Date : / /
Page No.

TUTORIAL - 1

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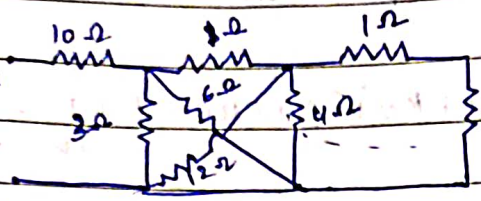
Slot : E11 + E12 + E13
Subject = EEE1001

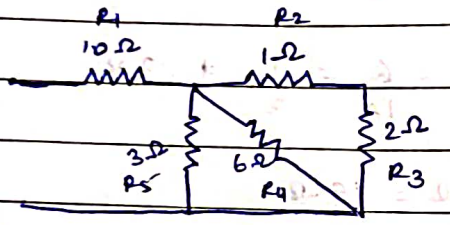
1



⇒ series = 5 + 1 = 6 Ω

⇒ parallel with = $\frac{4 \times 6}{4 + 6} = \frac{24}{10}\ \Omega$ ↳ R'

$= \frac{12}{5}\ \Omega$



$\Rightarrow \frac{1}{R''} = \frac{1}{12} + \frac{5}{12} = \frac{6}{12}$

$R'' = 2\ \Omega$

⇒

R_2 and R_3 in series ⇒ $2 + 1 = 3\ \Omega$

$\Rightarrow \frac{1}{6} + \frac{1}{3} = \frac{1}{2} \Rightarrow 2\ \Omega$

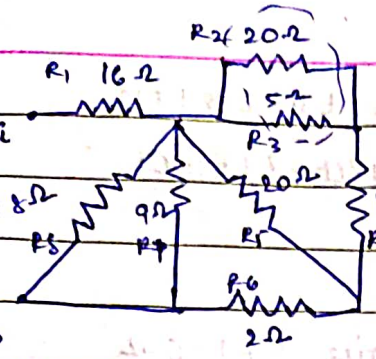
2 is parallel with 3 Ω

$\frac{1}{2} + \frac{1}{3} = \frac{5}{6}\ \Omega$

series $= 10 + \frac{6}{5} = \frac{56}{5}\ \Omega$

⇒

Date : / /
Page No.



2

$Req_1 = R_2$ and R_3 || ckt $\rightarrow \frac{5 \times 20}{20+5} = 4\,\Omega$

Req_1 and R_4 in series $= 1+4 = 5\,\Omega = Req_2$

Req_2 and R_5 in parallel $= \frac{1}{5} + \frac{1}{20} = \frac{5}{20} \Rightarrow 4\,\Omega = Req_3$

Req_3 and R_6 in series $= 4\,\Omega + 2\,\Omega = 6\,\Omega$

Req_3 and R_7 in parallel $\Rightarrow \frac{1}{6} + \frac{1}{9} = \frac{5}{18} \Rightarrow \frac{18}{5} = Req'$

Req' and R_8 in parallel $\Rightarrow \frac{1}{18} + \frac{5}{18} = \frac{6}{18} = \frac{1}{3} \Rightarrow 3\,\Omega$

Req'' and R_1 in series $\Rightarrow 16\,\Omega + 3\,\Omega = 19\,\Omega$

equivalent resistance $= 19\,\Omega$

=

(3) ~~Wrong question (20Ω resistor not in the diagram).~~

(4) $V = 20 \sin \pi t$ V

$R = 5\,k\Omega$

$V = IR$ (ohm's law)

$I = \frac{V}{R} = \frac{20 \sin \pi t}{5 \times 10^3} = 4 \sin \pi t$ mA

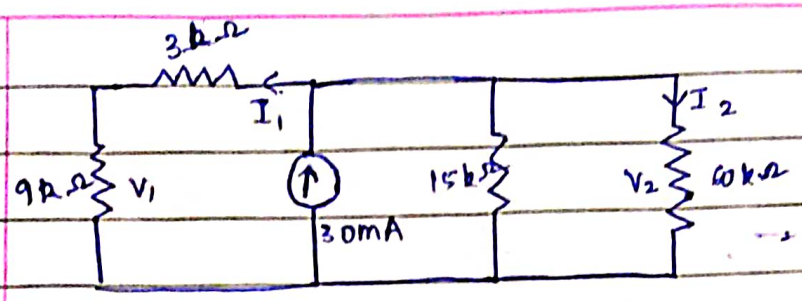
$P = V.I = 20 \sin \pi t \times 4 \sin \pi t = 80 \sin^2 \pi t$ mW

(5) $i = 2A$; $t = 10s$

$q = it = 2 \times 10 = 20C$

Voltage drop $= V = \frac{W}{q} = \frac{2.3 \times 10^3}{20} = \frac{2300}{20} = 115V$

3



$$R' = \frac{15 \| 60}{} = \frac{5}{60} = \frac{1}{12} \; ; \; 12k\Omega$$

$$R'' = 9 + 3 = 12\,k\Omega$$

$$R_{eq} = \frac{2}{12} \Rightarrow 6\,k\Omega$$

$$V = IR$$

$$I_1 = 30mA \times \frac{6k\Omega}{12k\Omega} = 15\,mA$$

$$I_2 = 30mA \times \frac{6k\Omega}{60k\Omega} = 3\,mA$$

a) $V_1 = I_1 R = 15mA \times 9k\Omega = 135\,V$

$V_2 = I_2 R = 3mA \times 60k\Omega = 180\,V$

b) Power $\Rightarrow$ ~~$P_{eq} = \frac{V^2}{R_{eq}} = \frac{V_1}{}$~~ $\Rightarrow P_1 = I^2 R = \frac{V^2}{R} = \frac{135 \times 135}{9k\Omega} = 2025\,mW$

$$P_2 = \frac{V^2}{R} = \frac{180 \times 180}{60k\Omega} = 540\,mW$$

~~Ans. R~~

(c) ~~Total power $P = 30mA \times 30mA \times 6k\Omega = 30 \times 10^{3} \times 30 \times 10^{3} \times 6 \times 10^{3}$~~

(c) Total power $P = I^2 R = 30 \times 10^{-3} \times 30 \times 10^{-3} \times 6 \times 10^{3} = 5400\,mW$