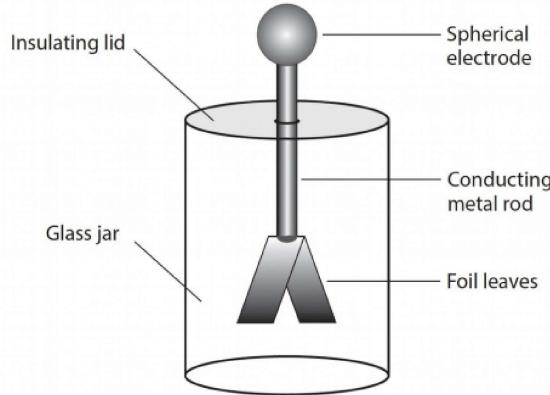


GIBILISCO FINAL EXAM 7TH EDITION

1. Complete the following statement with a single word that makes it true. "When you connect multiple inductors and/or capacitors in parallel, their values all add up to give you the net _____.
 A. Reactance D. Susceptance *
 B. Impedance E. Conductance
 C. Resistance
2. The atomic weight of an atom approximately equals the number of
 A. Neutrons in it.
 B. Protons in it.
 C. Neutrons plus the number of protons in it. *
 D. Electrons in it.
 E. Neutrons plus the number of electrons in it.
3. What's the technical term for the length of time between a specific point in an AC cycle and the same point in the next cycle?
 A. Frequency D. Duration
 B. Cycle time E. Wavelength
 C. Period *

Figure Exam-1

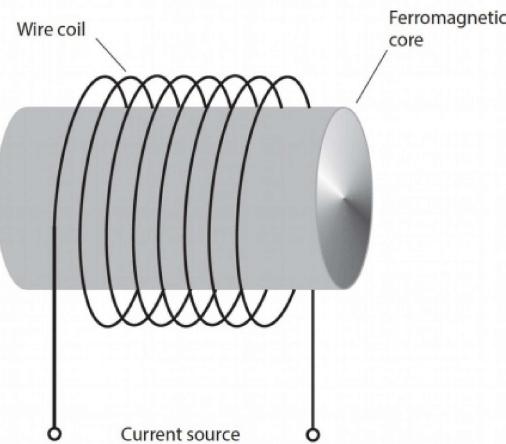


4. Figure Exam-1 shows a device that detects the presence of electrical
 A. Current. D. Energy.
 B. Resistance. E. Charge. *
 C. Power.
5. You should never expect to see an autotransformer used
 A. As a loopstick antenna.
 B. For RF impedance matching.
 C. When isolation between windings is important. *
 D. To step an RF voltage down by a small factor.
 E. To step an RF voltage up by a small factor.
6. When you express a point in the RXL quarter-plane as a vector, you give that point a unique
 A. Magnitude and direction. *
 B. Combination of resistance and inductance.
 C. Combination of resistance and frequency.
 D. Pure resistance.
 E. Pure reactance.
7. You have a string of holiday ornament bulbs. They're all connected in series. One of the bulbs burns out. What happens?
 A. The current in every other bulb increases.
 B. The voltage across every other bulb increases. *
 C. The power consumed by every other bulb increases.
 D. The current in, voltage across, and power consumed by every other bulb all increase.
 E. All the other bulbs go out, leaving the whole string dark.
8. A complex number
 A. Is the same thing as an imaginary number.
 B. Comprises a real number plus or minus an imaginary number. *
 C. Is a one-dimensional quantity.
 D. Quantifies the characteristic impedance of a transmission line.
 E. Can't quantify anything in the real world.
9. Power that exists only within the reactive part of an AC circuit is sometimes called
 A. Theoretical power.
 B. Apparent power.
 C. True power.
 D. False power.
 E. Imaginary power. *

10. Roughly how much current, passing through your heart, does it take to kill you?
 A. 0.1 mA D. 100 mA *
 B. 1 mA E. Any of the above
 C. 10 mA

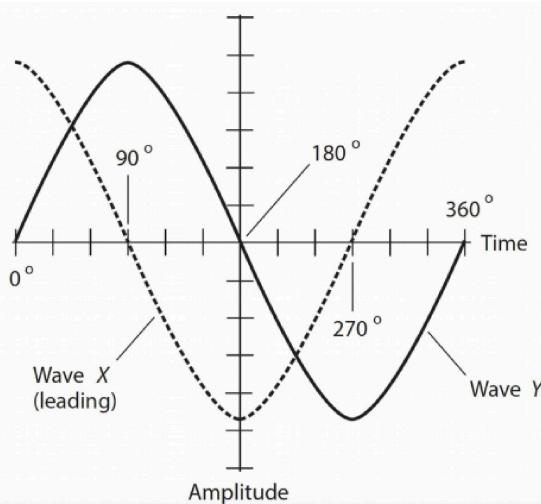
11. An inductor works by storing and releasing energy in the form of
 A. An electric field.
 B. A magnetic field. *
 C. Electric charge.
 D. Pure reactance.
 E. Complex impedance.

Figure Exam-2



12. What will happen if you connect a battery to the "current source" terminals of the device shown in Figure Exam-2?
 A. The battery voltage will increase.
 B. The core will behave like a magnet (it normally doesn't). *
 C. The core will stop acting like a magnet (it normally does).
 D. The polarity of the core's magnetic field will reverse.
 E. Current will flow in the coil, but nothing else will happen.
13. What happens to the reactance of a 100-pF capacitor as you lower the frequency of an AC signal through it?
 A. It's always zero, because capacitors don't have any reactance.
 B. It's negative, but it increases (gets closer to zero).
 C. It's positive, and it increases.
 D. It's negative, and it decreases (gets farther from zero). *
 E. It's positive, but it decreases.
14. The Arduino Pro Mini differs from the Arduino Uno in that
 A. It has no analog inputs.
 B. It has no built-in USB interface. *
 C. It is a larger board for professional use.
 D. It costs more than the Arduino Uno.
 E. None of the above
15. In a bipolar transistor, the term zero bias means that two of the three electrodes are at the same voltage. Which electrodes?
 A. Emitter and base * D. Source and drain
 B. Base and gate E. Emitter and gate
 C. Emitter and collector
16. When used for audio peak clipping, a diode voltage limiter
 A. Has high gain and sensitivity.
 B. Often distorts the sound. *
 C. Can break into oscillation.
 D. Needs a high-voltage battery.
 E. Drains a lot of current from the battery.
17. Bleeder resistors
 A. Should be connected in parallel with power-supply filter capacitors. *
 B. Should be connected in series with power-supply filter capacitors.
 C. Can keep power-supply filter capacitors from burning out.
 D. Can be connected across batteries to smooth out the voltage.
 E. Can minimize the risk of electrocution from solar cells.

Figure Exam-3



18. Figure Exam-3 shows two sine waves in phase
- Quadrature. *
 - Dissonance.
 - Coincidence.
 - Opposition.
 - Offset.
19. Alkaline cells
- Cost less than zinc-carbon cells.
 - Last longer than zinc-carbon cells in small electronic devices. *
 - Are constructed in a completely different way than zinc-carbon cells.
 - Have shorter shelf lives than zinc-carbon cells.
 - Need warmer temperatures than zinc-carbon cells.
20. Compared with circuits built up from discrete components, integrated circuits (ICs) offer all of the following advantages except one. Which one?
- Better reliability
 - Reduced size
 - Lower current demand
 - Higher inductance values
 - Higher speed *
21. Which of the following actions could damage a microcontroller?
- Connecting a 5-V digital output to a 3.3-V input on a second microcontroller. *
 - Connecting a 3.3-V digital output to a 5-V input on a second microcontroller.
 - Connecting a 1.5-V cell between GND and a digital input of a microcontroller.
 - Connecting a digital output pin through a 1000-ohm resistor to another digital output pin on the same microcontroller.
 - Connecting a digital output pin directly to a digital input pin on the same microcontroller.
22. What kind of waveform would you expect to see from the OUT pin of a 555 Timer IC configured as an oscillator?
- A square wave *
 - A sine wave
 - A triangular wave
 - A ramp
 - None of the above
23. A key advantage of JFETs over bipolar transistors is the fact that JFETs
- Last longer.
 - Can handle more power.
 - Generate less internal noise. *
 - Have lower input impedance.
 - Can take more physical abuse.
24. The table below shows the digital inputs and output for
- | Input X | Input Y | Output |
|---------|---------|--------|
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

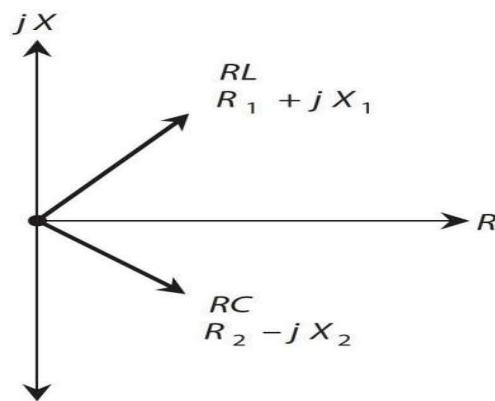
- An OR gate.
- A NOR gate.
- An AND gate.
- A NAND gate. *
- An XOR gate.

25. When you want to calculate a circuit's power gain (or loss) in decibels, the input and output impedances don't matter
- if their reactance components are both inductive or both capacitive.
 - if both are purely reactive.
 - if both are purely resistive. *
 - if the input has constant amplitude.
 - under any circumstances.
26. A well-designed power supply has rectifier diodes whose peak-inverse-voltage (PIV) ratings
- equal the positive or negative peak AC input voltage.
 - significantly exceed the positive or negative peak AC input voltage. *
 - equal the peak-to-peak AC voltage across the transformer primary.
 - ensure that they constantly remain in a state of avalanche breakdown.
 - are less than their own forward breakdown voltages.
27. A 12-V battery drives 777 mA of current through a resistor. Remembering the rules of rounding and significant figures, how should you express the resistance?
- 15 Ω *
 - 15.4 Ω
 - 9.3 Ω
 - 9.32 Ω
 - 65 Ω
28. Which of the following things can a displacement transducer do?
- Measure the peak-to-peak amplitude of an AC wave
 - Convert sound waves to radio signals
 - Convert infrared, visible, or ultraviolet radiation to DC
 - Convert an electrical signal to mechanical rotation *
 - Measure the frequency of an irregular wave
29. In an amplitude-modulated (AM) signal, the carrier wave conveys no information itself, but it nevertheless consumes
- 10 percent of the power.
 - 25 percent of the power.
 - 33 percent of the power.
 - 50 percent of the power.
 - more than 50 percent of the power. *
30. The table below shows the digital inputs and output for
- | Input X | Input Y | Output |
|---------|---------|--------|
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |
- An OR gate.
 - A NOR gate.
 - An AND gate. *
 - A NAND gate.
 - An XOR gate.
31. If 1 km of wire has a conductance of 0.6 S, then 3 km of the same wire has a conductance of
- 1.8 S.
 - 1.2 S.
 - 0.2 S. *
 - 0.3 S.
 - 0.6 S.
32. A half-wave, center-fed dipole antenna has gain over
- an isotropic antenna. *
 - a Yagi antenna.
 - a quad antenna.
 - a dish antenna.
 - a longwire antenna.
33. The table below shows the digital inputs and output for

Input X	Input Y	Output
0	0	0
0	1	1
1	0	1
1	1	0

- A. an OR gate.
B. a NOR gate.
C. an XOR gate. *.
34. A capacitor works by storing and releasing energy in the form of
A. an electric field. *
B. a magnetic field.
C. electric charge.
35. One gigabyte equals exactly
A. 10^3 bytes.
B. 10^6 bytes.
C. 10^9 bytes.
36. Suppose that a battery, connected to an unchanging load, delivers constant current for a while and then “dies fast.” In technical terms, that battery has a
A. flat ampere-hour characteristic.
B. flat energy-loss curve.
C. flat discharge curve. *
D. nonlinear discharge contour.
E. linear discharge contour.
37. Which of the following antenna types is designed mainly for use at ultra-high and/or microwave frequencies?
A. Horn
B. Dish
C. Helical
D. Corner reflector
E. All of the above *
38. If you want to build a bipolar-transistor RF power amplifier with the highest efficiency possible, and if you intend to use it for FM only, you should bias the transistor
A. beyond saturation.
B. at saturation.
C. midway between cutoff and saturation.
D. at cutoff
E. beyond cutoff. *
39. You connect a circuit whose output has a $1000\text{-}\Omega$, reactance-free impedance to the primary of a transformer. As a result, the secondary exhibits a $10\text{-}\Omega$, reactance-free impedance. What's the transformer's primary-to-secondary turns ratio?
A. 100:1
B. 10:1 *
C. 1:10
D. 1:100
E. You need more information to answer this question.
40. If you connect a 1.00 V DC electrochemical cell across a $2.00\text{-}\Omega$ resistor, how much current will flow through the resistor?
A. 125 mA
B. 250 mA
C. 500 mA *
D. 707 mA
E. 1.41 A
F. 2.00 A

Figure Exam-4



41. Refer to Fig. Exam-4, which shows the impedance vectors for two hypothetical circuits. The diagram suggests that if you connect these two circuits in series, you'll get a third, more complicated circuit that contains
A. pure resistance without reactance.
B. some resistance with a little bit of capacitive reactance.
C. some resistance with a little bit of inductive reactance. *
D. pure capacitive reactance.
E. pure inductive reactance.
42. Imagine a perfect sine wave without any DC component. You can shift the phase of that wave by a certain number of degrees and end up with the same wave “upside-down.” How many degrees?
A. 45
B. 90
C. 180 *
D. 270
E. 360
43. In a perfect sine wave with no DC component, the peak-to-peak amplitude is
A. half the positive peak amplitude.
B. about 0.707 times the positive peak amplitude.
C. the same as the positive peak amplitude.
D. about 1.414 times the positive peak amplitude.
E. twice the positive peak amplitude. *
44. If the inductive reactance and the resistance have the same ohmic value in an RL circuit, then the phase angle is how many degrees?
A. 0
B. 45 *
C. 90
D. 30
E. 60
45. In a microcontroller, a 10-bit analog input gets digitized, changing it to a number in the range
A. 0 to 256.
B. 0 to 1023. *
C. 0 to 4096.
D. 0 to 255.
E. 0 to 100
46. Why are switched-mode power supplies for providing low-voltage DC from 117V AC lighter than conventional 60Hz transformer power supplies?
A. They can use smaller inductors, because they operate at high frequencies. *
B. They avoid the use of transformers at all.
C. They fail to provide electrical isolation from the AC side to the DC side.
D. They use aluminum transformers.
E. None of the above.
47. How many diodes are used in a two-phase bridge rectifier?
A. 1
B. 2
C. 4 *
D. 8
E. None of the above.
48. Which of the following has the shortest wavelength?
A. Microwave
B. Infrared
C. X-rays *D. Visible light
E. Shortwave radio
49. In a PNP transistor, you'd normally set the DC collector voltage
A. the same as the base voltage.
B. more positive than the emitter voltage.
C. more negative than the emitter voltage. *
D. the same as the emitter voltage.
E. at zero (ground potential).

50. If you want an electric power delivery system to work its best, then
- the transmission line's characteristic impedance must be as low as possible.
 - the transmission line's characteristic impedance must be as high as possible.
 - the load impedance must comprise a pure reactance equal to the characteristic impedance of the transmission line.
 - the load impedance must comprise a pure resistance equal to the characteristic impedance of the transmission line. *
 - the ground system must have as little reactance as possible.
51. With a permeability-tuned solenoid-coil inductor, moving more of the core into the coil
- increases the inductance. *
 - does not change the inductance.
 - reduces the inductance.
 - increases the frequency.
 - reduces the reactance.
52. Arduino shields are
- protective devices that prevent damage to GPIO pins.
 - programs for the device.
 - a collection of Arduino software.
 - boards that you can add to the Arduino to provide extra hardware features. *
 - None of the above.
53. A power supply can incorporate a circuit that applies a reduced AC voltage to the transformer for a couple of seconds immediately after power-up, and then delivers the full voltage once the filter capacitors have charged completely. This precaution minimizes the risk of damage to the
- transformer core.
 - voltage regulator.
 - filter capacitors.
 - rectifier diodes. *
 - bleeder resistors.
54. If the real-number part of a complex-number impedance is zero and the imaginary part is nonzero (positive or negative), then the number denotes
- pure reactance. *
 - pure capacitance but not inductance.
 - pure inductance but not capacitance.
 - a short circuit.
 - an open circuit.
- Figure Exam-5
-
55. In Fig. Exam-5, the small black dots represent electrons and the larger white dots represent holes. This drawing portrays a semiconductor diode in a state of
- forward bias below the forward breakdown voltage.
 - forward bias at or beyond the forward breakdown voltage.
 - reverse bias below the avalanche voltage. *
 - reverse bias at or beyond the avalanche voltage.
 - zero bias.
56. Imagine a circuit that has finite, nonzero resistance but no reactance. You send an AC signal through it. What's the phase angle in degrees?
- It depends on the signal frequency.
 - 0 *
 - 45
 - 90
 - 180
57. What is the decimal value of the hex number FE?
- 110
 - 255
- B. 200
C. 254
E. None of the above *
58. Fill in the blanks in the following statement with a single word that makes it true. "In either a series circuit or a parallel circuit that operates from a battery, the sum of the ___ in each component always equals the total ___ that the circuit demands from the battery."
- amperage
 - voltage
 - wattage *
 - charge
 - Any of the above
59. If four capacitors of value $100\mu\text{F}$ are connected in parallel, the overall capacitance will be:
- $400\mu\text{F}$ *
 - $25\mu\text{F}$
 - $100\mu\text{F}$
 - $1\mu\text{F}$
 - None of the above
- Figure Exam-6
-
60. Figure Exam-6 shows a common-gate amplifier that uses a JFET. A circuit of this type usually
- has less gain than a common-source amplifier.
 - is less likely to break into oscillation than a common-source amplifier.
 - works well as an RF power amplifier (if the JFET is designed to handle moderate or high power).
 - has an output signal that coincides in phase with the input signal.
 - All of the above *
61. At very high frequencies (VHF), tropospheric bending occurs
- except in intense low-pressure systems such as hurricanes.
 - because for radio waves, the refractive index of air decreases with altitude. *
 - only during geomagnetic storms caused by unusual activity on the sun.
 - because air gets more prone to ionization as the altitude increases.
 - at no time; it's a widespread misconception.
62. In general, a voltmeter should have
- the highest possible internal resistance. *
 - the lowest possible internal resistance.
 - the highest possible sensitivity.
 - the ability to withstand the highest possible current.
 - the ability to dissipate the highest possible amount of power.
63. In a phase-locked loop (PLL) circuit, the output stays at the same frequency as the reference oscillator frequency thanks to a phase
- divider.
 - comparator. *
 - multiplier.
 - stabilizer.
 - splitter.
64. Which of the following types of diode might you use in a power-supply voltage regulator?
- Rectifier
 - PIN
 - Zener *
 - Varactor
 - Gunn
65. If you connect five 50-pF capacitors in parallel, you get a net capacitance of
- 250 pF . *
 - 125 pF .
 - 50 pF .
 - 25 pF .
 - 10 pF .
66. Which of the following is not a type of flip-flop?
- J-K
 - R-S
 - Rowling
 - master-slave
 - T *

67. What's the technical term for the number of times per second that a digital signal changes state (from low to high or vice-versa)?
 A. Bits per second D. Signal shift rate
 B. Digital frequency E. Triggering rate
 C. Baud rate *
68. Doppler radar can measure or estimate the
 A. frequency of a radio signal.
 B. wind speed in a tornado. *
 C. distance between two ships at sea.
 D. depth of the ocean at a specific location.
 E. intensity of the lightning in a thundershower.
69. A ferromagnetic material
 A. concentrates magnetic lines of flux that pass through it. *
 B. increases the magnetomotive force around a current-carrying wire.
 C. causes the current in a wire to increase.
 D. causes the current in a wire to decrease.
 E. increases the number of ampere-turns in a coil of wire
70. Which of these statements about an op-amp configured as a unity gain buffer is true?
 A. The input impedance is high and the output impedance is high.
 B. The input impedance is low and the output impedance is low.
 C. The input impedance is high and the output impedance is low.
 D. The input impedance is low and the output impedance is high.
 E. None of the above *
71. Sixty degrees of phase represents
 A. 1/6 of a cycle. * D. 1/2 of a cycle.
 B. 1/4 of a cycle. E. 2/3 of a cycle.
 C. 1/3 of a cycle.
72. Which of the following components is the most sensitive to damage by static electricity discharge through its pins?
 A. Bipolar transistors D. Mylar capacitors
 B. MOSFET transistors * E. Zener diodes
 C. J-FET transistors
73. The Arduino Uno has two microcontroller chips because
 A. that way, it can perform twice as fast.
 B. one of the microcontrollers is dedicated to providing a USB interface. *
 C. one of the microcontrollers provides a video interface.
 D. one microcontroller provides access to the GPIO pins and the other one performs the processing.
 E. that way, if one processor fails the other one can take over.
74. What type of 100-nF, 16V capacitor would you select for an undemanding application?
 A. Multi-layer ceramic * D. Paper
 B. Aluminum electrolytic E. Mica
 C. Tantalum
75. In a certain advanced form of radio communication, the transmitter carrier frequency varies in a controlled manner, independent of the signal modulation. The receiver is programmed to follow the transmitter frequency from instant to instant, so it "thinks" that the signal frequency remains constant. What's the technical name for this mode?
 A. Spread spectrum * D. Coherent carrier
 B. Variable frequency E. Fluctuating carrier
 C. Synchronized frequency
76. What happens to the reactance of a 10-mH inductor as you lower the frequency of an AC signal through it?
 A. It's always zero, because inductors don't have any reactance.
 B. It's negative, but it increases (gets closer to zero).
 C. It's positive, and it increases.
 D. It's negative, and it decreases (gets farther from zero).
 E. It's positive, but it decreases. *
77. You have a package of fixed resistors. The manufacturer quotes their value as 56.0 Ω , plus or minus 10.0 percent. You measure the resistance of each component with an ohmmeter. Which of the following readings indicates a reject?
 A. 50.0 Ω * D. 59.7 Ω
 B. 51.0 Ω E. 61.1 Ω
 C. 52.0 Ω
78. You might use a tunnel diode as a
 A. high-speed switch.
 B. voltage limiter.
 C. variable capacitor.
79. Which of the following things can have resonant properties?
 A. Piezoelectric crystals D. LC circuits
 B. Antennas E. All of the above *
 C. Sections of transmission line
80. The characteristic impedance of a parallel-wire RF transmission line depends on the
 A. standing-wave ratio (SWR).
 B. length of the line.
 C. voltage between the wires.
 D. frequency of the signal.
 E. spacing between the wires. *
81. If you want to exercise good engineering practice, you should make a series-parallel network of resistors using
 A. the highest-wattage resistors you have on hand at the moment.
 B. resistors that are all as nearly identical as possible. *
 C. a series combination of parallel-connected resistors.
 D. a parallel combination of series-connected resistors.
 E. whatever you have on hand at the moment, as long as it works.
82. If two AC sine waves have identical frequency and phase, and if both of them lack DC components, then when you combine them you get
 A. a sine wave whose amplitude equals the difference between the amplitudes of the original waves.
 B. a sine wave whose amplitude equals the sum of the amplitudes of the original waves. *
 C. a square wave whose amplitude equals the difference between the amplitudes of the original waves.
 D. a square wave whose amplitude equals the sum of the amplitudes of the original waves.
 E. no wave at all, because the original waves cancel each other out.
83. Which of the following statements about a microcontroller's GPIO pins is false?
 A. A GPIO pin can change mode from an input to an output while a program is running.
 B. A GPIO pin, when used as an output, can directly drive an LED with a suitable current-limiting resistor.
 C. GPIO pins often have a second function, such as a serial interface pin.
 D. GPIO pins normally operate at 3.3 V or 5 V.
 E. GPIO pins are fixed as either inputs or outputs during manufacture. *
84. Which of the following statements applies to an emitter-follower circuit?
 A. The output signal is in phase opposition relative to the input signal.
 B. You apply the input signal between the emitter and ground.
 C. It can operate as a stable RF oscillator.
 D. The gain increases as the frequency increases.
 E. It can match a high impedance to a low impedance. *
85. If you connect five 50-pF capacitors in series, you get a net capacitance of
 A. 250 pF. D. 25 pF.
 B. 125 pF. E. 10 pF. *
 C. 50 pF.
86. You can increase the current-delivering capacity of a solar panel by
 A. connecting multiple solar cells in series when you build it.
 B. connecting an alkaline battery in series with it.
 C. connecting multiple solar cells in parallel when you build it. *
 D. connecting a lead-acid battery in series with it.
 E. charging it from a wall outlet before using it.
87. The minority carriers in P type semiconductor material are
 A. atomic nuclei. D. electrons. *
 B. protons. E. holes.
 C. neutrons.
88. A coil wound inside a pot-core shell
 A. can carry more current than it could without the shell.
 B. allows you to get a large inductance in a small space. *
 C. gets more efficient as you increase the frequency.
 D. can be easily adjusted to vary the inductance.
 E. has no reactance, unlike other coil types.
89. Movement of holes in a semiconductor material
 A. is the same thing as electron movement in the same direction.
 B. can occur only if the current is high enough.
 C. constitutes an electric current. *

GIBILISCO SECTION 1(CHAPTERS 1-8)**Quiz – Chapter 1 – Background Physics**

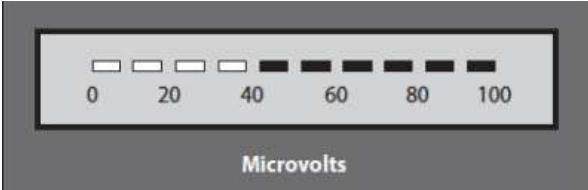
1. The number of protons in the nucleus of an atom always
 A. equals its atomic number. *
 B. equals its atomic weight.
 C. equals the number of electrons.
 D. equals the number of neutrons plus the number of electrons.
2. The number of neutrons in the nucleus of an atom sometimes
 A. equals its atomic number.
 B. equals its atomic weight.
 C. equals the number of protons.
 D. More than one of the above * *
3. The atomic weight of an atom always
 A. equals the number of electrons.
 B. equals the number of protons.
 C. equals the number of neutrons.
 D. approximately equals the number of neutrons plus the number of protons. *
4. When an atom has a net negative electric charge, we can call it
 A. an anion. * C. diatomic.
 B. a cation. D. positronic.
5. An atom can have
 A. more than one isotope. *
 B. only one isotope.
 C. no more protons than neutrons.
 D. no more neutrons than protons.
6. An element whose atoms can have more than one atomic weight
 A. cannot exist.
 B. always has an electric charge.
 C. shares protons with surrounding atoms.
 D. is a common occurrence in nature. *
7. A compound comprising three atoms
 A. cannot exist.
 B. always has an electric charge.
 C. shares protons with surrounding atoms.
 D. is a common occurrence in nature. *
8. Ionization by itself never causes
 A. the conductivity of a substance to improve.
 B. an atom to gain or lose protons. *
 C. an electrically neutral atom to become charged.
 D. an atom to gain or lose electrons
9. Which of the following substances is the worst electrical conductor?
 A. Mercury C. Glass *
 B. Aluminum D. Silver
10. Which of the following substances allows electrons to move among its atoms with the greatest ease?
 A. Copper * C. Dry air
 B. Pure water D. Porcelain
11. If we place 12 V across a component whose resistance equals 6 ohms, how much current will flow through the component?
 A. 0.5 A
 B. 2 A *
 C. 72 A
 D. We need more information to say.
12. If we double the resistance in the situation of Question 11 but don't change the voltage, the current will
 A. not change. C. double.
 B. get cut in half. * D. quadruple.
13. The term static electricity refers to
 A. voltage with no current. *
 B. current with no voltage.
 C. current through an infinite resistance.
 D. voltage that never changes.
14. Which of the following general statements applies to dielectric materials?
 A. They have extremely low resistance (practically zero).
 B. They have extremely high resistance (practically infinite). *
 C. They have resistance that depends on the current through them.
 D. They produce two different voltages at the same time.
15. We can express the quantity of electrons flowing past a fixed point per unit of time in
 A. coulombs. C. ohms.
 B. volts. D. amperes. *
16. In a lightning stroke, the term channel means
 A. a current-carrying path of ionized air. *
 B. alternating-current frequency.
 C. a stream of moving protons and neutrons.
 D. a flowing stream of cool gas.
17. The term electromotive force (EMF) is an alternative expression for
 A. current. C. voltage. *
 B. charge. D. resistance.
18. When you shuffle across a carpeted floor on a dry winter afternoon, you can acquire a potential difference, with respect to ground, of
 A. an ohm or two. C. millions of ohms.
 B. up to about 200 ohms. D. None of the above. *
19. Which of the following devices directly converts chemical energy to electricity?
 A. A generator C. A motor
 B. A dry cell * D. A photovoltaic cell
20. Which of the following devices directly converts visible light to electricity?
 A. A generator C. A motor
 B. A dry cell D. A photovoltaic cell *

Quiz – Chapter 2 – Electrical Units

1. In an electric dipole of constant polarity, the positive charge center
 A. has more electrons than the negative charge center.
 B. has the same number of electrons as the negative charge center.
 C. has fewer electrons than the negative charge center. *
 D. sometimes has more electrons than the negative charge center, sometimes has the same number, and sometimes has fewer.
2. If you touch two points that have DC voltage between them, one point with your left hand and the other point with your right hand, which of the following voltages would present the greatest electrocution hazard?
 A. 1.5 V
 B. 15 V
 C. 150 V *
 D. All three voltages would present equal electrocution hazards because it's the current that kills, not the voltage.
3. If you increase the DC voltage across a resistor by a factor of 100 but you also increase the resistance to keep the current constant, then (assuming the resistor doesn't burn out) the resistor will dissipate
 A. 100 times as much power as it did before. *
 B. 10 times as much power as it did before.
 C. the same amount of power as it did before.
 D. 1/10 as much power as it did before.
4. If a length of wire exhibits 500 mS of conductance, then it has a resistance of
 A. 0.02 Ω.
 B. 0.2 Ω.
 C. 2 Ω. *
 D. an amount that depends on how much current the wire carries.
5. A 330-Ω resistor has a conductance of
 A. 0.303 mS. C. 30.3 mS.
 B. 3.03 mS. * D. 303 mS.
6. A circuit breaker is rated for 15.0 A in a 13.8-V DC automotive system (with the alternator running). This breaker should cut off the current if you connect a set of devices that demand a total of more than
 A. 207 W. * C. 1.09 W.
 B. 20.7 W. D. 920 mW.
7. A heater warms a space by 1,000,000 J over a period of time. This amount of energy represents
 A. 1055 Btu.
 B. 948 Btu. *
 C. 10.55 Btu.
 D. None of the above. The British thermal unit quantifies power, not energy!
8. Suppose that a 6.00-V battery delivers 4.00 W of power to a light bulb. How much current flows through the bulb?
 A. 24.0 A

- B. 1.50 A
C. 667 mA *
D. We must know the bulb's resistance to calculate the current.
9. Imagine that a span of wire 200 m long has a conductance of 900 mS.
A 600-m length of this wire would have a conductance of
A. 8.10 S. C. 300 mS. *
B. 2.70 S. D. 100 mS.
10. Which of the following units quantifies energy?
A. The erg C. The joule
B. The kilowatt-hour D. All of the above *
11. Suppose that an AC cycle repeats at a constant rate of one full cycle every 0.02 seconds. This wave has a frequency of
A. 500 Hz. C. 50 Hz. *
B. 200 Hz. D. 20 Hz.
12. In many countries outside the United States, utility AC electricity has a frequency of
A. 33 Hz. C. 75 Hz.
B. 50 Hz. * D. 100 Hz.
13. If we could see them, the magnetic flux contours near a straight, current-carrying wire would look like
A. concentric circles with the wire at their centers. *
B. straight lines parallel to the wire.
C. straight lines that all pass through the wire at right angles.
D. spirals that originate on the wire and all lie in planes perpendicular to the wire
14. A high DC voltage across a load (a component with DC resistance)
A. gives rise to poor conductance.
B. can exist even if the load has low resistance. *
C. invariably drives a lot of current through the load.
D. All of the above.
15. Suppose that DC flows through a wire coil. The magnetomotive force produced by this coil depends on
A. the number of turns in the coil. *
B. the diameter of the coil.
C. the resistance of the coil.
D. the material around which the coil is wound.
16. Suppose that 3 A of current flows through a 100-turn, circular loop of wire wound around a powdered-iron rod. Then we remove the rod, leaving the coil with an air core. The magnetomotive force
A. decreases. C. stays the same. *
B. increases. D. drops to zero.
17. Which, if any, of the following units can express magnetomotive force?
A. The ampere-turn per square meter
B. The weber per square meter
C. The maxwell per square meter
D. None of the above. *
18. Given a sine-wave AC input, the output of a full-wave rectifier
A. has an average voltage equal to the peak voltage.
B. comprises constant DC just like a battery produces.
C. is pulsating DC. *
D. is also a sine wave.
19. Given a sine-wave AC input, the output of a half-wave rectifier
A. has an average voltage equal to the peak voltage.
B. comprises constant DC just like a battery produces.
C. is pulsating DC. *
D. is also a sine wave.
20. Which of the following units can express overall magnetic-field quantity?
A. The weber * C. The volt
B. The coulomb D. The watt

Quiz – Chapter 3 – Measuring Devices

1. You can use an oscilloscope to
A. see the shape of an AC wave. *
B. detect an electrostatic charge.
C. measure an extremely high resistance.
D. measure electrical power.
2. An advantage of a meter that relies on electrostatic deflection rather than electromagnetic deflection is the fact that the electrostatic meter can measure
A. the frequency of an AC wave.
- B. AC voltage as well as DC voltage. *
C. magnetic field strength as well as electric field strength.
D. All of the above
3. An electronic thermometer works by measuring the DC output of
A. a solar cell. C. an illuminometer.
B. an electroscope. D. a thermocouple. *
4. Which of the following voltages would produce the bar-graph-meter indication shown?
- 
- A. 0.040 mV * C. 4.0 mV
B. 0.40 mV D. 40 mV
5. Which of the following statements about a DMM in comparison to analog VOM is correct?
A. Small changes in the readings will be easier to visualize
B. The cost of DMM is much higher than an analog meter
C. The readings will be more accurate with a DMM *
D. All of the above
6. Which of the following phenomena can you use an oscilloscope to measure or observe?
A. The waveform of an AC signal
B. The frequency of an AC signal
C. The peak-to-peak voltage of an AC signal
D. Any of the above *
7. An electric utility meter measures, on a monthly-use basis,
A. energy. * C. current.
B. voltage. D. power.
8. You place a 12-V battery in series with a resistor and a galvanometer. The resulting current causes the compass needle to deflect 20 degrees toward the west. How can you get the needle to deflect 30 degrees toward the west?
A. Maintain the battery polarity and decrease the resistance. *
B. Maintain the battery polarity and increase the resistance.
C. Reverse the battery polarity and decrease the resistance.
D. Reverse the battery polarity and increase the resistance.
9. Electrostatic force can directly cause
A. two objects having opposite electric charges to repel.
B. two objects having like electric charges to repel. *
C. electric current to stop flowing in a conductor if the voltage is too high.
D. a compass needle to veer to the right or left, depending on the polarity.
10. Which of these features are you least likely to find on a DMM?
A. Sound level measurement *
B. Temperature measurement
C. Capacitance measurement
D. Frequency measurement
11. You want to test a 330- Ω resistor to ensure that its actual resistance comes close to the specified value. You have an analog ohmmeter with a nonlinear scale that runs from "infinity" (at the far left) to 1 (at the far right) with 6 roughly in the middle (such as in Fig. 3-9), and that has range switches with six settings marked "x 1" to "x 100 k" in powers of 10. Which range switch will provide the most accurate reading? You can use Fig. 3-9 in the book as a visual aid.
A. x 1 C. x 10 k
B. x 100 * D. x 100 k
12. An ideal ammeter would have
A. infinite internal resistance.
B. moderate internal resistance.
C. low internal resistance.
D. zero internal resistance. *
13. Where would you place a DC voltmeter if you wanted to directly measure the voltage of a battery connected to an electrical circuit?
A. Between either battery pole and electrical ground
B. Between the negative battery pole and the circuit input
C. Between the positive battery pole and the circuit input

- D. Between the negative battery pole and the positive battery pole *
14. An ideal voltmeter would have
 A. infinite internal resistance. *
 B. moderate internal resistance.
 C. low internal resistance
 D. zero internal resistance.
15. Why should a voltmeter have a high internal resistance?
 A. To maximize the current that the meter draws from the circuit under test
 B. To minimize the risk of electric shock to technicians who use the meter
 C. To minimize the extent to which the meter disturbs the circuit under test *
 D. To minimize the risk of the meter burning out
16. The measurement resistance of a DMM used in a voltage range will typically have a value of:
 A. Less than 10- Ω C. 1-M or more
 B. 100-k or more D. 10-M or more *
17. In a general sense, bar-graph meters lack
 A. useful range. C. precision. *
 B. sensitivity. D. physical ruggedness.
18. An analog ohmmeter has
 A. a nonlinear scale. * C. a bar-graph display.
 B. a high current requirement. D. an AC power source.
19. You might find a D'Arsonval movement in an analog
 A. voltmeter. C. ohmmeter.
 B. ammeter. D. Any of the above. *
20. Which of the following statements are TRUE when considering Digital Oscilloscopes?
 A. Digital oscilloscopes only operate at low frequencies under 1 MHz
 B. Digital oscilloscopes are more expensive than their CRT-based counterparts
 C. Some digital oscilloscopes can record readings for later analysis *
 D. Digital oscilloscopes usually only have one channel
- Quiz – Chapter 4 – Direct-Current Circuit Basics**
1. We have an unlimited supply of 33- Ω resistors, each capable of dissipating 0.50 W. To achieve a 33- Ω resistor that can dissipate 18 W (including a 2-W safety margin), which configuration should we use?
 A. A 6×6 series-parallel matrix of individual resistors. *
 B. A 9×4 series-parallel matrix of individual resistors.
 C. A 3×12 series-parallel matrix of individual resistors.
 D. Any of the above.
2. A 6.30-V lantern battery is connected across a 330- Ω resistor. The power dissipated by the resistor is:
 A. 19.0 mW.
 B. 8.31 mW.
 C. 120 mW. *
 D. We need more information to calculate it.
3. If we connect 10 components in parallel, each with a DC conductance of 0.15 S, what is the net DC conductance of the combination?
 A. 0.015 S. C. 1.5 S. *
 B. 0.15 S. D. 15 S.
4. We have an unlimited supply of 100- Ω resistors, each capable of dissipating 1.00 W. To achieve a resistance of 100 Ω capable of dissipating up to 12 W (including a 2.5-W safety margin), which is the smallest $n \times n$ matrix that will work here?
 A. A 5×5 matrix. C. A 3×3 matrix.
 B. A 4×4 matrix. * D. A 2×2 matrix.
5. If we connect a 6.3-V battery across a 330- Ω resistor, the current is:
 A. 72 mA. C. 12 mA.
 B. 36 mA. D. 19 mA. *
6. The voltage across a resistor is 2.2 V. The resistor dissipates 400 mW. What is its resistance?
 A. 12 Ω . * C. 48 Ω .
 B. 24 Ω . D. 96 Ω .
7. If we connect eight resistors in parallel, all identical and each with a value of 1.100 k Ω , what is the resulting resistance of the combination?
 A. 8800 Ω . C. 1100 Ω .
 B. 4840 Ω . D. 137.5 Ω . *
8. We wire up three resistors in parallel: 600 Ω , 300 Ω , and 200 Ω . Then we connect a 12-V battery across the combination. How much current does the 300- Ω resistor draw by itself?
 A. 80 mA. C. 33 mA.
 B. 40 mA. * D. 11 mA.
9. If we decrease the conductance of a resistor by a factor of 16 while leaving it connected to a source of constant DC voltage, the power that the resistor dissipates will:
 A. Decrease by a factor of 16. *
 B. Decrease by a factor of 4.
 C. Increase by a factor of 4.
 D. Increase by a factor of 16.
10. If we double the DC voltage across a resistor and double its resistance as well, the power that the resistor dissipates will:
 A. Get cut in half. C. Double. *
 B. Stay the same. D. Quadruple.
11. If we double the DC voltage across a resistor and double its resistance as well, the current that the resistor draws will:
 A. Get cut in half. C. Double.
 B. Stay the same. * D. Quadruple.
12. If we know the current through a component (in amperes) and its resistance (in Ω), how can we calculate the energy (in joules) that the component consumes?
 A. Square the current and then multiply by the resistance.
 B. Multiply the current by the resistance.
 C. Divide the resistance by the current.
 D. We need more information to do it. *
13. Suppose that 33.300 mA DC flows through a resistance of 3.33333 k Ω . How can we best express the voltage across this resistance, taking significant figures into account?
 A. 111 V. C. 111.00 V. *
 B. 111.0 V. D. 110.999 V.
14. If a potentiometer carries 18.5 mA DC and we set its resistance to 1.12 k Ω , how much power does it dissipate?
 A. 383 mW. * C. 60.5 mW.
 B. 20.7 mW. D. 67.8 mW.
15. We wire up seven 70.0- Ω resistors in parallel and then connect a 12.6-V battery across the whole combination. How much current is drawn from the battery?
 A. 25.7 mA. C. 794 mA.
 B. 1.26 A. * D. 180 mA.
16. We remove three of the resistors from the circuit in Question 75. What will happen to the current drawn by any one of the remaining four resistors?
 A. It will go down to zero.
 B. It will become 4/7 of its previous value.
 C. It will stay the same. *
 D. It will become 7/4 of its previous value.
17. We connect resistors with values of 180 Ω , 270 Ω , and 680 Ω in series with a 12.6-V battery. How much power does the set of resistors dissipate as a whole?
 A. 7.12 W. C. 11.2 mW.
 B. 89.7 W. D. 140 mW. *
18. The three primary units that engineers use when working with DC systems are:
 A. Ampere, volt, and ohm. *
 B. Watt, joule, and volt.
 C. Siemens, ampere, and joule.
 D. Erg, joule, and ohm.
19. A direct current of 3.00 A flows through a component whose conductance is 0.250 S. What is the voltage across the component?
 A. 0.750 V.
 B. 12.0 V. *
 C. 36.0 V.
 D. We need more information to calculate it.
20. A direct current of 3.00 A flows through a component whose conductance is 0.250 S. How much power does the component dissipate?
 A. 750 mW.
 B. 2.25 W.
 C. 36.0 W. *
 D. We need more information to calculate it.

107.
108.
109.

- A. b/a
B. c/b

- C.b/c
D.a/b

Chapter 3

110. A resistance of $50 \text{ k}\Omega$ has a conductance of:
A. 20 S
B. 0.02 S
C. 0.02 mS^*
D. 20 kS

111. Which of the following statements is incorrect?
A. $1 \text{ N} = 1 \text{ kg m / s}^2$
B. $1 \text{ V} = 1 \text{ J/C}$
C. $30 \text{ mA} = 0.03\text{A}$
D. $1 \text{ J} = 1 \text{ N / m}^*$

112. The power dissipated by a resistor of 10Ω when a current of 2 A passes through it is:
A. 0.4 W
B. 20 W
C. 40 W^*
D. 200

113. A mass of 1200 g is accelerated at 200 cm/s^2 by a force. The value of the force required is:

- A. 2.4 N^*
B. $2,400 \text{ N}$

- C. 240 kN
D. 0.24 N

114. A charge of 240 C is transferred in 2 minutes. The current flowing is:

- A. 120 A
B. 480 A^*

- C. 2 A
D. 8 A

115. A current of 2 A flows for 10 h through a 100Ω resistor. The energy consumed by the resistor is:
A. 0.5 kWh
B. 4 kWh^*

- C. 2 kWh
D. 0.02 kWh

116. The unit of quantity of electricity is the:

- A. Volt
B. coulomb

- C. ohm
D. joule*

117. Electromotive force is provided by: very thin and heavily doped with holes
A. Resistances
B. a conducting path
C. an electric current
D. an electrical supply source*

118. The coulomb is a unit of:

- A. power*
B. voltage

- C. energy
D. quantity of electricity

119. In order that work may be done:
A. a supply of energy is required
B. the circuit must have a switch*

- C. coal must be burnt
D. two wires are necessary

120. The ohm is the unit of:
A. Charge
B. Resistance

- C. power
D. current

121. The unit of current is the:
A. Volt
B. Coulomb

- C. joule
D. ampere

Chapter 4

122. $60 \mu\text{s}$ is equivalent to:

- A. 0.06 s
B. 0.00006 s^*

- C. 1000 minutes
D. 0.6 s

123. The current which flows when 0.1 coulomb is transferred in 10 ms is:

- A. 1 A
B. 10 A^*

- C. 10 m A
D. 100 m A

124. The p.d applied to a $1 \text{ k}\Omega$ resistance in order that a current of $100 \mu\text{A}$ may flow is:

- A. 1 V
B. 100 V

- C. 0.1 V^*
D. 10 V

125. Which of the following formulae for electrical power is incorrect?

- A. VI
B. $\frac{V}{I} *$

- C. I^2R
D. $\frac{V^2}{R}$

126. The power dissipated by a resistor of 4Ω when a current of 5 A passes through it is:

- A. 6.25 W
B. 20 W

- C. 80 W
D. 100 W^*

127. Which of the following statements is true?

- A. Electric current is measured in volts
B. $200 \text{ k}\Omega$ resistance is equivalent to $2 \text{ M}\Omega$
C. An ammeter has a low resistance and must be connected in parallel with a circuit
D. An electrical insulator has a high resistance*

128. A current of 3 A flows for 50 h through a 6Ω resistor. The energy consumed by the resistor is:

- A. 0.9 kWh
B. 2.7 kWh^*

- C. 9 kWh
D. 27 kWh

129. What must be known in order to calculate the energy used by an electrical appliance?

- A. voltage and current
B. current and time of operation
C. power and time of operation
D. current and resistance*

130. Voltage drop is the:

- A. maximum potential
B. difference in potential between two points*
C. voltage produced by a source
D. voltage at the end of a circuit

131. A $240 \text{ V}, 60 \text{ W}$ lamp has a working resistance of:

- A. 1400 ohm
B. 60 ohm

- C. 960 ohm^*
D. 325 ohm

132. The largest number of 100 W electric light bulbs which can be operated from a 240 V supply fitted with a 13 A Fuse is:

- A. 2
B. 7

- C. 31*
D. 18

133. The energy used by a 1.5 kW heater in 5 minutes is:

- A. 5 J
B. 450 J

- C. 7500 J
D. $450,000 \text{ J}^*$

134. When an atom loses an electron, the atom:

- A. becomes positively charged*
B. Disintegrates
C. experiences no effect at all
D. becomes negatively charged

Chapter 5

135. The unit of resistivity is:

- A. ohms
B. ohm millimeter

- C. ohm meter*
D. ohm/meter

136. The length of a certain conductor of resistance 100Ω is doubled and its cross-sectional area is halved. Its new resistance is:

- A. 100Ω
B. 200Ω
C. 50Ω
D. $400 \Omega^*$

137. The resistance of a 2 km length of cable of cross-sectional area 2 mm^2 and resistivity of is:

- A. 0.02Ω
B. $20 \Omega^*$

- C. $0.02 \text{ m}\Omega$
D. 200Ω

138. A piece of graphite has a cross-sectional area of 10 mm^2 . If its resistance is 0.1Ω and its resistivity , its length is:

- A. 10 km
B. 10 cm

- C. 10 mm
D. 10 m^*

139. The symbol for the unit of temperature coefficient of resistance is:
 A. $\Omega/\text{^{\circ}C}$ C. $\text{^{\circ}C}$
 B. Ω D. $\Omega/\Omega\text{^{\circ}C}^*$
140. A coil of wire has a resistance of 10Ω at $0\text{^{\circ}C}$. If the temperature coefficient of resistance for the wire is $0.004/\text{^{\circ}C}$, its resistance at $100\text{^{\circ}C}$ is:
 A. 0.4Ω C. $14 \Omega^*$
 B. 1.4Ω D. 10Ω
141. A nickel coil has a resistance of 13Ω at $50\text{^{\circ}C}$. If the temperature coefficient of resistance at $0\text{^{\circ}C}$ is $0.006/\text{^{\circ}C}$, the resistance at $0\text{^{\circ}C}$ is:
 A. 16.9Ω C. 43.3Ω
 B. $10 \Omega^*$ D. 0.1Ω
142. A colour coding of red-violet-black on a resistor indicates a value of Resistances
 A. $27 \Omega \pm 20\%^*$ C. $270 \Omega \pm 20\%$
 B. 270Ω D. $27 \Omega \pm 10\%$
143. A resistor marked as $4K7G$ indicates a value of:
 A. $47 \Omega \pm 20\%$ C. $0.47 \Omega \pm 10\%$
 B. $4.7 \Omega \pm 20\%$ D. $4.7 \Omega \pm 2\%^*$
- Chapter 6**
144. A battery consists of:
 A. a cell C. a generator
 B. a circuit D. a number of cells*
145. The terminal p.d. of a cell of e.m.f. 2 V and internal resistance 0.1Ω when supplying a current of 5 A will be:
 A. 1.5 V^* C. 1.9 V
 B. 2 V D. 2.5 V
146. Five cells, each with an e.m.f. of 2 V and internal resistance 0.5Ω are connected in series. The resulting battery will have:
 A. an e.m.f. of 2 V and an internal resistance of 0.5Ω
 B. an e.m.f. of 10 V and an internal resistance of $2.5 \Omega^*$
 C. an e.m.f. of 2 V and an internal resistance of 0.1Ω
 D. an e.m.f. of 10 V and an internal resistance of 0.1Ω
147. If the five cells of question 3 are connected in parallel the resulting battery will have:
 A. an e.m.f. of 2 V and an internal resistance of 0.5Ω
 B. an e.m.f. of 10 V and an internal resistance of 2.5Ω
 C. an e.m.f. of 2 V and an internal resistance of $0.1 \Omega^*$
 D. an e.m.f. of 10 V and an internal resistance of 0.1Ω
148. Which of the following statements is false?
 A. A Leclanché cell is suitable for use in torches
 B. A nickel-cadmium cell is an example of a primary cell*
 C. When a cell is being charged its terminal p.d. exceeds the cell e.m.f.
 D. A secondary cell may be recharged after use
149. Which of the following statements is false? When two metal electrodes are used in a simple cell, the one that is higher in the electrochemical series:
 A. tends to dissolve in the electrolyte
 B. is always the negative electrode
 C. reacts the most readily with oxygen
 D. acts as an anode*
150. Five 2 V cells, each having an internal resistance of 0.2Ω are connected in series to a load of resistance 14Ω . The current flowing in the circuit is:
 A. 10 A
 B. 1.4 A
 C. 1.5 A
 D. $\frac{2}{3} \text{ A}^*$
151. For the circuit of question 7, the p.d. at the battery terminal is: Resistances
 A. 10 V
 B. $\frac{9}{3} \text{ V}^*$

- C. 0 V
 D. $10 \frac{2}{3} \text{ V}$
152. Which of the following statements is true?
 A. The capacity of a cell is measured in volts
 B. A primary cell converts electrical energy into chemical energy
 C. Galvanising iron helps to prevent corrosion*
 D. A positive electrode is termed the cathode
153. The greater the internal resistance of a cell: a supply of energy is required
 A. the greater the terminal p.d.
 B. the less the e.m.f.
 C. the greater the e.m.f.
 D. the less the terminal p.d.*
154. The negative pole of a dry cell is made of:
 A. Carbon C. Zinc*
 B. Copper D. Mercury
155. The energy of a secondary cell is usually renewed:
 A. by passing a current through it*
 B. it cannot be renewed at all
 C. by renewing its chemicals
 D. by heating it
156. Which of the following statements is true?
 A. A zinc carbon battery is rechargeable and is not classified as hazardous
 B. A nickel cadmium battery is not rechargeable and is classified as hazardous
 C. A lithium battery is used in watches and is not rechargeable*
 D. An alkaline manganese battery is used in torches and is classified as hazardous
- Chapter 7**
157. If two 4Ω resistors are connected in series the effective resistance of the circuit is:
 A. $8 \Omega^*$ C. 2Ω
 B. 4Ω D. 1Ω
158. If two 4Ω resistors are connected in parallel the effective resistance of the circuit is:
 A. 8Ω C. $2 \Omega^*$
 B. 4Ω D. 1Ω
159. With the switch in Figure 1 closed, the ammeter reading will indicate:
 A. 1 A C. $\frac{1}{3} \text{ A}^*$
 B. 75 A D. 3 A
- Figure 1**
-
160. The effect of connecting an additional parallel load to an electrical supply source is to increase the:
 A. resistance of the load
 B. voltage of the source
 C. current taken from the source
 D. p.d. across the load
161. The equivalent resistance when a resistor of $\frac{1}{3} \Omega$ is connected in parallel with a $\frac{1}{4} \Omega$ resistance is:

A. $\frac{1}{7} \Omega^*$

B. 7Ω

C. $\frac{1}{12} \Omega$

D. $\frac{3}{4} \Omega$

162. With the switch in Figure 2 closed the ammeter reading will indicate:

A. 108 A

C. 3 A

B. $\frac{1}{3} A^*$

D. $\frac{3}{4} A$

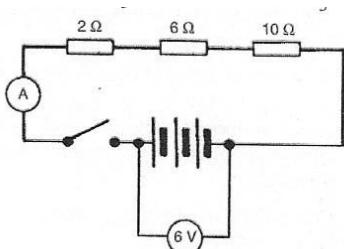


Figure 2

163. A 6Ω resistor is connected in parallel with the three resistors of Figure 2. With the switch closed the ammeter reading will indicate:

A. $\frac{3}{4} A$

B. 4 A

C. $\frac{1}{4} A$

D. $1\frac{1}{3} A^*$

164. A 10Ω resistor is connected in parallel with a 15Ω resistor and the combination in series with a 12Ω resistor. The equivalent resistance of the circuit is:

A. 37Ω
B. $18\Omega^*$
C. 27Ω
D. 4Ω

165. When three 3Ω resistors are connected in parallel, the total resistance is:

A. 3Ω
B. 9Ω
C. 1Ω
D. 0.333Ω

166. The total resistance of two resistors and when connected in parallel is given by:

A. $R_1 + R_2$

B. $\frac{1}{R_1} + \frac{1}{R_2}$

C. $\frac{R_1 + R_2}{R_1 R_2}$

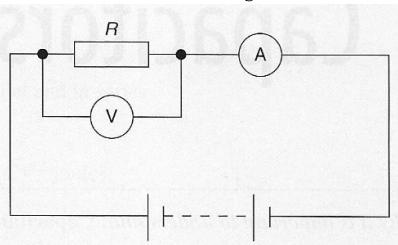
D. $\frac{R_1 R_2}{R_1 + R_2} *$

167. If in the circuit shown in Figure 3, the reading on the voltmeter is 5 V and the reading on the ammeter is 25 mA, the resistance of resistor R is:

A. 0.005Ω
B. 5Ω

C. 125Ω
D. $200\Omega^*$

Figure 3



168. A variable resistor has a range of 0 to $5\text{k}\Omega$. If the slider is set at halfway, the value of the current flowing through a 750Ω load, when connected to a 100V supply and used as a potentiometer, is:

A. 25mA^*
B. 40mA

C. 17.39mA
D. 20mA

Chapter 8

169. electrostatics is a branch of electricity concerned with:

A. energy flowing across a gap between conductors
B. charges at rest*
C. charges in motion
D. energy in the form of charges

170. The capacitance of a capacitor is the ratio:

A. charge to p.d. between plates*
B. p.d. between plates to plate spacing
C. p.d. between plates to thickness of dielectric
D. p.d. between plates to charge

171. The p.d. across a $10\mu\text{F}$ capacitor to charge it with 10mC is:

A. 10V
B. 1kV^*

C. 1V
D. 10V

172. The charge on a 10pF capacitor when the voltage applied to it is 10kV is:

A. $100\mu\text{C}$
B. 0.24N

C. $0.1\mu\text{C}^*$
D. $0.01\mu\text{C}$

173. Four $2\mu\text{F}$ capacitors are connected in parallel. The equivalent capacitance is:

A. $8\mu\text{F}^*$
B. $0.5\mu\text{F}$

C. $2\mu\text{F}$
D. $6\mu\text{F}$

174. Four $2\mu\text{F}$ capacitors are connected in series. The equivalent capacitance is

A. $8\mu\text{F}$
B. $0.5\mu\text{F}^*$

C. $2\mu\text{F}$
D. 6μ

175. State which of the following is false. The capacitance of a capacitor:

A. is proportional to the cross-sectional area of the plates
B. is proportional to the distance between the plates*
C. depends on the number of plates
D. is proportional to the relative permittivity of the dielectric

176. Which of the following statements is false?

A. An air capacitor is normally a variable type
B. A paper capacitor generally has a shorter service life than most other types of capacitor
C. An electrolytic capacitor must be used only on a.c. supplies*
D. Plastic capacitors generally operate satisfactorily under conditions of high temperature

177. The energy stored in a $10\mu\text{F}$ capacitor when charged to 500V is:

A. 1.25mJ
B. $0.025\mu\text{J}$

C. 1.25J^*
D. 1.25C

178. The capacitance of a variable air capacitor is at maximum when

A. the movable plates half overlap the fixed plates
B. the movable plates are most widely separated from the fixed plates
C. both sets of plates are exactly meshed*
D. the movable plates are closer to one side of the fixed plate than to the other

179. When a voltage of 1kV is applied to a capacitor, the charge on the capacitor is 500nC . The capacitance of the capacitor is:

A. $2 \times 10^9\text{F}$
B. 0.5pF

C. 0.5mF
D. 0.5nF^*