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ENGG104 Tutorial **1** extra **Problems** (revision)
(Solutions**)**

Name_____ Student Number_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) A 9–volt battery with a 500 mAh capacity is connected to a circuit which draws 100 mA. How long will the battery be able to power this circuit in theory? 1) _____
   A) 0.2 hours B) 0.05 hours C) 0.5 hours D) 5 hours

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

2) The free proton is the positive charge carrier in a solid conductor. 2) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

3) How many joules would be required to create a voltage of 25 volts if 80 coulombs of charge were transferred? 3) _____
   A) 2000 B) 3.2 C) 32 D) 200

4) What is the current (in amperes) if 10.0 coulombs of charge pass through a wire in 2.0 seconds? 4) _____
   A) 10 amperes B) 20 amperes C) 5 amperes D) 0.2 amperes

5) In a battery there is an accumulation of electrons on one terminal of the battery and an accumulation of positive ions on the other terminal. This will result in a(n) _____. 5) _____
   A) weak battery B) increase in battery deterioration
   C) potential difference D) decrease in battery current

6) Germanium and silicon are examples of 6) _____
   A) conductors B) insulators
   C) battery electrolytes D) semiconductors

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

7) An electrical circuit consists of a battery and a single load. Draw a sketch to show how to connect a voltmeter and an ammeter to the circuit. Show meter polarity on your diagram. 7) _____

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

8) Current flowing from a battery is measured by placing an ammeter across the battery terminals. 8) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

9) One coulomb is the total charge associated with 6.242×10^{18} electrons. How many electrons will pass through a conductor if 50 μA of current flows for 5 seconds? 9) _____

10) Name five good conductors of electricity. 10) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

11) A common *primary* battery is the 11) _____
A) silicon–germanium type. B) carbon–zinc type.
C) lead–acid type. D) nickel–cadmium type.

12) What potential (voltage) exists between two power supply terminals if 5 joules of energy are required to move 10 coulombs of charge between the two terminals? 12) _____
A) 10 V B) 0.5 V C) 5 V D) 2 V

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

13) VOM stands for _____. 13) _____

14) DMM stands for _____. 14) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

15) If 40 joules of energy are required to move 25 coulombs of charge, what would the voltage be? 15) _____
A) 1.6 volts B) .6 volts C) 16 volts D) 1000 volts

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

16) What resistance reading would result across a fuse if the fuse were "blown"? 16) _____

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

17) When selecting a conductor, malleability and ductility do not have to be considerations in the selection process. 17) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

18) The color bands blue, gray, brown, gold describe which one of these resistors? 18) _____
A) 68 Ω ±10% B) 680 Ω ±10% C) 680 Ω ±5% D) 68 Ω ±5%

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

19) The unit for resistance is called _____. 19) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

20) Semiconductors are known to have a negative temperature coefficient because an increase in temperature will result in which of the following? 20) _____
A) An increase in resistance only at room temperature
B) A decrease in resistance only at room temperature
C) A decrease in the resistance level
D) An increase in the resistance level

21) Which *one* of these statements is true? 21) _____

A) As conductor length increases, conductance increases proportionally.
B) As resistance increases, conductance increases proportionally.
C) As conductor area decreases, conductance increases proportionally.
D) As conductor area increases, conductance increases proportionally.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

22) An element whose terminal resistance can be varied in a linear or nonlinear manner is called _____. 22) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

23) What is the color code for a resistor whose value is 650 ohms? 23) _____

A) Green, Blue, Brown
B) Blue, Green, Brown
C) Green, Black, Brown
D) Brown, Black, Green

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

24) What safety precaution must be observed when using an ohmmeter? 24) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

25) Which *one* of these statements is true of the ohmmeter? 25) _____

A) It displays a resistance of zero if the leads touch each other, and an infinite reading if there is no connection at all.
B) It is used to measure resistance in a circuit only if the circuit is powered by low–voltage batteries.
C) It is used to measure resistance of a single resistor in a network without removing the resistor from the circuit.
D) It should be stored with the selector switch in the resistance mode.

26) The resistance between the two outside terminals of a potentiometer is 100 kΩ. If the resistance between the wiper and one outside terminal is 20 kΩ, what is the resistance between the wiper and the other outside terminal? 26) _____

A) 80 kΩ B) 20 kΩ C) 16 kΩ D) 100 kΩ

27) The fifth color band found on some resistors denotes 27) _____

A) manufacturer's resistance tolerance, which indicates the precision with which the resistor was made.
B) power rating, in tenth–watt increments.
C) reliability, in percentage of failures per 1000 hours of use.
D) temperature coefficient, in ohmic percentage change per °C.

28) The current consumed by a digital wristwatch is 20 μA. What is the equivalent resistance of the watch if it is powered by a 1.5 V battery? 28) _____

A) 30 μΩ B) 75 kΩ C) 75 Ω D) 33.3 kΩ

29) A series circuit with a resistor has a voltage drop of 10 volts and a current of 5 mA. If the resistance and voltage are doubled, what is the value of the current through the circuit? 29) _____

A) 2.5 mA B) 20 mA C) 5 mA D) 10 mA

30) A 12 volt automobile taillight bulb draws 6 amperes from the battery. What is the "hot" resistance of this lamp? 30) _____

A) 24 Ω B) 72 Ω C) 2 Ω D) 3 Ω

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

31) A solar cell with an efficiency of 12% drives a small motor with an efficiency of 85%. What is the overall efficiency of the system? 31) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

32) In which of the following does the current in an electrical circuit equal the electromotive force divided by the resistance? 32) _____

A) Watt's Law B) Ohm's Law

C) Coulomb's Law D) Kirchhoff's Law

1) D
2) FALSE
3) A
4) C
5) C
6) D
7) Sketch should show the voltmeter across (in parallel with) battery terminals with the + voltmeter terminal connected to the + battery terminal. The ammeter should be in the current path (in series), with the + ammeter terminal nearest the + battery terminal.
8) FALSE
9) 1.6×10^{15} electrons
10) copper, gold, silver, aluminum, tungsten, etc.
11) B
12) B
13) Volt–Ohm–Milliammeter
14) Digital Multimeter
15) A
16) Infinite resistance.
17) FALSE
18) C
19) Ohms
20) C
21) D
22) Rheostat
23) B
24) Always turn off power to the circuit before attaching the ohmmeter.
25) A
26) A
27) C
28) B
29) C
30) C
31) 10.2%
32) B