SRM Institute of Science and Technology
College of Engineering and Technology

Mode of Exam
OFFLINE

Common to EEE, ECE, Mechanical, Mechatronics and CSE

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2021-22 (EVEN) **SET-A**

Test: CLAT-1 **Date: 21/04/2022**
Course Code & Title: 18EES101J – Basic Electrical and Electronics Engineering **Duration:** 50 Mins
Year & Sem: I & II **Max. Marks:** 25

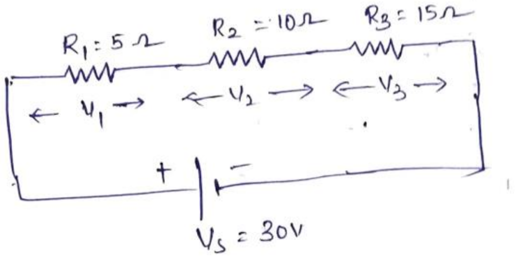
Course Articulation Matrix:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	L	L	M	-	M	M	M	M	-	M	-	-	-
CO2	H	M	L	L	M	-	M	M	M	M	-	M	-	-	-
CO3	H	-	L	L	M	-	M	M	M	M	-	M	-	-	-
CO4	H	-	L	M	M	-	M	M	M	M	-	M	-	-	-
CO5	H	M	M	M	M	-	M	M	M	M	-	M	-	-	-
CO6	-	-	L	2	M	-	M	M	M	M	-	M	-	-	-

<table>
<tr><th colspan="7">Part - A
(3 x 4 Marks = 12 Marks)</th></tr>
<tr><th>Q. No</th><th>Answer all the questions</th><th>Marks</th><th>BL</th><th>CO</th><th>PO</th><th>PI Code</th></tr>
<tr><td>1</td><td>

1a)

Ans.



(2M)

$I = \frac{V_T}{R_{eq}} = \frac{30}{30} = 1A.$

$V_1 = 1 \times 5 = 5V$

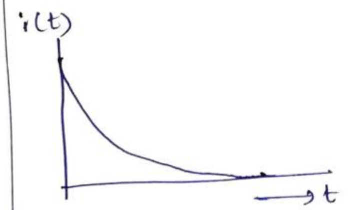
$V_2 = 1 \times 10 = 10V$

$V_3 = 1 \times 15 = 15V.$

1b)

Ans.

$i(t) = \frac{V}{R} e^{-t/RC}$ (1M)



(1M)

</td><td>4</td><td></td><td>1</td><td>1</td><td></td></tr>
<tr><td>2</td><td>

Thus, maximum power transfer will occur when the value of the load resistance is equal to the internal resistance of the source.

The maximum power transfer theorem is stated as follows:

In a dc network maximum power will be consumed by the load or maximum power will be transferred from the source to the load when the load resistance becomes equal to the internal resistance of the network as viewed from the load terminals.

The value of maximum power when $R_L = R_i$ is calculated as

$$P_L(\max) = \frac{E^2 R_L}{(R_L + R_L)^2} \quad (\text{since } R_i = R_L)$$
$$= \frac{E^2}{4R_L} = \frac{E^2}{4R_i} \qquad (2.5)$$

</td><td>4</td><td></td><td>1</td><td></td><td></td></tr>
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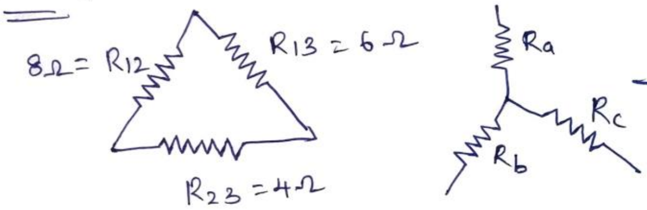
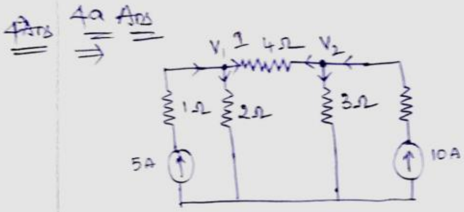
3	~~Ans~~ a 3 Ans :  — (1 mark) $R_a = 2.66\Omega$, $R_b = 1.77\Omega$, $R_c = 1.33\Omega$ (Each - 1 mark)	4		1		

Part – B
(1 x 13 Marks = 13 Marks)

5(a)	~~Ans~~ 4a Ans ⇒  Apply at node '1', $5 = \frac{V_1 - 0}{2} + \frac{V_1 - V_2}{4}$ —— (2 mark) $\Rightarrow 5 = \frac{2V_1 + V_1 - V_2}{4}$ $20 = 3V_1 - V_2 \longrightarrow (1)$ —— (2 mark) $10 = \frac{V_2 - 0}{3} + \frac{V_2 - V_1}{4}$ —— (3 mark) $\Rightarrow 10 = \frac{4V_2 + 3V_2 - 3V_1}{12}$ $\boxed{V_1 = 14.44V}$ $\boxed{V_2 = 23.33V}$ – (2 mark) $\Rightarrow 120 = 7V_2 - 3V_1 \longrightarrow (2)$ —— (2 mark) $V_1 = \frac{130}{9}$, $V_2 = \frac{70}{3} = \frac{210}{9}$ $I = \frac{V_1 - V_2}{4} = \frac{130/9 - 210/9}{4} = \frac{-80}{9 \times 4} = \frac{-80}{36}$ $\lvert I \rvert = 2.22A$ // —— [1 mark]	13	2	1	1,2	

(or)

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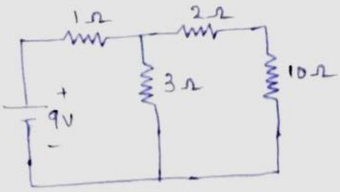
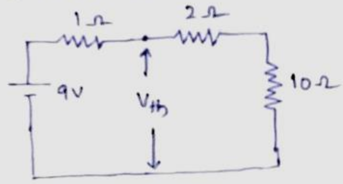
<td>5(b)</td>
<td>

4b Ans.



Using thevinins theorem.

Step 1 : calculate V_{th} (or) V_{oc}

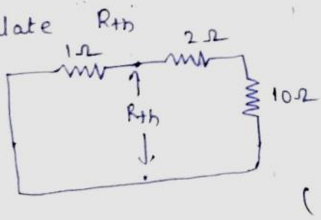


Voltage division rule ⇒

$$V_{th} = V_T \times \frac{12}{13}$$

$$= 9 \times \frac{12}{13} = 8.3\,V.$$ — (2) Mark

Step 2 : Calculate R_{th}



$$R_{th} = \frac{12 \times 1}{12 + 1} = \frac{12}{13}$$

$R_{TH} = 0.923\,\Omega$ —— (2) Mark

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<td>13</td>
<td>2</td>
<td>1</td>
<td>1,2</td>
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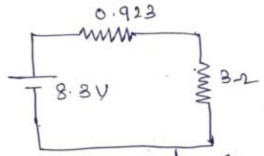
Step 3 :

Draw equivalent circuit



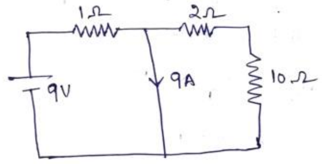
$$I = \frac{8.3}{3.923} = 2.115A.$$

(1 mark)

(2 mark)

Using Norton's theorem

Step 1 : Calculate 'I_{sc}' (or) 'I_N'

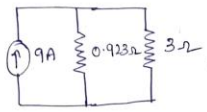


$\Rightarrow I_{sc} = 9A$ —— (2 mark)

Step 2 : Calculate 'R_N'

$R_N = R_{TH} = 0.923\,\Omega$ ⟵ (1 mark)

Step 3 : Draw Nortons equivalent circuit.

	 —— (1 mark) $\Rightarrow I_L = 9 \times \frac{0.923}{3.923}$ —— (2 mark) $= 2.115\,A$					

Question Paper Setter

Approved by Audit Professor/
Course Coordinator