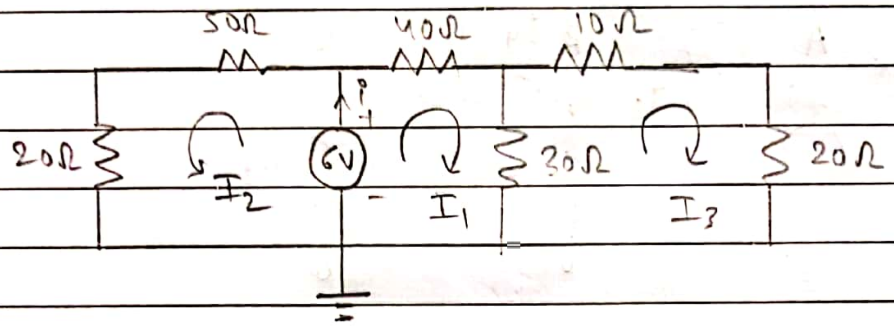
Yash. P. Dalvi
7128402
Ydalvi

BEE

1/15

Q.2.
A.
9



→ Consider loop 1.

∴ ~~6 − 40~~ By Applying KVL law:-

∴ $6 - 40(I_1) - 30(I_1 - I_3) = 0$

∴ $6 - 70 I_1 + 30 I_3 = 0$

∴ $70 I_1 - 30 I_3 = 6 \rightarrow (1)$

Consider loop 2

By Applying KVL law :-

∴ $6 - 50(I_2) - 20(I_2) = 0$

∴ $6 = 70 I_2$

∴ $I_2 = 0.086$ Amp $\rightarrow (2)$

Consider loop 3.

By Applying KVL law:-

∴ $-30(I_3 - I_1) - 10(I_3) - 20(I_3) = 0$

∴ $30 I_1 = 60 I_3$

∴ $I_1 = 2 I_3 \rightarrow (3)$

Put (3) in (1)

∴ $70 \times 2 I_3 - 30 I_3 = 6$

∴ $I_3 = 0.055$ Amp $\rightarrow (4)$

Yash. P. Dalvi
7128402
Udalvi

Put (4) in (1)

$\therefore 70 I_1 - 30 \times 0.055 = 6$

$\therefore \underline{I_1 = 0.109 \text{ Amp}} \rightarrow (5)$

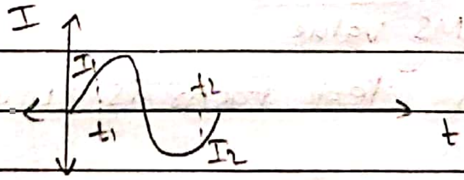
$\therefore$ Current $i = I_1 + I_2$
$= 0.109 + 0.086$
$= \underline{0.195 \text{ Amp} \uparrow}$

<u>Ans:-</u> Current i through 6 V is 0.195 Amp $\uparrow$

iii

(A) <u>Instantaneous Value:-</u>

→ The value of an alternating current (A.C) quantity at a given time instance is known as its instantaneous value. eg. Let I_1, I_2 be instantaneous current values at time t_1, t_2



(B) RMS Value:-

→ The value of AC changes with time, whereas the D.C quantity for same conditions remains constant with time. The rms value is the criteria to measure the effective A.C value.

The effective rms value of an A.C is equal to that D.C value whic when flowing through a given resistance for a given period of time produces the same amount

Yash. P. Dalvi
7128402
Ydalvi

of heat or work done as that when the A.C value was flowing through the circuit.

RMS value = Root Mean Square value

(c) Form Factor

→ It is the ratio of RMS value to the average value of an A.C quantity.

$$\text{Form factor} = \frac{\text{RMS Value}}{\text{Average Value}}$$

For a Sine wave Form factor is 1.11

(D) Peak factor

→ It is the ratio of Maximum value to the rms value of an A.C quantity.

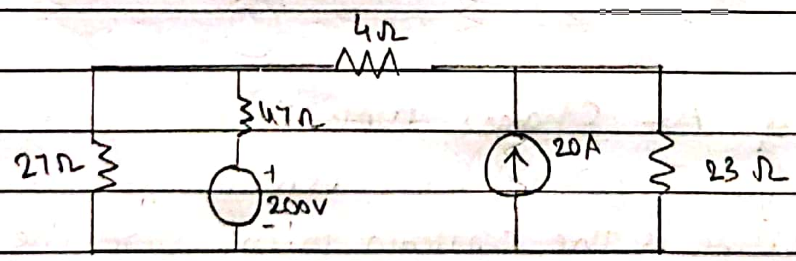
$$\text{Peak Factor} = \frac{\text{Maximum Value}}{\text{RMS Value}}$$

For a Sine wave Peak Factor is 1.414

2. (B)

(i)

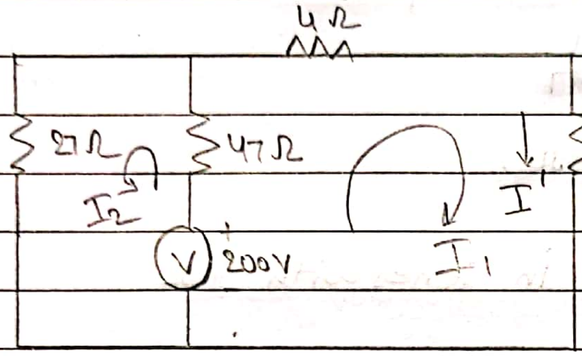
→



Yash. P. Dalvi
7128402
Ydalvi

BEE

Case 1:- Consider 200V supply source.



In loop 1.

Applying KVL Law:-

$200 - 47(I_1+I_2) - 4(I_1) - 23(I_1) = 0$

$\therefore \quad 74 I_1 + 47 I_2 = 200 \rightarrow (1)$

In loop 2.

Applying KVL Law:-

$200 - 47(I_2+I_1) - 27(I_2) = 0$

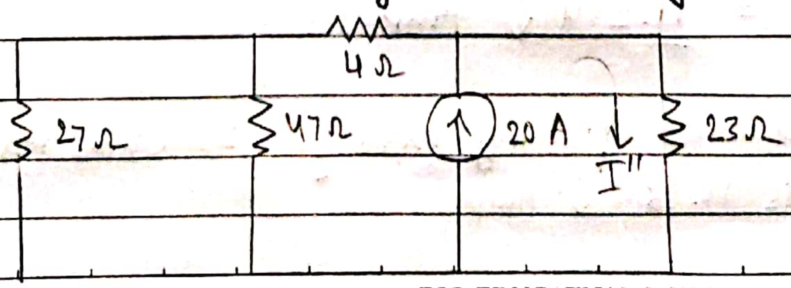
$\therefore \quad 47 I_1 + 74 I_2 = 200 \rightarrow (2)$

Solving (1) and (2) simultaneously we get

$I_1 = 1.653$ Amp ; $I_2 = 1.653$ Amp

$\therefore \quad I_{23} = I' = 1.653 \downarrow$

Case 2:- Considering 20 A supply source.



Yash. P. Dalvi
7128402
Ydalvi

$\because$ 27 Ω and 47 Ω are in parallel.

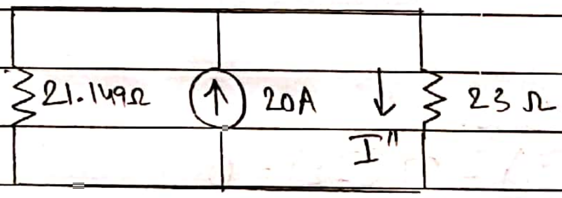
$$\therefore \frac{1}{R_{eq}} = \frac{1}{27} + \frac{1}{47}$$

$$\therefore R_{eq} = 17.149\ \Omega.$$

Now, this R_{eq} is in series with 4 Ω

$$\therefore R''_{eq} = R_{eq} + 4$$
$$= 17.149 + 4$$
$$R''_{eq} = 21.149\ \Omega.$$

New diagram is :-



$\therefore$ By Current Divider Formula.

$$I'' = \frac{20 \times 21.149}{21.149 + 23} = 9.581 \text{ Amp} \downarrow$$

By Super position theorem :

$$I_{23} = I' + I''$$
$$= 1.653 + 9.581$$
$$I_{23} = 11.234 \downarrow \text{ Amp}$$

Ans :- Current flowing through 23 Ohms resistance is 11.234 ↓ Amp