ICT Secondary School – F.3 Arduino Basics

To develop a burglar alarm using Arduino – Chapter 1: PIR sensor

1. Which of the following objects can be detected by a PIR sensor?
   I. Human beings
   II. Dogs
   III. Toy cars
   IV. A basketball
   A. (I) only
   B. (II) & (III) only
   C. (III) & (IV) only
   D. (I) & (II) only

2. Which of the followings about PIR sensors is/are correct?
   I. A PIR sensor can tell the exact distance between the sensor and the object
   II. A PIR sensor does not require an individual +5V input for power supply
   III. A PIR sensor does not require to be grounded
   IV. The sensitivity of PIR sensors are fixed
   A. (I) & (II) only
   B. (III) & (IV) only
   C. (I), (III) & (IV) only
   D. None of the above

3. For declaring a variable storing the pin number used to connect the PIR sensor to Arduino
   MEGA 2560, which of the following statement is NOT correct?
   I. const int PIRSensor = 22;
   II. String PIRSensor = “22”;
   III. const int PIRSensor == 22;
   IV. int PIRSensor = 22;
   A. (III) only
   B. (I) & (II) only
   C. (IV) only
   D. (II) & (III) only
1. Consider the following diagram:

Which of the following is correct?
I. B should be connected to GND socket on Arduino mainboard
II. Even A is not connected to anything, the LED unit can still emit lights
III. If B is not connected to anything, the LED unit will not emit lights
IV. The connection of A and B to Arduino mainboard are interchangeable

A. (I) only
B. (II) only
C. (II) & (III) only
D. (III) & (IV) only

2. Which of the following statements for initializing a LED unit is/are correct?
I. `pinMode(ledPin, OUTPUT);`
II. `pinMode(OUTPUT, ledPin);`
III. `pinMode(23, OUTPUT);`
IV. `pinMode(23, INPUT);`

A. (II) only
B. (I) & (IV) only
C. (I) & (III) only
D. (III) & (IV) only

3. Which of the following lighting effects cannot be done on a 2-pin LED unit?
A. Making it to blink continuously
B. Changing its brightness
C. Change its color randomly for every 10 seconds
D. Making it to light up constantly
1. Which of the following is/are the major consideration(s) of adding an ultrasonic sensor in a burglar alarm system?
   I. An ultrasonic sensor can detect human beings, whereas a PIR sensor cannot
   II. The object detection range of an ultrasound sensor is larger than that of a PIR sensor
   III. An ultrasonic sensor can tell the exact distance of an object
   IV. An ultrasonic sensor can detect objects behind a wall
   A. (I) only
   B. (II) only
   C. (III) only
   D. (III) & (IV) only

2. Which of the followings about ultrasonic sensors is/are correct?
   I. The sound wave transmitted by an ultrasonic sensor can be heard by humans
   II. Power supply can be handled by its TRIG pin, no +5V connection is needed
   III. Its TRIG pin and ECHO pin are interchangeable
   IV. The sensitivity of ultrasonic sensors cannot be adjusted
   A. (I) & (II) only
   B. (III) & (IV) only
   C. (IV) only
   D. (II) & (IV) only

3. For initializing an ultrasonic sensor, which of the following statement is correct?
   I. pinMode(trigPin, INPUT); pinMode(echoPin, OUTPUT)
   II. pinMode(trigPin, OUTPUT); pinMode(echoPin, INPUT)
   III. pinMode(26, OUTPUT); pinMode(28, INPUT)
   IV. pinMode(trigPin, OUTPUT); pinMode(echoPin, OUTPUT)
   A. (I) & (II) only
   B. (II) & (III) only
   C. (III) & (IV) only
   D. (II), (III) & (IV) only
1. Which of the followings about active buzzer is/are correct?
   I. An active buzzer can emit sound at multiple pitch
   II. Pulse value of active buzzer is 1000hz
   III. The sound level of an active buzzer cannot be adjusted
   IV. An active buzzer can only be used to emit constant sound
   A. (I) only
   B. (II) & (III) only
   C. (IV) only
   D. None of the above

2. Which of the following statement(s) is/are correct?
   I. An object at 1km away can trigger an ultrasound sensor, and make the active buzzer to emit sound
   II. A toy car at 10cm away can trigger an PIR sensor, and make the active buzzer to emit sound
   III. There is a switch for users to manually turn off the active buzzer
   IV. An active buzzer can be programmed to emit sound and stop emitting sound interchangeably for every second
   A. (I) & (II) only
   B. (III) & (IV) only
   C. (IV) only
   D. (II) & (IV) only

3. Which of the following description about the combined use of LEDs and active buzzers is/are correct?
   I. An ultrasonic sensor cannot be used to trigger LEDs and buzzers at the same time
   II. When we have already implemented multiple LEDs, no ultrasonic sensors should further be installed to protect the Arduino mainboard from over-currenting
   III. One LED can only be paired with one ultrasound sensor for triggering alerts
   A. (I) only
   B. (II) & (III) only
   C. None of the above
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To develop a burglar alarm using Arduino – Chapter 5: Passive buzzer

1. Which of the followings about passive buzzer is/are incorrect?
   I. A passive buzzer can play a sound non-stop, while active buzzer cannot
   II. The sound range (in hz.) of active buzzer is wider than passive buzzer
   III. The sound level of a passive buzzer is fixed
   IV. A passive buzzer can be used to play a simple melody
   A. (I) only
   B. (II) & (IV) only
   C. (I), (II) & (III) only
   D. All of the above

2. Which of the following statement(s) is/are correct?
   I. The GND pin of a passive buzzer has the same length as its digital pin
   II. The connection of GND pin and digital pin of a passive buzzer are interchangeable
   III. A 220ohm resistor can be added to reduce the maximum volume of passive buzzers
   IV. Active buzzer and passive buzzer cannot be implemented together on Arduino
   A. (I) only
   B. (III) only
   C. (I) & (III) only
   D. (II), (III) & (IV) only

3. Look at the following program segment:

```c
void intrusionSiren(int pin){
    for (int x=200; x<1600; x++){
        tone (pin, x, 10);
    }
}
```

What is the purpose of the segment?
   A. To make the passive buzzer to emit sound for 1400 times
   B. To make the passive buzzer to emit sound for 1400ms
   C. To make the passive buzzer to emit sound with increasing tone from 200hz to 1600hz
   D. To make the passive buzzer to emit sound with decreasing tone from 1600hz to 200hz
To develop a burglar alarm using Arduino – Chapter 6: SW420 vibration sensor

1. A SW420 vibration can ___________________.
   I. Detect door bumping
   II. Detect destroy of door lock
   III. Detect motions
   IV. Detect breaking of door grass

A. (II) only
B. (I) & (II) only
C. (III) & (IV) only
D. (I), (II) & (IV) only

2. Look at the following diagram:

The switch circled in RED cannot be used to:
A. Increase the vibration detection rate
B. Decrease the vibration detection rate
C. Pause the sensor from operation
D. Adjust the accuracy of the sensor

3. Which of the following is the possible readings from a SW420 in serial monitor?
   I. “Vibration detected”
   II. -10
   III. 10120
   IV. 0

A. (I) & (II) only
B. (II) & (IV) only
C. (III) & (IV) only
D. (I), (III) & (IV) only
To develop a burglar alarm using Arduino – Chapter 7: I2C 1602a LCD (I)

1. Which of the following text can be displayed on a I2C 1602a LCD?
   I. 教育大學
   II. ^__^
   III. **aRduInO**
   IV. /--\../--\.
   A. (I) & (II) only
   B. (II) & (III) only
   C. (II), (III) & (IV) only
   D. All of the above

2. For making the I2C LCD to successfully display text, you must ________________.
   I. Prepare at least 4 jumper cables
   II. Prepare at least 5 jumper cables
   III. Ensure the Arduino mainboard is connected to a computer for data transmission
   IV. Ensure a 220ohm resistor is used in between.
   A. (I) only
   B. (I) & (III) only
   C. (II) & (IV) only
   D. None of the above

3. Inspect the picture below:

![Image of LCD display]

For displaying the text “hello, world!” which of the cursor setting is correct?
   A. lcd.setCursor(1, 0)
   B. lcd.setCursor(0, 1)
   C. lcd.setCursor(0, 0)
   D. lcd.setCursor(1, 1)
I. Amy, one of the programmers of ICT burglar alarm. She wanted to show the real-time readings (i.e. distance information) from the ultrasound sensor on a 1602a LCD. For example, “12cm” will be displayed if an object is detected within 12cm from the sensor. However, when testing the system, she will sometimes discover texts like “12cmm”, “64cmm” and “85cmm” on the LCD display. Which of the following commands may help her to address to the issue?

   I. `lcd.clear();`
   II. `lcd.setCursor();`
   III. `lcd.backlight();`
   IV. `lcd.init();`

A. (I) only  
B. (I) & (IV) only  
C. (I), (II) & (IV) only  
D. None of the above

2. Look at the program segment below:

   ```
   void loop{
       lcd.setCursor(0,0)
       lcd.print("Arduino"); lcd.print("1");
       lcd.clear(); lcd.print("1111111111111111");
   }
   ```

The last piece of text that will be displayed on the LCD is:

   I. Arduino  
   II. Arduino1  
   III. 1111111111111111  
   IV. Cannot be determined

A. (I) only  
B. (IV) only  
C. Either (I) or (III)  
D. No text will be displayed
1. Which of the following blocks on an EEPROM of a RFID card is read-only?
   I. (15, 0)
   II. (0, 0)
   III. (0, 15)
   IV. (15, 15)
   A. (I) only
   B. (II) only
   C. (II) & (IV) only
   D. (I) & (III) only

2. Amy complains the RFID reader she implemented on Arduino cannot read RFID cards, which of the following may be the possible cause(s)?
   I. She placed her RFID card too far from the sensor
   II. The RFID card she is using has no UID in its EEPROM
   III. The type of the RFID card she is using is unsupported by the RFID reader
   IV. She has accidentally wipe the UID of her RFID card during development
   A. (I) only
   B. (I) & (II) only
   C. (I) & (III) only
   D. (I), (III) & (IV) only

3. Which of the following pins of a RFID reader is/are not compulsory to be connected to Arduino?
   I. RESET pin
   II. GND pin
   III. SDA pin
   IV. MISO pin
   A. (I) only
   B. (II) only
   C. (III) only
   D. (I) & (IV) only
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To develop a burglar alarm using Arduino – Chapter 10: RC522 RFID module (II)

1. If you are going to implement a RFID module, so that you can reset a burglar alarm using a registered RFID card, which of the following may not necessarily to pay attention to?
   I. The handling of unregistered RFID card
   II. The event(s) that should happen after a registered RFID card is tapped
   III. The delay of the RFID reader reading a RFID card
   A. (I) only
   B. (II) only
   C. (I) & (II) only
   D. All of the above

2. Which of the following about the use of RFID card is/are not possible?
   I. Using a RFID card to trigger multiple LEDs to blink
   II. After a button is pressed, display the UID of any detected RFID card on a LCD display
   III. After a button is pressed, wipe the UID of any detected RFID cards
   IV. Using a RFID card to trigger a method to clear the text on a LCD display
   A. (II) only
   B. (I) & (II) only
   C. (III) & (IV) only
   D. (I), (II) & (IV) only
1. Sam wants to utilize an ultrasound sensor, so that any objects inside the <=100 detection range will cause the buzzer to sound. However, he discovers sometimes the buzzer will not sound even object distance <=100 cm is detected. Which may be the possible cause?

A. He forgets to program the sensor to temporarily stop running after dedicated object is detected  
B. There is loud noise around the ultrasound sensor  
C. No RFID card is registered beforehand  
D. There is another device utilizing ultrasound sensor nearby

2. Consider there is a flag, named A, for storing the Boolean value of the object detection status. Which of the following descriptions are correct?

I. If object detected $\rightarrow$ A = FALSE  
II. If object detected $\rightarrow$ A = TRUE  
III. If $A = TRUE \rightarrow$ stop sensors from running temporarily  
IV. If $A \neq TRUE \rightarrow$ make buzzer to sound

A. (I) & (III) only  
B. (II) & (III) only  
C. (III) & (IV) only  
D. (II), (III) & (IV) only

3. Puchi complains that even when he has reset the burglar alarm system using a registered RFID card, the buzzer then sounds again right after he reset the system. He then claimed either the RFID reader or the RFID card is defective. Do you agree with his claim? Justify your answer.

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