rotor current.
 - c) full load current.
 - d) 125% of full load current.
11. The normal slip of an induction motor under no load is
- a) 0 - 1%
 - b) 3 - 5%
 - c) 7 - 10%

- d) 10 - 25%
12. When can an overcurrent device rating exceed the ampacity of its branch circuit conductors?
- a) never
 - b) always
 - c) always, on a circuit without motors
 - d) sometimes on a motor circuit
13. A 15 amp branch circuit is carrying 150 amps. This is probably
- a) an overload
 - b) a short circuit
 - c) a lightning stroke
 - d) a normal load
14. A dual-voltage motor
- a) uses electric power at two voltages simultaneously for better starting.
 - b) can use electric power at either of two volages with no changes.
 - c) used low voltage for starting due to voltage drop, then high voltage for running.
 - d) can be adapted to either of two voltages with internal connection changes.
15. Compare the total connected load (TCL) and the total computed demand load (TCDL) for a farm building:
- a) $TCL > TCDL$
 - b) $TCL \geq TCDL$
 - c) $TCL = TCDL$
 - d) $TCL \leq TCDL$
 - e) $TCL < TCDL$

16. (8) Sketch the circuit of a dual-voltage split-phase motor, wired to operate at low voltage.

Sketch the circuit of the same motor, wired for a high voltage and for running in the opposite direction.

17. (10) Draw a sketch and describe the go-power motor dynamometer used in the motor characteristics lab, and how it operates. You need not discuss electrical measurement.

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18. A capacitor start-induction run motor has this nameplate information:

230 V 40A single-phase 7.5 hp 1725 rpm code L

These data were taken while the motor is loaded to 5 hp: 230V, 5.3 kW, 30A

- (5) a) What is the efficiency of the motor as it runs this load?

- (5) b) What is the output torque of the motor as it runs this load?

- (5) c) What is the speed of the motor as it runs this load?

- (5) d) What torque is this motor capable of producing as it starts a load?

- (5) e) What current will the motor draw as it produces this torque?

- (5) f) If this motor is the only load on a branch circuit, what are the highest and lowest circuit breaker sizes which could be used on the branch circuit?

- (22) 19. Phase sequence: ABC, 120/208 3 phase service, Balanced load. Wattmeters are connected to read + power.

The wattmeter reads 8.2 kW. What power is the 3-phase load using?