

Date: 03/09/2023

Quiz 9 (Week 9)

**1. Given the schematic below, what is Vo/Vb? Show your calculations**

R2 and R4 are in parallel, equivalent resistance is 6, let's name it R5, then this parallel resistance R5 is in series with R3, and together in parallel with R1, so the overall resistance is 9. (R5, R3) and R1 has 1:1 current percentage, so  $V_o/V_b = 6/18 = 1/3$ .

**Ans = 1/3**

**2. Resistivity of a wire depends on (justify):**

From resistance,  $R = \rho \frac{L}{A}$

Where R = resistance, L = length, A = area of cross-section and  $\rho$  = resistivity. The electrical resistivity of a given metallic wire depends on the number density of free electrons in the conductor which is the nature of the material, that is the number of free electrons per unit volume.

**Ans: (B)**

**3. What fields and why should the Title Block of the schematic page have?**

Issue date: To document when the schematic page was created

Revision: Specify the revision history for the schematic

Title: The title of this schematic page

Company: Company name that develop this schematic page

Comment: Some comment on this schematic page

**4. When N resistances each of value R are connected in parallel, then resultant resistance is X. When these N resistances are connected in series, total resistance is ? Show your calculations.**

In parallel,

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots + \frac{1}{R_n}$$

Date: 03/09/2023

Since all resistances are equal,  $\frac{1}{R_{eq}} = \frac{N}{R}$ ,  $R_{eq} = \frac{R}{N}$ , but given this value is X, so  $X = \frac{R}{N}$ ,  $R = NX$ . In series,  $R_{eq} = NR = N^2 X$ , the answer is

**Ans: (D)**

**5. Given the schematic below, what is  $I_o/I_b$ ? Show your calculations**

$I_b = I_o + I_x$  (set  $I_x$  as the current flow through  $R_2$  and  $R_4$ ), since  $(R_2, R_4)$  and  $R_3$  are in parallel,  $I_x = 2I_o$ ,  $I_b = 3I_o$ , so  $I_o/I_b = 1/3$ .

**Ans: 1/3**

**6. Resistance of a wire is R Ohms. The wire is stretched to double its length, then its resistance in ohms is ? Show your calculations**

$R = \rho \frac{L}{A}$ , If the wire is stretched to double the length, the area of cross section gets reduced to half, so the new resistance is  $4R$ .

**Ans: (B)**

**7. ADC has 12-bit resolution measuring 4.096V signal. What is the effective bit number when it measures 0.5V? Justify**

$\frac{4.096}{2^{12}} = 0.001 V$ ,  $\frac{0.5}{0.001} = 500$ ,  $2^9 > 500$ , so the effective bit number is 9 bit

**Ans: 9bit**

**8. Two bulbs marked 200 watt-250 volts and 100 watt-250 volts are joined in series to 250 volts supply. Power consumed in circuit is: Show your calculations**

$$R = R_1 + R_2 = \frac{250 \times 250}{200} + \frac{250 \times 250}{100} = \frac{1875}{2}$$

$$P = \frac{V \times V}{R} = \frac{250 \times 250}{1875/2} = 66.67 W$$

**Ans: (B)**