

MCQs:

1.

Which formula represents Ohm's Law?

- A) $V = I/R$
- B) $R = V/I$
- C) $I = V/R$
- D) $P = VI$

Answer: C) $V = IR \Rightarrow V/R = I \Rightarrow I = V/R$

2.

In a given electrical circuit, a 15 ohm resistor is used. If a voltage of 45 V is applied across this resistor, what is the current flowing through it?

- A) 0.33 A
- B) 3 A
- C) 30 A
- D) 1.5 A

Answer: B) 3 A

Using Ohm's Law, $V = IR$, we can rearrange the equation to solve for the current, $I = V/R$. By substituting the values, $I = 45 \text{ V} / 15 \text{ Ohm} = 3 \text{ A}$. Thus, the current flowing through the resistor is 3 A.

3.

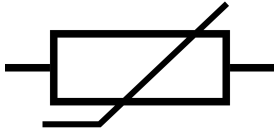
In soldering electronic components, what is the primary function of flux?

- A) To cool down the components after soldering
- B) To increase the melting point of solder
- C) To clean and prepare the metal surfaces to enhance the flow of solder
- D) To insulate the solder joint after cooling

Correct Answer: C) To clean and prepare the metal surfaces to enhance the flow of solder

Flux is used in soldering to clean and prepare the metal surfaces by removing oxides and impurities. This ensures a strong and clean bond between the solder and the metal surfaces. Flux also helps the solder flow more smoothly over the parts to be joined.

4.



What is the component shown above?

- A) Resistor
- B) Capacitor
- C) Thermistor
- D) Diode

Answer: C) Thermistor

It's a thermistor.

5.

What is the output voltage V_{out} in a voltage divider circuit where $V_{in} = 12V$, $R_1 = 100$ Ohms, and $R_2 = 200$ Ohms?

- A) 6 volts
- B) 8 volts
- C) 10 volts
- D) 4 volts

Answer: B) 8 Volts

$$V_{out} = V_{in} * R_2 / (R_1 + R_2)$$

$$V_{out} = 12 * 200 / (100 + 200)$$

$$V_{out} = 12 * 200 / 300$$

$$V_{out} = 12 * \frac{2}{3}$$

$$V_{out} = 8V$$

LAQs:

1.

This is incomplete code from a previous project on controlling a potentiometer to adjust the speed of leds flashing:

“Build a simple device which lights four LEDs one after the other and controls the speed at which the sequence displays with a potentiometer. When the potentiometer is turned fully counter clockwise the LED sequence should proceed slowly. When the potentiometer is turned in the clockwise direction it should proceed faster and faster.”

The potentiometer is connected to pin A3, please fill in the blanks to make the code work.

```
1 int potPin = A3;
2 int potVal = 0;
3 int interval = 100;
4 unsigned long previousMillis = 0;
5 int counter = 0;
6 int prev = 0;
7 int pins[] = {2,3,4,5};
8 void setup() {
9     pinMode(pins[0], OUTPUT);
10    pinMode(pins[1], OUTPUT);
11    pinMode(pins[2], OUTPUT);
12    pinMode(pins[3], OUTPUT);
13 }
14 void loop() {
15     potVal = analogRead(____);
16     unsigned long currentMillis = ____;
17     if (currentMillis - previousMillis >= _____) {
18         previousMillis = _____;
19         digitalWrite(pins[____], LOW);
```

```

20     digitalWrite(pins[____], HIGH);
21     prev = ____;
22     counter = ____;
23 }
24 }

```

Answers:

Line 15: potPin or A3 (1 point)

Line 16: `millis()` (1 point)

Line 17: interval + potVal (1 point), 0.5 points if only potVal, 0 for just interval

Line 18: currentMillis (1 point)

Line 19: prev (1 point)

Line 20: counter (1 point)

Line 21: counter (1 point)

Line 22: $(\text{counter}+1) \% 4$ (1 point) (any equivalent equation would work)

2.

Explain the soldering process, including essential equipment, safety measures, and techniques, using specific examples.

Answer:

Introduction to Soldering (1 point):

- Brief explanation of soldering and its significance in electronic work or repairs, e.g., joining electrical components for circuit connections.

Equipment (1 point for each up to 3 points):

- Identification and description of key tools required, such as:
 - Soldering iron
 - Solder wire (with flux)
 - Soldering stand
 - Wet sponge
 - Any appropriate tools that would be useful while soldering that aren't mentioned above

Safety Precautions (2 points):

- Mention of safety measures like wearing safety goggles, working in a well-ventilated area, and using heat-resistant gloves to prevent burns.

Techniques (4 points):

- Step-by-step explanation of soldering techniques, including but not limited to:

- Tinning the soldering iron tip.
- Heating the joint evenly.
- Continuously apply solder to the joint.
- Ensuring a smooth, shiny appearance of the soldered joint without excess solder.
- Cut component wires before soldering
- Apply flux if no flux is in the soldering wire already
- Clean the tip with wet sponge or soft metal with flux
- Repeat tinning after cleaning
- Any comment on why it might not be soldering properly as long as its reasonable
- Any other points that are mentioned in this video:
<https://www.youtube.com/watch?v=lpkkfK937mU>