

Name _____

AE 363 - Exam 2

Part 1 Closed Book

Multiple Choice: 2 pt. each

1. When the actuating pin is NOT depressed on a microswitch, there is a circuit from:
 - a) NO to C
 - b) NC to C
 - c) NO to NC
 - d) C to NO and NC

2. 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

3. Capacitor start-induction run motors are NOT found on variable speed ventilating fans because
 - a) they don't have adequate torque to start the fan.
 - b) they are not available in the correct sizes.
 - c) they cannot stand the temperatures likely in this application.
 - d) the starting winding would be turned on and damaged during low-speed operation.

4. In a permanent split capacitor-type motor,
 - a) there is only one winding and it has a capacitor in series.
 - b) there are two windings which are both always used, and one has a capacitor in series.
 - c) the capacitor is designed so that it will never wear out. The motor is the same as a capacitor - start type in other respects.
 - d) the starting winding circuit contains a pair of parallel capacitors. One is switched, one is not switched.

5. A household window fan is equipped with this type motor:
- a) repulsion start induction run
 - b) shaded pole
 - c) capacitor start
 - d) universal
 - e) synchronous
 - f) split-phase
6. A fully loaded motor operating continuously at a temperature 10 C over its rated ambient will have a life of about:
- a) 10,000 hrs
 - b) 20,000 hrs
 - c) 35,000 hrs
 - d) 17,500 hrs
 - e) 5,000 hrs
 - f) 70,000 hrs
 - g) none of the above
7. A low-cost general purpose motor will have
- a) a code letter toward the end of the alphabet.
 - b) a code letter toward the beginning of the alphabet.
 - c) no code letter.
 - d) a code letter anywhere in the alphabet.
8. 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
9. A motor with a full-load speed of 1150 RPM has this many poles:
- a) 2
 - b) 4
 - c) 6
 - d) 8
10. With the rotor locked, a motor under test develops 33 lb ft of torque. The motor is developing this HP:
- a) 0

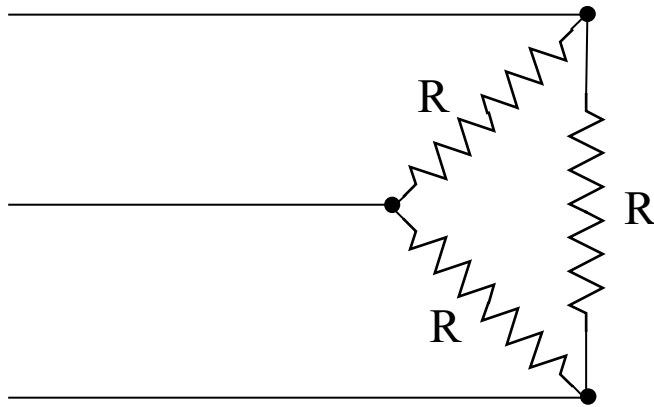
- b) 0.0019
 - c) 5260
 - d) 33
 - e) none of the above
11. A certain motor has adequate torque to start its load but inadequate power to drive the load once started.
- a) this is impossible
 - b) this motor will not be able to get the load started.
 - c) this motor will operate at an abnormally high current and an abnormally low speed.
 - d) this motor will run the load too fast.
12. The load on a 1/2 HP induction motor is increases to 1 HP. When this is done, the motor will
- a) stop.
 - b) slow to about 1/2 of full load speed.
 - c) maintain full load speed.
 - d) slow to about 95% of full load speed.
 - e) light up like a Christmas tree
13. The programmer of a programmable controller enters on the screen a ladder diagram circuit which is:
- a) a control circuit
 - b) a load circuit
 - c) both (a) and (b)
 - d) (a) or (b), depending on the needs of the application
14. A 120/208-V load is to be connected using a plug and receptacle. The load is to be safety grounded. The load includes 120V single phase as well as 3-phase 208 volt components. Use a
- a) 3 wire, 4-pole plug and receptacle.
 - b) 4 wire, 3 pole.
 - c) 4 wire, 5 pole.
 - d) 5 wire, 4 pole.
15. How many phase sequences are possible on a 3-phase power system?
- a) 1
 - b) 2
 - c) 3
 - d) 4
 - e) 5

16. Sketch the circuit of a dual-voltage 2-value capacitor motor, wired to operate at high voltage.

(8)

Sketch the circuit of the same motor wired for low voltage and for running in the opposite direction.

17.



This 3-phase load consists of three 3.6-kW heaters. Each heater has a current of 15A.

(18)

Find

I_p

I_L

E_p

E_L

R

18. An electric clothes dryer has 240-volt loads, 120-volt loads, and needs to have its frame grounded. Explain why it uses a 3-pole, 3-wire plug and socket.
- (5)

19. A two-value capacitor motor has this nameplate information:

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

These data were taken while the motor is loaded to 9 hp: 230V, 8.3 kW, 45A

- (4) 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?

20. Conveyors A, B, and C are all controlled by magnetic motor starters (with 120-volt coils) and start-stop stations. Each magnetic motor starter has a spare NO pole. Conveyors A and B both feed conveyor C. The control circuits need to be designed so that neither A nor B can operate unless C is operating. If C is operating, either A or B can be started without the other. For safety, an overload on any motor must shut down all three conveyors. Draw a ladder diagram of the control circuit.