Quiz – Chapter 29 – Microcontrollers

1. What's the main purpose of flash memory in a microcontroller?
(a) To store program variables
(b) To store program code
(c) To store charge
(d) To interface with GPIO pins

2. What's the main purpose of RAM in a microcontroller?
(a) To store program variables
(b) To store program code
(c) To store charge
(d) To interface with GPIO pins

3. Which of the following statements about GPIO pins is true?
(a) Once a GPIO pin has been set to be an input or output, it cannot subsequently be changed.
(b) GPIO pins can usually source and sink large currents.
(c) GPIO pins can be switched between acting as an input to acting as an output while a program is running on the microcontroller.
(d) GPIO pins normally operate at 10 V.

4. Which of the following connections is not allowed because it could damage a microcontroller?
(a) Connecting a 3.3-V digital output to a 5-V input
(b) Connecting a 5-V digital output to a 3.3-V input
(c) Connecting one digital output pin of a microcontroller to a digital input on the same microcontroller

(d) Connecting a 1.5-V cell between GND and a digital input of a microcontroller
5. Under which of the following circumstances would you use an external pull-up resistor on a digital input?
(a) Every time you connect a switch to a digital input.
(b) Whenever the lead between the digital input and the switch is long.
(c) Whenever you connect a digital output from one microcontroller to the digital input of another.
(d) When the digital input is on a 3.3V microcontroller.

6. Which of the following voltages at a digital input is most likely to result in a logical HIGH being registered by the microcontroller?
(a) 2 V on a 5-V microcontroller
(b) 0 V on a 5-V microcontroller
(c) 2 V on a 3.3-V microcontroller
(d) None of the above

7. What current would flow through an LED with a forward voltage of 2 V and a series resistor of 1k (1000 ohms) driven by a 5-V digital output?
(a) 1 mA
(b) 2 mA
(c) 3 mA
(d) 4 mA

8. Debouncing of switches is
(a) only possible using hardware.
(b) usually done using software.
(c) never necessary.
(d) None of the above

9. How are interrupt inputs different from regular inputs?
(a) They aren't; they're the same thing!
(b) They use faster logic.
(c) They use slower logic.
(d) When interrupt inputs change signal level, they trigger an interrupt service routine.

10. Which of the following statements about PWM is true?
(a) PWM is the only method for producing an analog output from a microcontroller.
(b) Microcontrollers generally use high frequencies for PWM (over 100 kHz).
(c) A duty cycle of 100% in a PWM output from a 5-V microcontroller will produce an output voltage of 0 V.
(d) A duty cycle of 100% in a PWM output from a 5-V microcontroller will produce an output voltage of 5 V.

11. PWM control of an LED
(a) changes the actual brightness of the LED.
(b) changes the peak voltage across the LED.
(c) changes the peak current through the LED.
(d) changes the apparent brightness of the LED as interpreted by the human eye/brain.

12. An 8-bit analog input to a microcontroller will be digitized into a number in the range
(a) 0 to 256.
(b) 0 to 1023.
(c) 0 to 4096.
(d) 0 to 255.

13. What would be the digitized value of a 1-V input to an analog input of a 5-V microcontroller with an 8-bit ADC?
(a) 1
(b) 51
(c) 48
(d) 127

14. Which of the following statements about SPI is true?
(a) SPI is used as the programming interface for most microcontrollers.
(b) SPI can only be used to connect one device to a microcontroller.
(c) SPI is not clocked and requires accurate time for data transmission.
(d) SPI is never used as the programming interface for a microcontroller.

15. Which of the following statements about I2C is true?
(a) I2 C is used as the programming interface for most microcontrollers.
(b) I2 C can only be used to connect one device to a microcontroller.
(c) I2 C is not clocked and requires accurate time for data transmission.
(d) I2 C is never used as the programming interface for a microcontroller.

16. Which of the following statements about TTL Serial is true?
(a) TTL Serial is always used as the programming interface for microcontrollers.
(b) A single TTL Serial connection can be connected to only one device at a time.
(c) TTL Serial uses voltages that swing above and below 0 V.
(d) TTL Serial is never used as the programming interface for a microcontroller.

17. Which of the following baud rates is not commonly used with serial interfaces?
(a) 100
(b) 300
(c) 1200
(d) 9600

18. Which of the following statements about USB is true?
(a) Some microcontrollers include a hardware USB interface.
(b) USB host devices provide 3-V power.
(c) The USB standard states that USB peripherals can draw a maximum of 100 mA from the USB power connections.
(d) None of the above

19. The C programs that you write for a microcontroller are
(a) directly copied into the flash memory of a microcontroller.
(b) converted into a form suitable for storing in the microcontroller's flash memory using software called an interpreter.
(c) converted into a form suitable for storing in the microcontroller's flash memory using software called a compiler.
(d) stored in the microcontroller's RAM.

20. What's the purpose of a bootloader?
(a) To allow a microcontroller to be programmed using SPI
(b) To allow a microcontroller to be programmed using I_2C
(c) To allow a microcontroller to be programmed using Serial and USB
(d) None of the above

Answers:
1. b, 2. a, 3. c, 4. b, 5. b, 6. c, 7. c, 8. b, 9. d, 10. d, 11. d, 12. d, 13. b, 14. a, 15. d, 16. b, 17. a, 18. a, 19. c, 20. c

Quiz – Chapter 30 – Arduino

1. The Arduino Uno has two microcontroller chips because
(a) that way it can perform twice as fast.
(b) one of the microcontroller chips is dedicated to providing a USB interface.
(c) one of the microcontroller chips provides a video interface.
(d) None of the above

2. The "L" LED of the Arduino Uno is connected to digital pin
(a) 10.
(b) 11.
(c) 12.
(d) 13.

3. The Arduino Uno clock frequency is
(a) 4 MHz.
(b) 8 MHz.
(c) 16 MHz.
(d) 20 MHz.

4. The Arduino Uno has regulated voltage outputs of
(a) 3.3 V and 5 V.
(b) 3.3 V only.
(c) 5 V only.
(d) None of the above

5. An Arduino can be powered
(a) only through its USB port.
(b) through its USB port or the DC barrel jack socket.
(c) through its DC barrel jack socket or "V_{in}" pin.

(d) through its USB port or the DC barrel jack socket or the "V$_{in}$" pin.

6. To use the Arduino IDE, you need a PC running
(a) Windows.
(b) Linux.
(c) Mac OS X.
(d) Any of the above

7. The USB interface of an Arduino can be used to
(a) program the Arduino.
(b) allow communication between the Arduino and your PC.
(c) power the Arduino.
(d) All of the above

8. The Arduino's six pins labeled A0 to A5 can be used
(a) only as analog inputs.
(b) as analog inputs or analog outputs.
(c) as analog or digital inputs.
(d) as analog inputs, digital inputs, or digital outputs.

9. The Arduino delay function pauses execution in time units of
(a) seconds.
(b) milliseconds.
(c) microseconds.
(d) clock cycles.

10. Why would the "L" LED not turn on in the following sketch?
```
void setup() {
  digitalWrite(13, HIGH);
}
void loop() {}
```
(a) Because pin 13 is not set to be an output
(b) Because the "L" LED is not connected to pin 13
(c) Because there is nothing in the loop function
(d) Because pin 13 is not usable as an output

11. In the context of programming, a variable is
(a) a numeric value such as 123.
(b) a way of giving a name to a value so that you can refer to that value by name and later change it if you want to.
(c) a named value that cannot subsequently be changed by the program.
(d) None of the above

12. A constant
(a) is a variable that cannot be changed while the program is running.
(b) is something known with certainty about what the program should do.
(c) is the same thing as a variable.
(d) uses more memory than a variable.

13. A "Sketch" is
(a) a rough design on paper for how your program is to work.
(b) a schematic for the electronic components that you are planning to connect to an Arduino.
(c) code to be "included" into your program that provides access to specialized hardware.
(d) the Arduino terminology for a program.

14. What output would you see on the Serial Monitor after running this sketch?
```
void setup() {
  Serial.begin(9600);
  int x = 12;
  x++;
  Serial.println(x);
}
void loop() {}
```
(a) 0
(b) 12
(c) 13
(d) 9600

15. What will happen when you run the following sketch?
```
void setup() {
  pinMode(13, OUTPUT);
}
void loop() {
  digitalWrite(13, HIGH);
  delay(200);
  digitalWrite(13, LOW);
}
```
(a) The "L" LED will blink 200 times a second.
(b) The "L" LED will blink 5 times a second.
(c) The "L" LED will appear to be on all the time.
(d) The "L" LED will appear to be off all the time.

16. Every Arduino sketch must contain the function or functions:
(a) setup.
(b) setup and loop.
(c) loop.
(d) No functions are mandatory.

17. Which of the following statements best describes the Serial Monitor?
(a) It is a USB hardware interface on the Arduino board.
(b) It monitors network traffic on your computer.
(c) It is used for programming an Arduino.
(d) It is part of the Arduino IDE that allows communication with an Arduino over USB.

18. Which of the following for constructs will count from 5 to 10 using the variable i?
(a) for (int i = 5; i <= 10; i ++)
(b) for (int j = 5; i <= 10; j ++)
(c) for (int i = 5; i < 10; i ++)
(d) for (int i = 1; i <= 5; i ++)

19. What is the maximum positive value that you can hold in a variable of type int?
(a) 255
(b) 256
(c) 65535
(d) 32767

20. Why do you need to use a reverse-biased diode across the coils of a relay?
(a) To boost the current
(b) To boost the voltage
(c) To "snub" voltage spikes as a result of switching the current to the coil
(d) None of the above

Answers:
1. b, 2. d, 3. c, 4. a, 5. d, 6. d, 7. d, 8. d, 9. b, 10. a, 11. b, 12. a, 13. d, 14. c, 15. c, 16. b, 17. d, 18. a, 19. d, 20. c

Quiz - Chapter 31 – Transducers and Sensors

1. If the return signal from an ultrasonic rangefinder operating in air, takes 30 milliseconds to do the entire round trip, roughly how far away is the obstacle reflecting the signal in metres? The speed of sound can be taken as 335m/s.
(a) 15m
(b) 30m
(c) 5m.
(d) 10m.

2. You would use a piezoelectric transducer to detect
(a) magnetic fields.
(b) ultrasonic waves.
(c) microwave RF signals.
(d) torque produced by a motor.

3. Which of the following systems, if any, can use magnetic receptors and a microcomputer to sense the presence of, and detect changes in, an external magnetic field?
(a) A capacitive proximity sensor
(b) A sonar
(c) A potentiometer
(d) None of the above

16. A photoelectric proximity sensor might have trouble detecting
(a) a gray curtain.
(b) a black wall.
(c) a red ball.
(d) All of the above

5. An elastomer pad, considered as an object all by itself, has variable
(a) conductance.
(b) magnetic-field intensity.
(c) sensitivity to ultrasound.
(d) inductive reactance.

6. What is the purpose of the moveable coil in a dynamic loudspeaker?
(a) To filter out high frequencies
(b) To change the output impedance of the loudspeaker
(c) To convert pressure waves of sound to a voltage
(d) To move the cone in response to the audio signal

7. You can use sonar to measure sound
(a) loudness.
(b) frequency.
(c) speed.
(d) None of the above

8. Which of the following types of transducer would you be most likely to use to generate ultrasound? b
(a) Optical encoder
(b) Piezo-electric
(c) Electric generator
(d) Elastomer

9. Which of the following devices is not an electromechanical transducer?
(a) An electric motor
(b) An electric generator
(c) A potentiometer
(d) A fluxgate magnetometer

10. You can sense angular positions using an?
(a) Sonar
(b) Quadrature encoder
(c) Back pressure sensor
(d) Electric generator

11. A robot can use a back-pressure sensor to
(a) measure the intensity of visible light.
(b) regulate the torque produced by an electric drill.
(c) determine the orientation of magnetic lines of flux.
(d) regulate the output of an acoustic transducer.

12. When you apply AF voltage to the plates of an electrostatic transducer, the electric field between the plates fluctuates in intensity, causing
(a) a magnetic field that moves the coil, producing sound waves.
(b) the capacitance to vary, thereby generating a phase shift.
(c) forces that move the flexible plate, producing sound waves.
(d) the plates to charge and discharge, producing AF current.

13. Which of the following devices is a form of RF transducer?
(a) A small loop antenna
(b) A back-pressure sensor
(c) An elastomer
(d) A potentiometer

14. In a dynamic pickup or microphone, incident sound waves cause AF current to flow in the coil as a result of
(a) the coil's motion within a magnetic field.
(b) the coil's motion within an electrostatic field.
(c) a DC voltage applied to the coil.
(d) changes in the capacitive reactance across the coil.

15. A motor whose shaft rotates in discrete increments (not continuously) is called
(a) an incremental motor.
(b) a stepper motor.
(c) a fractional motor.
(d) a selsyn.

Answers:
1. d, 2. b, 3. d, 4. b, 5. a, 6. d, 7. d, 8. b, 9. d, 10. b, 11. b, 12. c, 13. a, 14. a, 15. b

Quiz – Chapter 32 – Antennas for RF Communication

1. An antenna has a radiation resistance of 900 ohms and a loss resistance of 100 ohms. What's its efficiency to the nearest percentage point?
(a) 66 percent

(b) 75 percent
(c) 90 percent
(d) 93 percent

2. An antenna has a radiation resistance of 10 ohms and a loss resistance of 40 ohms. What's its efficiency to the nearest percentage point?
(a) 20 percent
(b) 25 percent
(c) 33 percent
(d) 67 percent

3. A circular loop antenna that measures exactly one wavelength in circumference, and that lies entirely in a single plane, radiates best
(a) in all possible directions; it's isotropic.
(b) in the plane perpendicular to the loop axis.
(c) along the loop axis in both directions.
(d) along the loop axis in one direction.

4. How long is a wavelength in free space at 7.05 MHz? Round your answer to three significant figures.
(a) 279 ft
(b) 140 ft
(c) 69.8 ft
(d) 34.9 ft

5. How long should you cut either side of a straight, center-fed, half-wavelength open dipole wire antenna for operation at a fundamental frequency of 7.05 MHz, taking into account the typical velocity factor for thin wire? Round your answer to three significant figures.
(a) 33.1 ft
(b) 66.2 ft
(c) 132 ft
(d) 265 ft

6. The feed-point impedance of a half-wave, center-fed, two-wire folded dipole is a pure resistance of
(a) eight times that of a half-wave open dipole made from a single wire.
(b) four times that of a half-wave open dipole made from a single wire.
(c) twice that of a half-wave open dipole made from a single wire.
(d) the same as that of a half-wave open dipole made from a single wire.

7. Even if an antenna system has a lot of loss resistance, it can work efficiently if you design it to have an extremely
(a) low reactance.
(b) high reactance.
(c) low radiation resistance.
(d) high radiation resistance.

8. How tall is a ground-mounted, quarter-wavelength vertical antenna designed for 10 MHz? Assume that the tubing used for the radiating element has a velocity factor of 92 percent. Express your answer to two significant figures.
(a) 6.9 ft
(b) 14 ft
(c) 23 ft
(d) 45 ft

9. You want to transmit radio signals with a base-fed, inductively loaded, short vertical antenna over perfectly conducting ground. The inductor comprises a low-loss coil. You feed the antenna with low-loss 50-ohm coaxial cable. Your radio is designed to work into a nonreactive, 50-ohm

load. You'll get the best results if you
(a) make the antenna less than ⅛ wavelength tall.
(b) use thick copper tubing as the radiating element.
(c) install a wide-range antenna tuner at the feed point.
(d) feed the antenna directly with the cable.

10. In terms of physical size, waveguides are practical at all frequencies
(a) below 3 MHz.
(b) below 300 MHz.
(c) above 3 MHz.
(d) above 300 MHz.

11. The feed-point impedance of a Zepp antenna is a pure,
(a) high resistance.
(b) low resistance.
(c) high capacitive reactance.
(d) high inductive reactance.

12. In a three-element Yagi, the director is half-wave resonant at
(a) the same frequency as that of the driven element.
(b) twice that of the driven element.
(c) a slightly lower frequency than that of the driven element.
(d) a slightly higher frequency than that of the driven element.

13. To get reasonable efficiency with a half-wavelength vertical antenna mounted over ground
with fair conductivity (using a wide-range antenna tuner at the antenna's base to match the
radiator to the feed line), you should
(a) make the radiating element a thick, solid metal rod.
(b) use a ground rod and a few radials (you won't need many).
(c) bury at least 100 radials measuring a half wavelength or more.
(d) salt the earth near the antenna to improve the ground conductivity.

14. Imagine a ground-plane antenna measuring   wavelength tall, with four radials each
wavelength long and drooping at 45 . You elevate the feed point at least   wavelength above
the surface and let the radials double as guy wires. This antenna has a purely resistive feed-point
impedance of approximately
(a) 37 ohms.
(b) 50 ohms.
(c) 73 ohms.
(d) 100 ohms.

15. When the total loss resistance in an antenna equals exactly half the feed-point radiation
resistance, the antenna's efficiency is
(a) 33 percent.
(b) 50 percent.
(c) 67 percent.
(d) 75 percent.

16. In a seven-element Yagi, the longest element is the
(a) driven element.
(b) first director.
(c) last director.
(d) reflector.

17. A small loopstick receiving antenna is most sensitive to signals arriving from
(a) all possible directions; it's isotropic.
(b) directions in the plane perpendicular to the loop axis.

(c) along the loop axis in both directions.
(d) along the loop axis in one direction.

18. Which of the following transmission-line types is ideally suited for use with a half-wave folded dipole?
(a) Parallel-wire line
(b) Waveguide
(c) Coaxial cable
(d) Any of the above; it doesn't matter

19. Which of the following antennas works best for satellite TV?
(a) Folded dipole
(b) Ground plane
(c) Loopstick
(d) Dish

20. Which of the following antenna types can provide significant power gain over a half-wave dipole?
(a) Yagi
(b) Dish
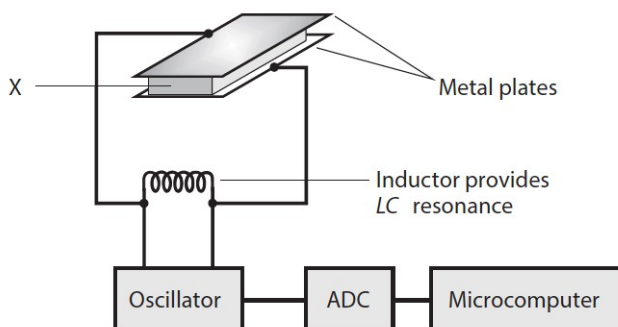(c) Helical
(d) All of the above

Answers:
1. c, 2. a, 3. c, 4. b, 5. a, 6. b, 7. a, 8. c, 9. c, 10. d, 11. a, 12. d, 13. b, 14. b, 15. c, 16. d, 17. b, 18. a, 19. d, 20. d

Quiz - Part 4

1. In most microcontrollers, Random Access Memory (RAM) is used to store
(a) programs only.
(b) programs and variables.
(c) data only.
(d) programs and constant values.
(e) nonvolatile data.

Figure Test 4-1

2. Figure Test 4-1 illustrates a pressure sensor. What's the material marked X?
(a) Quartz crystal
(b) Dielectric foam
(c) Conductive foam
(d) Solid dielectric
(e) Semiconducting foam

3. A stepper motor shaft rotates
(a) continuously at a speed that you can adjust.
(b) continuously at a speed that you can't adjust.
(c) only when it receives signals at certain frequencies.
(d) in increments, rather than continuously.
(e) back and forth, reversing at a time interval that you can adjust.

4. What's the technical term for a device that determines the distance to an object by transmitting sound pulses toward it and measuring the echo time?
(a) Acoustar
(b) Sonar
(c) Radar
(d) Sonic ranging
(e) Echo ranging

5. Which of the following statements best describes the role of a CPU?
(a) Fetch and execute program instructions
(b) Regulate the voltage of the microcontroller
(c) Store program code
(d) Store variables
(e) Convert analog readings into digital values

6. Which of the following statements about the Arduino is false?
(a) You can only program an Arduino using a Windows computer.
(b) A USB socket can supply power to an Arduino.
(c) The Arduino needs a computer to program it.
(d) The Arduino Uno can accept plug-in "shields" that fit onto its GPIO pins.
(e) The Arduino Uno has a 16-MHz clock.

7. Analog inputs usually allow a microcontroller to directly
(a) measure voltages between 0 and 10V.
(b) turn an LED on and off.
(c) measure the current flowing out of a GPIO pin.
(d) measure the resistance of a sensor.
(e) measure voltages between 0 and the supply voltage.

8. The simplest audio waveform, which concentrates all the energy at a single frequency, is a
(a) square wave.
(b) ramp.
(c) sinusoid.
(d) triangular wave.
(e) harmonic.

9. Every Arduino sketch must contain
(a) at least 10 lines of code.
(b) only the function "setup."
(c) only the function "loop."
(d) both the functions "setup" and "loop."
(e) global variables.

10. A half-wavelength vertical antenna, fed at the base and mounted on the surface, radiates efficiently even if the ground conductivity is not very good. That's because the feed-point impedance is
(a) a pure capacitive reactance.
(b) a pure inductive reactance.
(c) a pure and high resistance.

(d) a pure and low resistance.
(e) zero.

11. An eight-bit analog input will provide a digital numeric value between
(a) 1 and 256.
(b) 0 and 1023.
(c) 1 and 1024.
(d) 0 and 100.
(e) 0 and 255.

12. In an Arduino sketch, the word "const"
(a) must be placed before every variable declaration.
(b) will reduce the amount of flash storage needed for a program if used with any variable whose value never changes.
(c) indicates that a variable is consistent.
(d) should be used only in a function definition.
(e) None of the above

13. Which of the following antenna types has a bidirectional radiation pattern, as opposed to a unidirectional pattern?
(a) Dish
(b) Horn
(c) Helical
(d) Broadside array
(e) Corner reflector

14. Which of the following statements about PWM is false?
(a) PWM stands for Pulse Width Modulation.
(b) PWM control of an LED results in the LED turning on and off.
(c) PWM outputs are true analog outputs.
(d) With a PWM duty cycle of 50%, the PWM output will be on half the time.
(e) The frequency of PWM pulses is normally configurable.

15. Which of the following statements about "setup" and "loop" is false?
(a) "Setup" will run when the Arduino is powered up.
(b) "Loop" will run repeatedly when the Arduino is powered up.
(c) Pressing the Reset button will result in "setup" being run.
(d) After the "loop" function has run, the Arduino checks for serial programming updates.
(e) "Setup" can contain only one line of code.

16. Which of the following antennas is a parasitic array?
(a) Helical
(b) Broadside
(c) End-fire
(d) Dish
(e) Quad

17. What type of cable is totally immune to electromagnetic interference (EMI)?
(a) Bundled wire
(b) Parallel wire
(c) Twisted wire
(d) Helically wound
(e) Fiber-optic

18. What's the maximum positive number that can be stored in a variable of type "int" in Arduino C?
(a) 255
(b) 127

(c) 2,147,483,647
(d) 65,535
(e) 32,767

19. What type of antenna transmits and receives radio waves with circular polarization?
(a) Helical
(b) Broadside
(c) End-fire
(d) Dish
(e) Quad

20. At the feed point, a single-turn, circular-loop antenna a half wavelength in circumference exhibits a
(a) high inductive reactance.
(b) high capacitive reactance.
(c) low radiation resistance.
(d) high radiation resistance.
(e) short circuit.

21. An external pull-up resistor on a digital input will
(a) stop the switch contacts from "bouncing."
(b) allow a switch to be connected using a longer lead than would otherwise be possible.
(c) keep it in a low logic state.
(d) allow it to function as an output.
(e) allow it to function as an analog input.

22. Piezoelectric transducers are well suited for use in
(a) ultrasonic intrusion detectors.
(b) hi-fi stereo equipment.
(c) radio antenna systems.
(d) navigation systems.
(e) pressure sensors.

23. The Arduino Uno clock frequency is
(a) 4 MHz.
(b) 8 MHz.
(c) 16 MHz.
(d) 20 MHz.
(e) 80 MHz.

24. At a fixed location, the distance to the radar horizon depends on the
(a) height of the antenna.
(b) contour of the surrounding terrain.
(c) transmitter output power.
(d) weather conditions in the vicinity.
(e) All of the above

Figure Test 4-2

Loop circumference
less than 0.1 wavelength

Tuning

Feed line
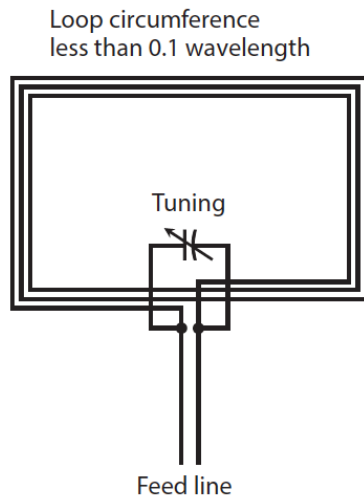
25. What purpose can the small loop shown in Fig. Test 4-2 effectively serve?
(a) Radio direction finding (RDF) below 20 MHz
(b) Transmitting below 100 kHz
(c) An isotropic receiving antenna at any frequency
(d) The tuned circuit in a microwave oscillator
(e) Transmitting or receiving at any frequency

26. A microcontroller's digital outputs can be directly connected to
(a) high-power loads such as motors.
(b) switches and sensors.
(c) computer monitors.
(d) low-current loads such as LEDs.
(e) USB peripherals such as printers.

27. A half-wavelength straight wire fed at one end with a quarter-wave section of parallel-wire transmission line is
(a) a zepp antenna.
(b) an open dipole antenna.
(c) a longwire antenna.
(d) an isotropic antenna.
(e) a quarter-dipole antenna.

28. Which of the following devices comprises a coil-and-magnet assembly that converts varying electric currents into sound waves?
(a) Acoustic converter
(b) Acoustic repeater
(c) RF transducer
(d) Loudspeaker
(e) DC transducer

29. The Arduino's six pins labeled A0 to A5
(a) can only be used as analog inputs.
(b) can be used as analog inputs or analog outputs.
(c) can only be used as analog or digital inputs.
(d) can be used as analog input, digital input or digital output.
(e) should not be used.

30. Which of these statements about the Arduino IDE is true?
(a) it can only be used to program official Arduino boards
(b) it uses the Python programming language
(c) it can be used to program many third-party microcontroller boards
(d) it only runs on Windows computers
(e) is uses the Javascript programming language

1. c, 2. b, 3. d, 4. b, 5. a, 6. a, 7. e, 8. c, 9. d, 10. c, 11. e, 12. b, 13. d, 14. c, 15. e, 16. e, 17. e, 18. e, 19. a, 20. d, 21. b, 22. a, 23. c, 24. e, 25. a, 26. d, 27. a, 28. d, 29. d, 30. c