GALGOTIAS UNIVERSITY

All Programs Semester I CAT II – January 2022

Answer uploading Template

Enrolment / Admission No. of Student	21SCSE1010662	Name of Course	BEEE
Name of Student	Shivam Dwivedi	Course Code	BEEU1T1003
Program	B.tech CSE	Date of Examination	18.01.22
Semester	1st	Time	2:00 to 3:40PM
Signature of Student	Shivam		

Student shall start writing from below:

1) Ans

MMF :- It stands for magnetomotive force (mmf) the current flowing in an electric circuit is due to the existance of electromotive force similarly magnetomotive force (MMF) is required to drive the magnetic flux in the magnetic circuit. It is denoted by Fm.

Fm = NI ampere-turns (A.t)

Reluctance :- It is defined as the ratio of magnetomotive force to magnetic flux. It is represents the opposition to magnetic flux, and depends on the geometry and composition of an object

$$\therefore R = \frac{F}{\phi}$$

$$R = \frac{l}{\mu_0 \mu_r A} = \frac{l}{\mu A}$$

2) Ans $I = 50 \sin 314 t$

time period =)

$T = \frac{2\pi}{\omega} = \frac{2\pi}{314} = \frac{2 \times 22}{314 \times 7} = \frac{44}{2198} = \frac{1}{50}$

$T = 0.02$ sec

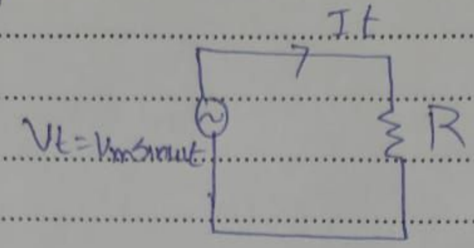
Maximum Current =)

When $\sin(\theta) = 1$

$I_0 = 5(\sin 90) = 5$

$I_0 = 5$ amp

3) Ans. pure resistive circuit



$V_t = V_m \sin\omega t$

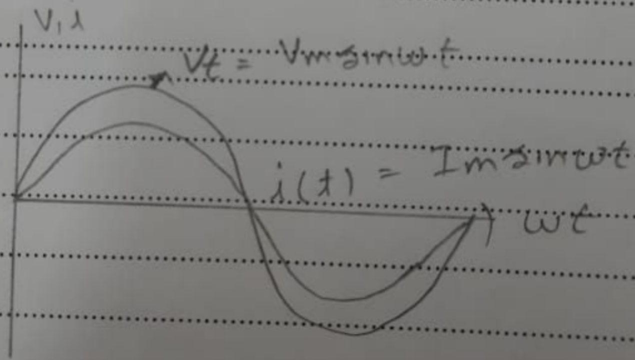
Ohm's law

$i_t = \frac{V_t}{R}$

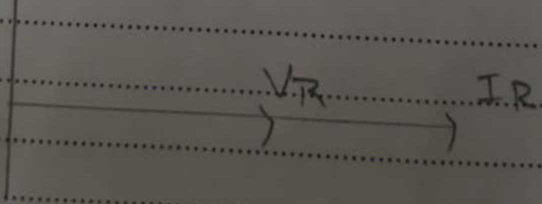
$= \frac{V_m \sin\omega t}{R}$

$i_t = I_m \sin\omega t$

• wave form



• phasor diagram



power:-

$$P_t = V_t \times i_t$$

$$= V_m \sin\omega t \times I_m \sin\omega t$$

$$= V_m I_m \sin^2 \omega t$$

$$P_{average} = \frac{\int_0^{2\pi} V_m I_m \sin^2 \omega t \, d\omega t}{2\pi}$$

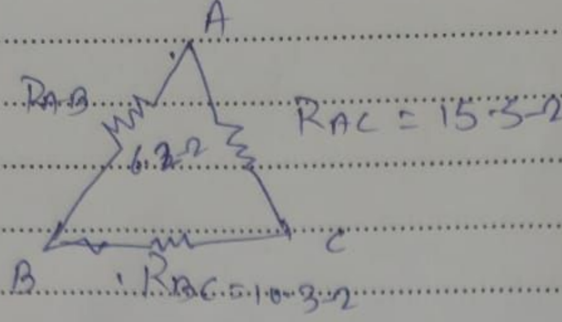
$$= \frac{\int_0^{2\pi} \frac{V_m I_m (1-\cos 2\omega t)}{2} \, d\omega t}{2\pi}$$

$$= \frac{V_m I_m}{2}$$

$$= \frac{V_m}{\sqrt{2}} \times \frac{I_m}{\sqrt{2}}$$

$$= V_{rms} \cdot I_{rms}$$

4)



$$R_a = \frac{R_{AB} \cdot R_{AC}}{R_{AB} + R_{BC} + R_{AC}}$$

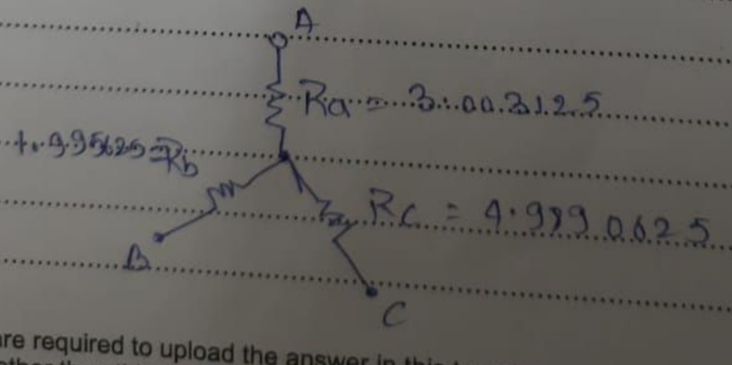
$$= \frac{6.2 \times 15.5}{6.2 + 10.3 + 15.5} = \frac{96.1}{32} = 3.003125$$

$$R_b = \frac{R_{AB} \cdot R_{BC}}{R_{AB} + R_{BC} + R_{AC}}$$

$$= \frac{6.2 \times 10.3}{6.2 + 10.3 + 15.5} = \frac{63.86}{32} = 1.995625$$

$$R_c = \frac{R_{AC} \cdot R_{BC}}{R_{AB} + R_{BC} + R_{AC}}$$

$$= \frac{15.5 \times 10.3}{6.2 + 10.3 + 15.5} = \frac{159.65}{32} = 4.9890625$$



Scholars are required to upload the answer in this template only on LMS. Answers uploaded other than this template will not be evaluated.

2) Ans. If a no. of voltage sources or current sources are acting in a linear network, then the resulting current in any branch is the algebraic sum of all the currents that would be produced in it when each source acts alone while all the others independent sources are replaced by their internal resistance.

$V_S = 10$	$V_S = 15$
$R_{equ} = 23.57$	$R_{eq} = 23.57$
$I_t = \frac{V}{R} = \frac{23.57}{10}$	$I_t = \frac{V}{R} = \frac{23.57}{15} = 1.571A$
$= 2.357\ A$	

$I_{BD_1} = \frac{15}{15+20} \times 2.357$

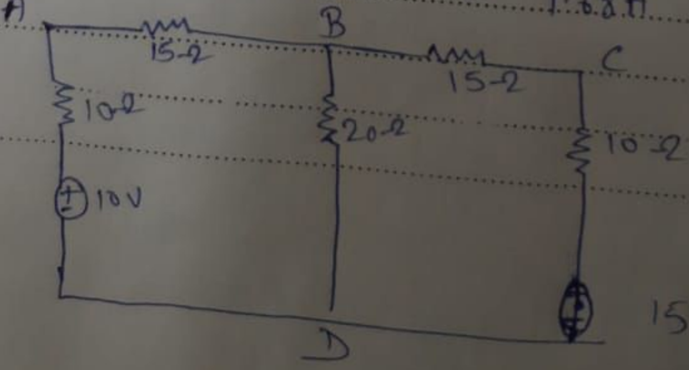
$= 1.01$

$I_{BD_2} = \frac{15}{15+20} \times 1.571$

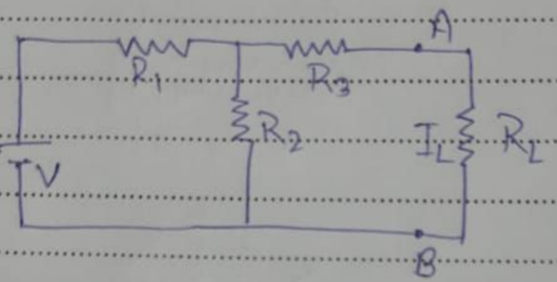
$= 0.67$

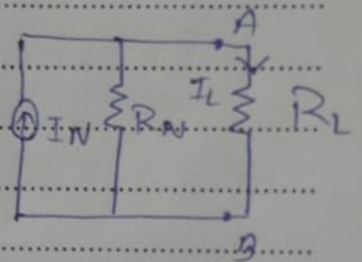
$I_{BD} = I_{B.1} + I_{B.D2}$

$= 1.01 + 0.67 = 1.68A$



b) Ans. A linear network consisting of a no. of voltage sources & resistances can be replaced by an equivalent network having a single current source (I_N) & a single resistance (R_N).

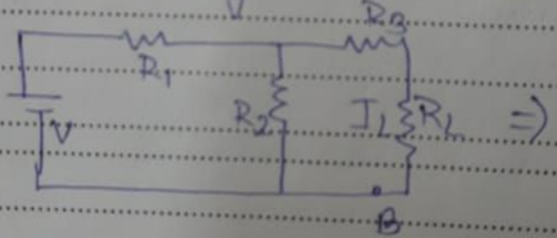


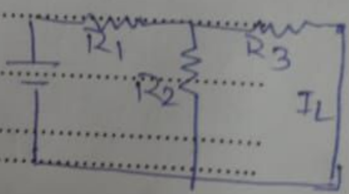


Nortons equivalent circuit

$$I_L = \frac{I_N \times R_N}{R_N + R_L}$$

* Steps for obtaining Norton's equivalent circuit





$$I_L = \frac{I_N \times R_N}{R_N + R_L} \quad \text{--- (1)}$$

Step 1:- find load on the source short the load terminals A & B.

$$R' = R_1 + R_2 \parallel R_3$$

$$R' = R_1 + \frac{R_2 R_3}{R_2 + R_3}$$

$$R' = \frac{R_1(R_2+R_3)+R_2R_3}{R_2+R_3}$$

$$R' = \frac{R_1R_2 + R_1R_3 + R_2R_3}{R_2+R_3} \quad \text{— (2)}$$

Step 2:- find Source Current (I')

$$I' = \frac{E}{R'}$$

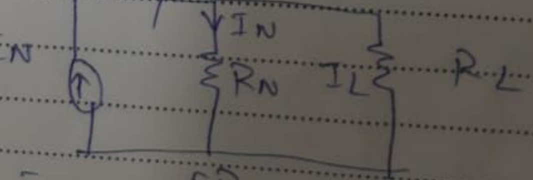
$$I' = \frac{E(R_2+R_3)}{R_1R_2+R_1R_3+R_2R_3} \quad \text{— (3)} \qquad \text{from (2)}$$

Step 3 find Norton's Current (I_N)

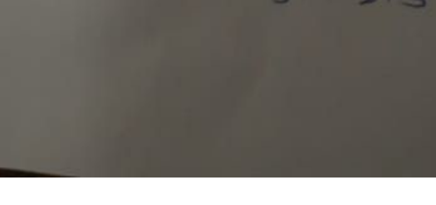
$$I_N = \frac{I' R_2}{R_2+R_3}$$

$$\Rightarrow I_N = \frac{ER_2}{R_1R_2+R_1R_3+R_2R_3} \quad \text{— (4)}$$

Step 4) find Norton Resistance (R_N) open the load terminals A & B. Also disconnect the cell.



$$R_N = R_3 + \frac{R_1R_2}{R_1+R_2} \quad \text{— (5)}$$



$$I_N = \frac{ER_2}{R_1R_2+R_1R_3+R_2R_3}$$

* Difference between Norton's & thevenins theorem:

1) Nortons theorem uses a ~~stiff~~ current source where as thevenins theorem uses a voltage source.

2) thevenins theorem uses a resistor in series while norton's theorem uses a resistor set in parallel with the source.

3) Nortons theorem is actually a derivation of the thevenins theorem.

4) the norton's & thevenin's resistance are equal in magnitude.