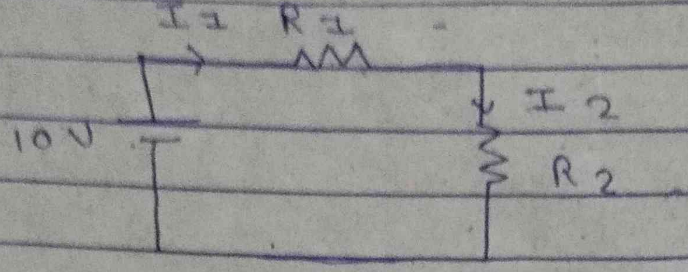
Problem:

1)



i) $R_1 = 1K\Omega \quad R_2 = 1K\Omega$

Applying KVL $10 - 1KI_1 - 1KI_2 = 0$

Here $I_1 = I_2$ because $\therefore I_1 = I_2 = I$

$$10 - 1KI - 1KI = 0$$
$$10 - 2KI = 0$$
$$10 = 2KI$$
$$I = \frac{10}{2K} = 5\,mA$$

ii) $R_1 = 1K\Omega \quad R_2 = 10K\Omega$

Applying KVL $I_1 = I_2 = I$

$$10 - 1KI - 10KI = 0$$
$$10 - 11KI = 0$$
$$11KI = 10$$
$$I = \frac{10}{11K} = 0.9\,mA$$

iii) $R_1 = 1K \quad R_2 = 5K$

Applying KVL $\quad 10 - 1KI - 5KI = 0$

$$10 = 6KI$$

$$I = \frac{10}{6K}$$

$$= 1.67\ mA$$

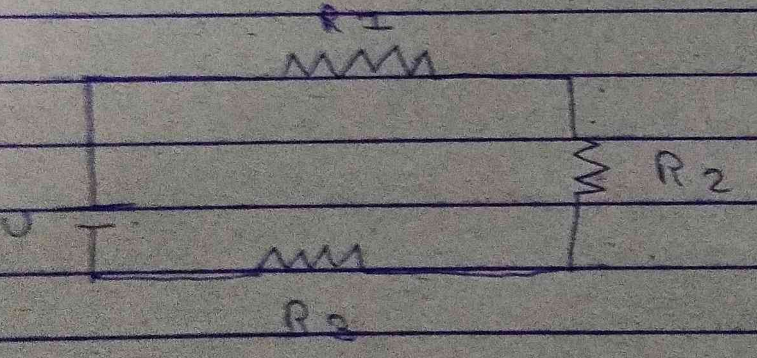
iv) $R_1 = 1K \quad R_2 = 100K$

Applying KVL $\quad 10 - 1KI - 100KI = 0$

$$10 = 101KI$$

$$I = \frac{10}{101K} = 0.099\ mA$$

3) a)



b) $V = 10V,\ R_1 = 1K,\ R_2 = 1K,\ R_3 = 1K$

$10 - IR_1 - IR_2 - IR_3 = 0 \qquad V_{R_1} = 3.33V$

$10 - 1KI - 1KI - 1KI = 0 \qquad V_{R_2} = 3.33V$

$10 - 3KI = 0 \qquad V_{R_3} = 3.33V$

$$I = \frac{10}{3K} = 3.33\ mA$$

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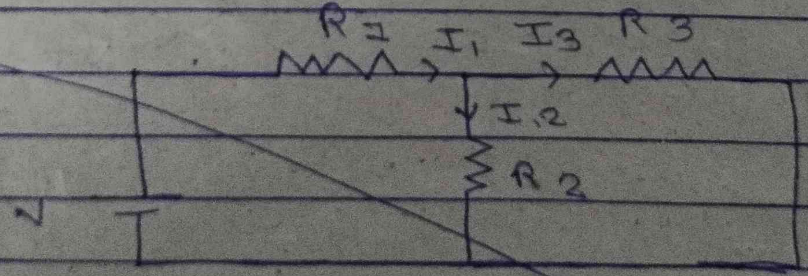
b) $V = 10V$, $R_1 = 1K$, $R_2 = 2K$, $R_3 = 4K$

$10 - 1KI - 2KI - 4KI = 0$
$10 - 7KI = 0$
$10 = 7KI$
$I = \frac{10}{7K} = \frac{10}{7} mA = 1.428\ mA$

$V_{R_1} = IR_1 = 1.428 \times 1K = 1.428\ V$
$V_{R_2} = IR_2 = 1.428 \times 2K = 2.856\ V$
$V_{R_3} = IR_3 = 1.428 \times 4K = 5.712V$

c) $V = 10V$, $R_1 = 1K$, $R_2 = 10K$, $R_3 = 100K$
$10 - 1KI - 10KI - 100KI = 0$
$10 = 111KI$
$I = \frac{10}{111K} = 0.09\ mA$
$V_{R1} = 0.09\ V$
$V_{R2} = 0.9\ V$
$V_{R_3} = 9V$

4)



4) i) $V = 5V$, $R_1 = 1K$, $R_2 = 10K$, $R_3 = 2K$

$R_{eq} = R_1 + (R_2 \parallel R_3)$
$= 1K + (1.67K)$
$= 2.67 K\Omega$

$\therefore I_1 = \dfrac{5}{2.67K} = 1.873 \text{ mA}$

$-I_3(2K) + 10K(I_2) = 0$
$10K I_2 - 2K I_3 = 0$

Now from KCL $I_1 = I_2 + I_3$
$\therefore I_2 + I_3 = 1.873 \text{ mA}$
multiply x2 $\therefore 2I_2 + 2I_3 = 3.746 \text{ mA}$

Now $10I_2 - 2I_3 = 0$
$2I_2 + 2I_3 = 3.746 \text{ mA}$

$12 I_2 = 3.746$
$I_2 = 0.312 \text{ mA}$

$I_3 = 1.561 \text{ mA}$
$I_2 = 0.312 \text{ mA}$
$I_1 = 1.873 \text{ mA}$

$V_{R1} = 1.873 V$ $\quad V_3 = 3.122$
$V_{R2} =$ ~~3.12V~~
~~0.312~~
$3.122 V$

b) $V = 5V$ $R_1 = 1K$, $R_2 = 2K$ $R_3 = 10K$

$R_{eq} = R_1 + (R_2 \parallel R_3)$

$= 1 + 1.67$

$= 2.67\ k\Omega$

$I_1 = \frac{5}{2.67K} = 1.873\ mA$

$-I_3(10K) + I_2(2K) = 0$

$2I_2 - 10I_3 = 0$

$I_2 + I_3 = 1.873\ mA$

$10I_2 + 10I_3 = 18.73$

$10I_2 + \cancel{10I_3} = 18.73$

$2I_2 - \cancel{10I_3} = 0$

$12I_2 = 18.73$

$I_2 = 1.56\ mA$

$I_3 = 0.313\ mA$

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5> b) The reading are different in CRO and DMM because DMM shows rms value. Where the CRO shows the waveform with peak value and $V_p = \sqrt{2} V_{rms}$

c) The readings are differet in CRO and DMM because DMM shows rms value. Where the CRO ~~shows~~ the waveform with peak value and $V_p = \sqrt{2} V_{rms}$

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6) 1) $V = 1V$, $I_d = \_\_$ $I_R = \_\_$ $R = 100\Omega$
$V_d = \_\_$

Applying KVL $1 - 0.7 - I_d(100) = 0$

Here $I_d = I_r$ $0.3 = 100 I_d$
$I_d = 3 mA = I_r$

$\therefore$ $I_d = 3 mA$ $V_d = 0.7 V$
$I_r = 3 mA$

2) $V = 1 V$ $I_d = \_\_$ $I_R = \_\_$, $R = 10\Omega$
$V_d = \_\_$

Applying KVL $1 - 0.7 - I_d(10) = 0$

Here $I_d = I_r$ $0.3 = I_d(10)$
$I_d = 30 mA$

$\therefore$ $I_d = 30 mA$ $V_d = 0.7 V$
$I_r = 30 mA$

3) $V = 5 V$ $I_d = \_\_$ $I_r = \_\_$ $R = 10\Omega$
$V_d = \_\_$

Applying KVL $5 - 0.7 - I_d(10) = 0$

Here $I_d = I_r$ $4.3 = I_d(10)$
$I_d = 0.43 A$

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$I_d = 0.43 A$. $I_r = 0.43 A$ $V_d = 0.7V$

4) $V = 0.4V$ $I_d = 0$ $I_r = 0$
$V_d = 0.4V$.
because $V_d = V_s$ till $V_s \leq 0.7$
$I_d = I_r$ till $V_s \leq 0.7$

iii) a) $V = 1 V$ $R = 100 \Omega$ $I_d = 0$
$I_r = 0$ $I_d = 0$, $V_d = 10V$
∴ diode is in reverse bias

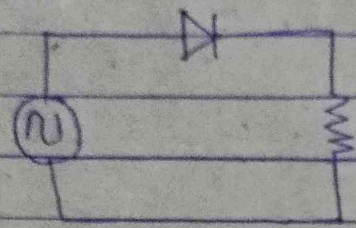
b) $V = 10V$ $R = 100 \Omega$ $I_d = 0$
$I_r = 0$ $V_d = 10V$

c) $V = 50V$ $R = 100 \Omega$ $I_d = 0$
$I_r = 0$ $V_d = 50V$

d) $V = 100V$ $R = 100 \Omega$ $I_d = 0$
$I_r = 0$ $V_d = 100V$

if diode will replace with 1N4001 then diode will burn out

7)



	Vin	I_d	I_r	V_r	V_d
1)	$10V_{p-p}$ sin	16.228 mA	16.228 mA	2.21V	1.624
2)	$8V_p$ Triangle	23.137 mA	23.137 mA	2.756 V	2.314
3)	$300mV_p$ sin	2.371 µA	2.371 µA	231.123 µV	166.064 mV

9)a) Here $V_i = 230$ rms $= 324.3$ V

$V_o = 5$ V

$\therefore \frac{N_i}{N_o} = \frac{V_i}{V_o} \Rightarrow \frac{N_i}{N_o} = \frac{324.3}{5} = 64.86$

$\therefore \frac{N_i}{N_o} = \frac{65}{1}$

b) ~~Here $V_i = 230$ V rms $= 324.3$ V~~

~~$V_o = 5$ V (∵ because it is~~

~~center tap transformer therefore there~~

is two section which gives output

that is why we have to half our

2) $V_i = 230\,V\ rms = 324.3\,V\ peak$
$V_o = 5\,V\ peak$

$\frac{N_i}{N_o} = \frac{V_i}{V_o/2}$ (∵ because it is center tap transformer)

$\frac{N_i}{N_o} = \frac{2V_i}{V_o}$

$\frac{N_i}{1} = \frac{2 \times 324.3}{5}$

$N_i \approx 130$

3) $V_i = 314\,V$, $V_o = 9\,V_p$

$\frac{N_i}{N_o} = \frac{V_i}{V_o}$

$\frac{N_i}{1} = \frac{314}{9} \Rightarrow N_i \approx 35$

4) $V_i = 100\,V$ $\quad V_o = 6\,V$

$\frac{N_i}{N_o} = \frac{V_i}{V_o} \Rightarrow \frac{N_i}{1} = \frac{100}{3} = 33$

centap