

Name

KEY

TSM 363 Final

Open: one 8.5x11 page both sides
Multiple choice: 2 pts each

- 1) Analysis of an electrical load shows a power factor of 1.1.
 - a) this load has more inductive reactance than capacitive reactance.
 - b) this load has more capacitive reactance than inductive reactance.
 - c) resistance load on the circuit exceeds the sum of capacitive and inductive load.
 - d) there has been an error in meters, meter reading, or calculations.

- 2) Magnetic motor starters for single and three-phase motors come with this number of load poles:
 - a) 1
 - b) 2
 - c) 3
 - d) 4
 - e) 5

- 3) Which value is closest to the level of illumination in this room now?
 - a) 0.03fc
 - b) 0.3fc
 - c) 3 fc
 - d) 30 fc
 - e) 300 fc

- 4) In a manual-start fluorescent light circuit, pressing the start button
 - a) establishes an arc
 - b) causes heaters to become incandescent
 - c) energizes the relay coil

- 5) A disadvantage of the incandescent lamp is:
 - a) low power factor
 - b) low efficiency
 - c) high power factor
 - d) high temperature sensitivity

- 6) A three-phase squirrel cage motor when compared to other motors in common use on farms:
- a) is simplest in design, has the best starting characteristics, and is probably cheapest in cost/HP
 - b) is not the simplest in design but has the best starting characteristics and is probably cheapest in cost/HP.
 - c) is not the simplest in design, does not have the best starting characteristics, and is probably not cheapest in cost/HP
 - d) is the simplest in design but does not have the best starting characteristics and is probably cheapest in cost/HP.
- 7) Compared to other motor types, a 3-phase motor
- a) has the highest starting torque
 - b) has the lowest starting current
 - c) is simplest
 - d) has the highest cost
- 8) A household window fan is equipped with this type motor:
- a) permanent split capacitor
 - b) shaded pole
 - c) capacitor start
 - d) universal
 - e) synchronous
 - f) split-phase
- 9) A motor with a full-load speed of 1150 RPM has this many poles:
- a) 2
 - b) 4
 - c) 6
 - d) 8
- 10) The full-load efficiency of an electric motor is typically:
- a) 0%
 - b) 5-40%
 - c) 40-70%
 - d) 75-90%
 - e) 90-125%
- 11) 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.

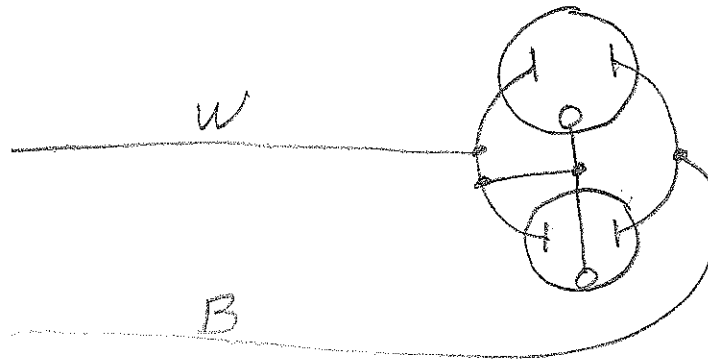
- 12) This type of motor has a centrifugal starting switch:
- a) 3-phase
 - b) shaded pole
 - c) split-phase
 - d) permanent split capacitor
 - e) repulsion on start-induction run
- 13) What is the slip of an induction motor running at 1725 rev/min?
- a) 0 rev/min
 - b) 1800 rev/min
 - c) 1725 rev/min
 - d) 75 rev/min
 - e) 1875 rev/min
- 14) Loading an induction motor to double its nameplate horsepower 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.
- 15) 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.
- 16) Current to a dual-voltage motor is measured to be 7.5 amps. The nameplate states 10 amps/5 amps. The motor is being operated at 230 V.
- a) this motor is overloaded.
 - b) this motor is loaded to less than its rated output hp.
 - c) one cannot determine from the information given whether the motor is overloaded or underloaded.
 - d) the motor is not being loaded.
- 17) A dual-voltage motor
- a) uses electric power at two voltages simultaneously for better starting.
 - b) can use electric power at either of two voltages 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.

- 18) If the starting switch on a split phase motor is stuck closed,
- a) the motor will not start by itself.
 - b) the motor will start normally, but the starting winding will overheat within a short period of time.
 - c) the motor will start, but will not reach normal speed
 - d) the motor will start and run with no difference in operation.
 - e) the motor will start and run backwards
- 19) Motors with full load currents of 4, 8, and 12 amps respectively, are to be served by a single branch circuit. This is the current to use when designing the conductor:
- a) 24
 - b) 25
 - c) 30
 - d) 27
- 15
4
8
- 20) Overload heaters on a 3-phase magnetic motor starter:
- a) can be in any one of the 3 energized conductors
 - b) can be in any two of the energized conductors
 - c) must be in all 3 energized conductors
 - d) must be in neutral plus all 3 energized conductors
- 21) 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.
- 22) This is the most expensive enclosure type
- a) TENV
 - b) TEFC
 - c) Explosion proof
 - d) ODP
- 23) This is the way to reverse a shaded pole motor:
- a) shift brushes
 - b) reverse two loads
 - c) reverse starting winding with respect to running winding
 - d) reverse field winding with respect to armature winding
 - e) usually not made reversible

- 24) To reverse a 3-phase motor, you must
- a) check phase sequence, interchange first and last phases.
 - b) reverse auxiliary winding with respect to the running winding.
 - c) cannot easily be reversed.
 - d) interchange any 2 phases.
 - e) shift brush holder
- 25) The normal full-load slip of an induction motor is:
- a) 0 - 2%
 - b) 3 - 5%
 - c) 7 - 10%
 - d) 10 - 25%
- 26) A 15-A circuit breaker is carrying 15 amps. Probably:
- a) it will open in a few milliseconds.
 - b) it will open in about 60 seconds.
 - c) it will never open.
 - d) any of the above, depending on the type of load.
- 27) 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
- 28) An electric shock victim has gone into ventricular fibrillation.
- a) there is no way to prevent death.
 - b) the person might be revived by professional treatment if kept alive until arrives.
 - c) the person will come out of fibrillation spontaneously if kept alive by CPR.
 - d) this occurs from most shocks and is not considered a dangerous situation.
- 29) A wild phase is present on this type of service:
- a) wye
 - b) delta
 - c) both wye and delta
 - d) neither wye nor delta
- 30) A voltmeter placed in series with a load will:
- a) cause a short circuit, but no damage to the meter.
 - b) read correctly the voltage across the load.
 - c) shut off almost all current to the load.
 - d) cause a short circuit and ruin the meter.

31) (10) A 2-terminal 120-V receptacle in an old house needs to be replaced and the replacement is a 3-terminal receptacle, having a safety grounding terminal. Since there is no green or bare grounding conductor existing in this circuit, the neutral (white) conductor is connected to both the neutral (silver) terminal and to the grounding (green) terminal.

a) Sketch this device and all the wires leading up to it. Show all wire colors.



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b) Is this procedure acceptable? Explain

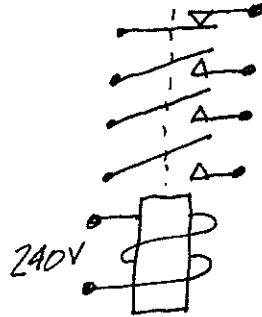
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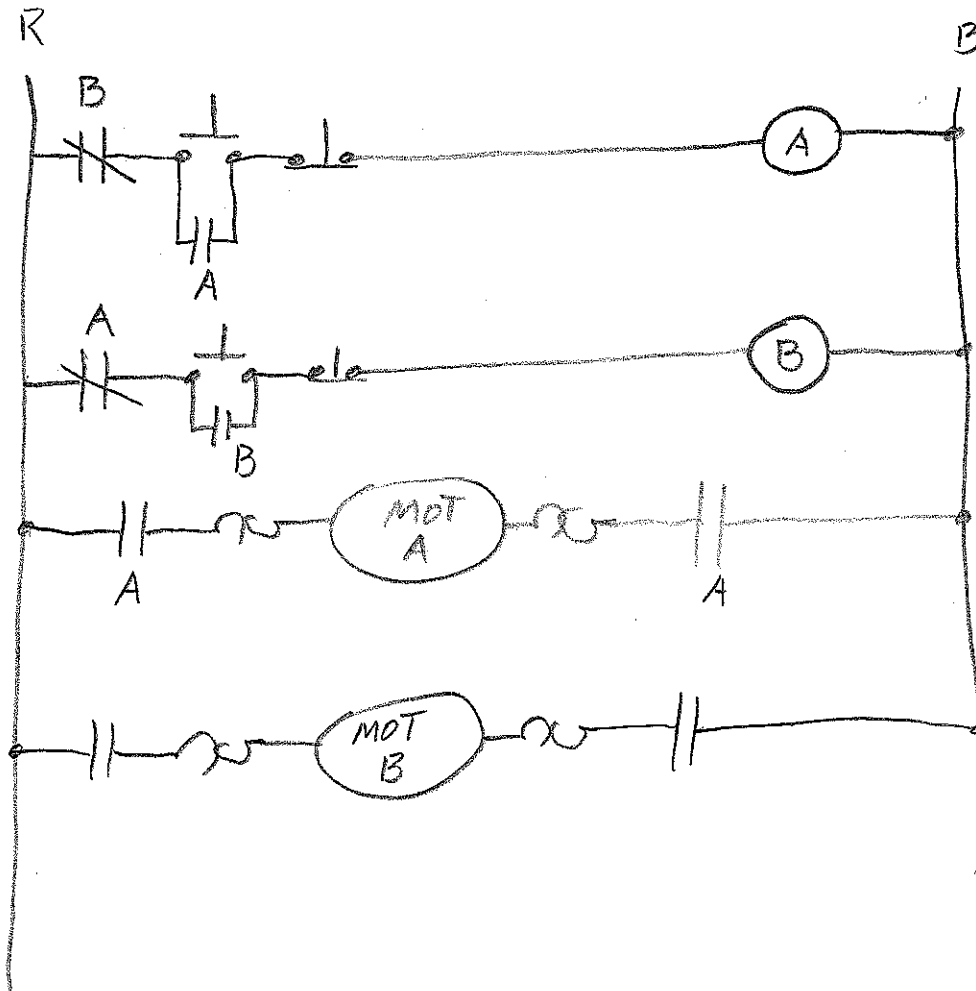
NO - CODE SAYS NO CONNECTION OF NEUTRAL & GROUND BEYOND PANEL

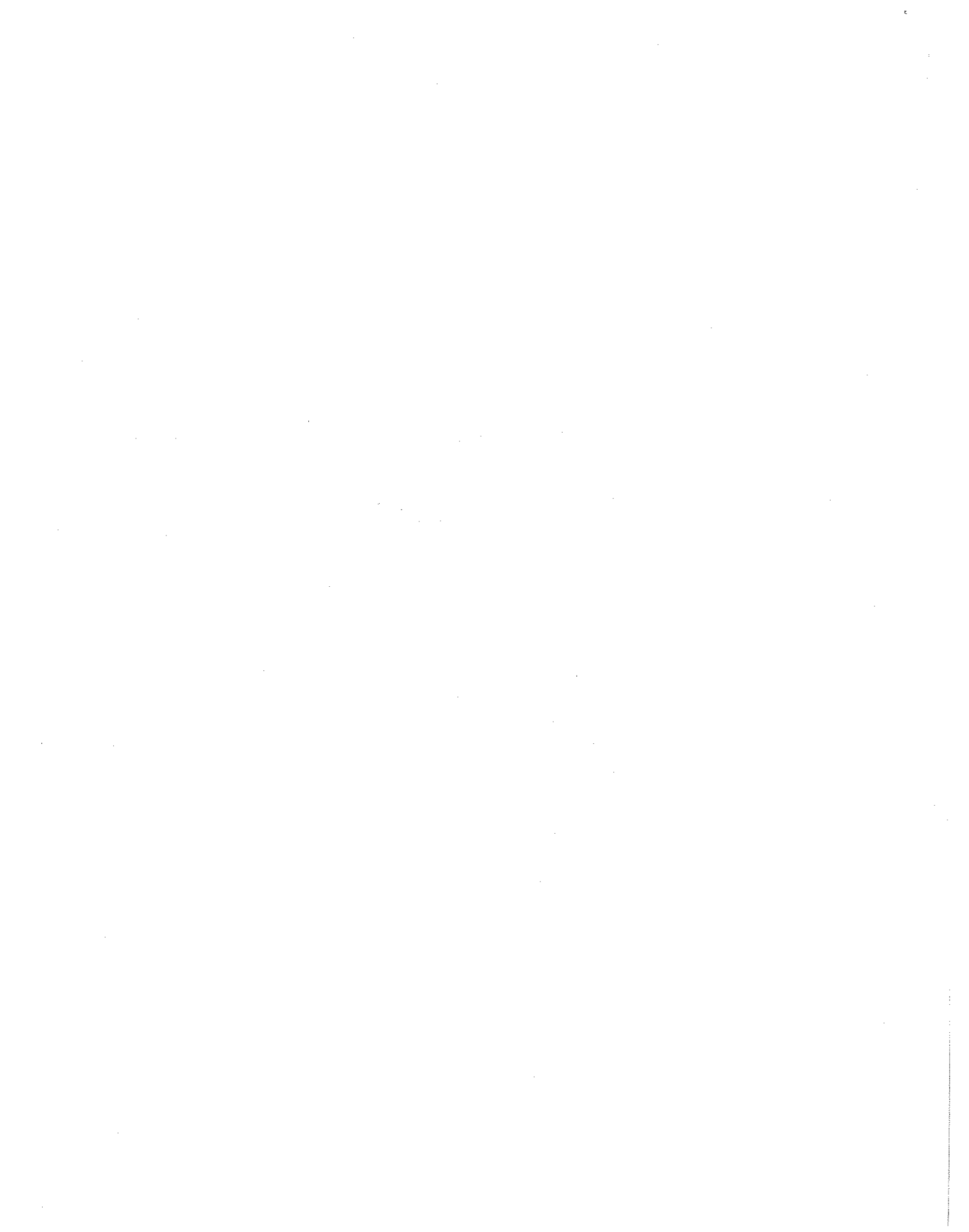
- IF NEUTRAL OPENS, LOAD FRAME IS HOT.

32) (25) Two 240-V single-phase motors designated Motor A and Motor B are controlled by two relays like this:



Along with two push-button stations. The motors must be wired so that if A is started first, B cannot come on and if B is started first, A cannot come on. Draw a ladder diagram showing both the load and coil circuits. NOTE THAT THE RELAY COILS ARE 240 V.





34) (5) The motor in the problem on the previous page is to be placed outside on a conveyor. Is this a suitable application? Explain

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NO - It's an open motor.

3

a TEFC is needed

35) (10) Assume the motor in the problem on the previous page is wound in a delta configuration.

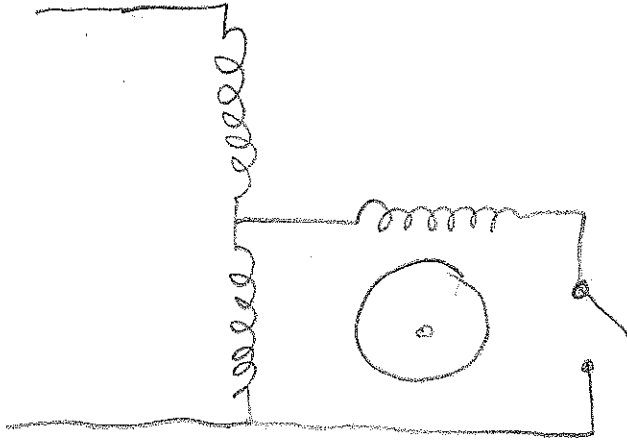
(a) Sketch the motor winding circuit



(b) Compute the phase current assuming the motor is wired for low voltage operation.

$$I_p = \frac{I_L}{\sqrt{3}}$$
$$\frac{80}{\sqrt{3}} = \underline{46.1A}$$

36(10) (a) A dual-voltage split phase motor is wired to run at high voltage. Sketch the motor circuit.



(b) Sketch the circuit of the same motor wired to run at low voltage in the opposite direction.

