

Name _____

AE 363 - Exam 1

Part 1 Closed Book

Multiple Choice: 2 pt. each

1. When an extra parallel load is added to a parallel circuit, total resistance of the circuit:
 - a) goes up.
 - b) goes down.
 - c) is not changed
 - d) can go up or down depending on circuit voltage.

2. Materials which are good insulators
 - a) have many free electrons.
 - b) have few free electrons.
 - c) have no electrons
 - d) must have no resistance.
 - e) have atoms which are positively charged

3. An ammeter placed in series with a load will:
 - a) read correctly the current through the load.
 - b) shut off almost all the current to the load.
 - c) cause a short circuit, but no damage to the meter.
 - d) cause a short circuit and ruin the meter.

4. The RMS value is shown on the dial of most AC meters because
 - a) this is the only practical way to construct a meter.
 - b) use of the RMS value permits calculation of power in AC and DC circuits using the same formula.
 - c) this is a strong tradition among meter manufacturers.
 - d) a meter which reads in RMS values will last much longer than one reading peak or squared values.

5. The volt amps drawn by a load equal the watts drawn by the load -
- a) always
 - b) never
 - c) when $PF < 1$
 - d) when $PF > 1$
 - e) when $PF = 1$
6. Negative instantaneous power in an AC circuit
- a) means energy stored in a reactive load component is flowing from the load to the generator.
 - b) is impossible.
 - c) means that resistive load components are adjusted to lower voltage by passing stored energy back to the generator.
 - d) occurs only at power factors less than 0.5.
7. A ground fault circuit interrupter (or ground fault tripper) disconnects the circuit
- a) when a detector senses that current is flowing toward the load in both the black and white wires at the same time.
 - b) when the current in the black wire exceeds a certain amperage for a certain time.
 - c) when a detector senses a larger current in black (hot) than in white (neutral).
 - d) when a detector senses a current in the wrong direction in the white (neutral).
8. A GFI will NOT protect a person who contacts
- a) red conductor and earth
 - b) black conductor and earth
 - c) black conductor and neutral conductor
9. For purposes of analysis of shock circuits, the resistance of the human body between extremities is assumed to be:
- a) 0.5 ohm
 - b) 5 ohms
 - c) 50 ohms
 - d) 500 ohms
 - e) 500,000 ohms

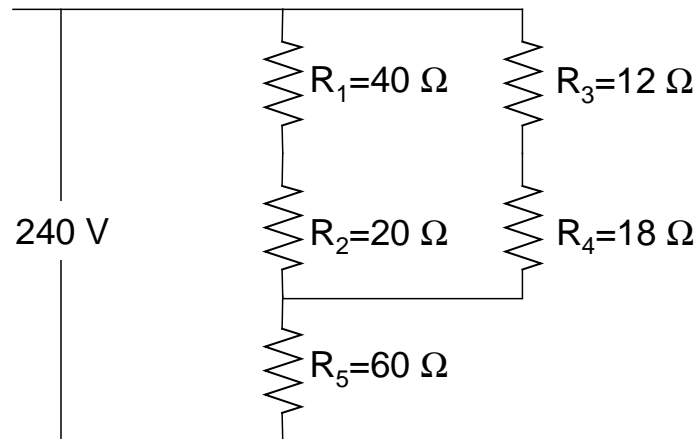
10. Severity of an electrical shock depends on
- a) magnitude of current.
 - b) duration of shock.
 - c) route through body.
 - d) all of the above.
 - e) a & b
 - f) a & c
11. The purpose of giving CPR to an unconscious shock victim is to
- a) revive the person.
 - b) prevent stoppage of the heart.
 - c) prevent ventricular fibrillation from occurring.
 - d) keep person alive until defibrillation assistance can arrive.
12. A watt-hour meter has a Kh factor of 3 on the nameplate. With a test load connected through it, 10 revolutions of the disk take 300 seconds. Compute the load wattage.
- a) 360 watts
 - b) 120 watts
 - c) 9000 watts
 - d) 90 watts
 - e) none of the above
13. If a 240-volt load has no connection to neutral,
- a) the load will work, but not very well
 - b) the load will not operate
 - c) this violates code
 - d) the load works normally
14. If conductor costs are considered, the least-cost conductor size is:
- a) the size suggested by NEC guidelines
 - b) a larger size than suggested by NEC guidelines
 - c) a smaller size than suggested by NEC guidelines
 - d) (A), (B), or (C) depending on other factors

15. If a conductor size for a 150 foot feeder was selected on the basis of ampacity, probably with the load on
- a) the conductor will overheat
 - b) there will be too high a voltage at the load
 - c) there will be excessive voltage drop in the conductor
 - d) the conductor will not overheat and voltage drop will be very small
16. In order to switch a light from 4 locations, these switches are needed:
- a) 2-S, 2-S3
 - b) 2-S3, 2-S4
 - c) 4-S4
 - d) 1-S4, 3-S3
17. A cable designated as 3 wire with ground contains these conductors:
- a) black, red, white, green, or bare
 - b) black, white, green, bare
 - c) black, red, green, bare
 - d) red, white, green, bare
 - e) black, red, white
18. NM cable is run along a wall in notches cut in the 2x4 studs.
- a) this is OK
 - b) this is never permitted
 - c) this is permitted if the wall is not load-bearing
 - d) this is permitted if 1/16-inch-thick plates are nailed over notch to protect the cable from nails
 - e) this is permitted if dry wall is to be glued on

Part 2 - Open Book and Open notes
Show your work

9/23/99
CJB

19. (15)



Compute: R_T
 I_1
 P_4

20. An electric motor draws 50 amps and 9 kW when connected to 240 volt, 60-Hz power source.

(30)

- (a) Draw a phasor diagram referencing on voltage, and another phasor diagram referencing on current. Show phase angle.

- (b) Compute R and X_L values which will model this motor as an R-L series circuit.

- (c) Calculate power used by R in circuit of (b).

- (d) Compute R and X_L values which will model this motor as an R-L parallel circuit.

- (e) Compute the size of a capacitor which can be placed in parallel with the motor and will cause the power factor to remain the same, but with current leading voltage.

21. A service panel supplies a constant 240 volts. A type USE copper branch circuit is to be run underground to a 10-kW resistive heater at a distance of 300 feet. Design voltage drop is 3%.

(19)

(a) What size conductor is needed, considering ampacity?

(b) What size is needed considering voltage drop?

(c) Write the complete specification for ordering the conductor.

(d) What is the voltage available at the load with the load on, and with this conductor used?