



### FIRST INTERNAL ASSESSMENT

Sem.: III  
 Date: 15/09/2019

Sub: Network Theory  
 Time: 3.00 -4.00 pm

Sub. Code:18EC32  
 Max. Marks:30

*Note: Answer two full questions, draw sketches wherever necessary.*

Q. No		Discription of Question	Marks	CO	RBT Level
1	a	Derive the expression for i) $\Delta$ to Y transformation ii) Y to $\Delta$ transformation.	8	C202.1	L2
	b	Using source transformation, find power delivered by 50V source shown in fig.1	7	C202.1	L4
<b>OR</b>					
2	a	Find the voltage across 20 $\Omega$ resistor in the network shown in fig. 2 by Mesh analysis.	8	C202.1	L4
	b	Calculate the voltage across the 6 $\Omega$ resistor using source shifting and transformation technique shown in fig. 3	7	C202.1	L4
3	a	Using node voltage method, find $V_1, V_2$ & $V_3$ and branch currents $i_1$ to $i_6$ . Network shown in fig. 4	8	C202.1	L4
	b	Find mesh currents $i_1, i_2$ and $i_3$ for network shown in fig. 5	7	C202.1	L4
<b>OR</b>					
4	a	Refer the network shown in fig. 6 to find node voltages $v_d$ and $v_c$	8	C202.1	L4
	b	Determine the equivalent resistance across X-Y shown in fig. 7	7	C202.1	L4

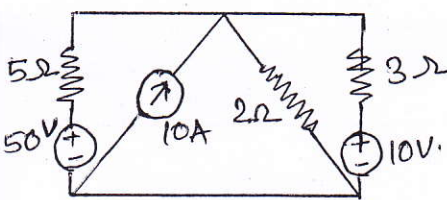


Fig. 1.

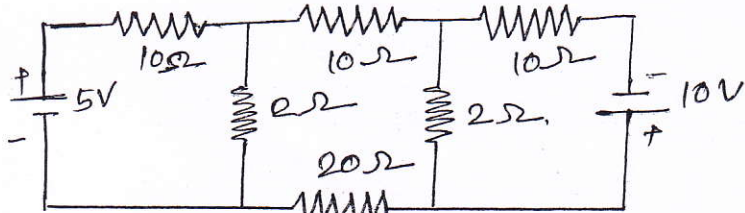


Fig. 2.

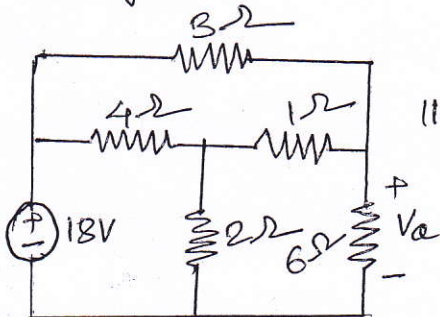


Fig. 3.

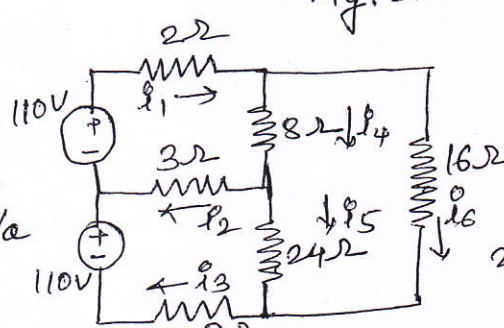


Fig. 4.

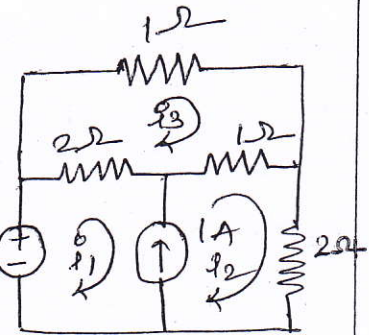


Fig. 5.

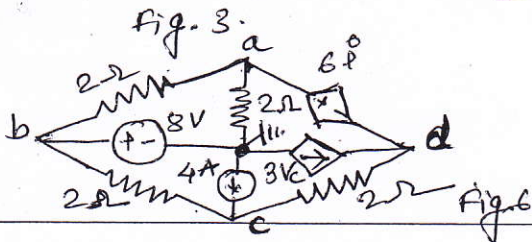


Fig. 6

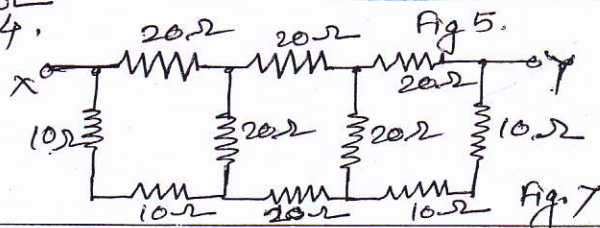


Fig. 7

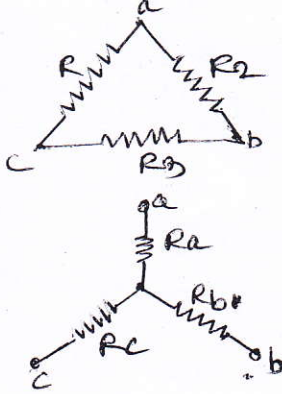
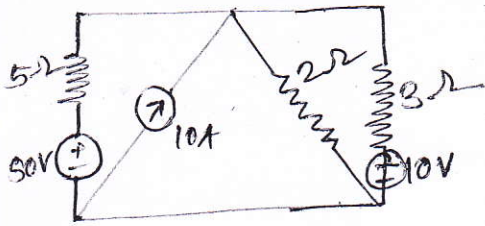
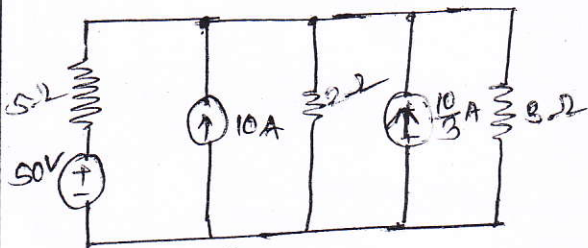
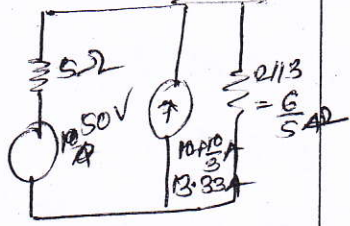
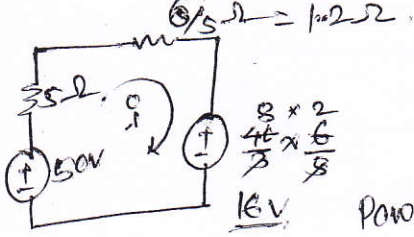
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### IA - I SCHEME OF EVALUATION

Sem : III	Subject : Network Theory	Sub Code : 15EC32	Date : 15/09/2019.		
Q. No.	Bit	Description	Marks	CO's	RBT Level
1.	a.	i) $\Delta$ to $\gamma$ transformation. $R_a = \frac{R_1 R_2}{R_1 + R_2 + R_3}, R_b = \frac{R_2 R_3}{R_1 + R_2 + R_3}, R_c = \frac{R_1 R_3}{R_1 + R_2 + R_3}$ ii) $\gamma$ to $\Delta$ transformation $R_1 = \frac{R_a R_b + R_b R_c + R_a R_c}{R_b}$ $R_2 = \frac{R_a R_b + R_b R_c + R_a R_c}{R_c}$ $R_3 = \frac{R_a R_b + R_b R_c + R_a R_c}{R_a}$	4	C2021	L2
			4		
	b.	    $\frac{3 \times 2}{3 + 2} = 1.2 \Omega$ $6.2 i = 50 - 16$ $i = \frac{34}{6.2} = 5.48 \text{ A}$ $P_s = 50 \times 5.48 = 274.2 \text{ W}$	7	C2021	L4

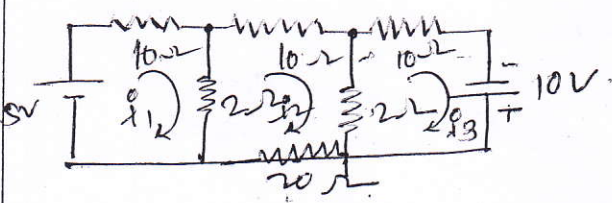
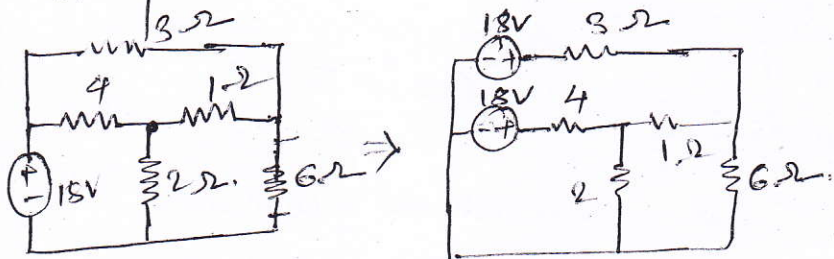
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**IA - I SCHEME OF EVALUATION**

Sem : 3		Subject : NT	Sub Code : 15EC32	Date : 10/09/19		
Q. No.	Bit	Description	Marks	CO's	RBT Level	
2.	a.	 <p>KVL for mesh ①  <math>10i_1 + 2(i_1 - i_2) = 5</math></p> <p>KVL to mesh ②  <math>12i_1 - 2i_2 = 5 \text{ --- (1)}</math></p> <p>KVL to mesh ③  <math>-2i_1 + 34i_2 - 2i_3 = 0 \text{ --- (2)}</math></p> <p>KVL to mesh ③  <math>-2i_2 + 12i_3 = 10 \text{ --- (3)}</math></p> $\begin{bmatrix} 12 & -2 & 0 \\ -2 & 34 & -2 \\ 0 & -2 & 12 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \\ i_3 \end{bmatrix} = \begin{bmatrix} 5 \\ 0 \\ 10 \end{bmatrix}$ <p><math>i_1 = 0.429 \text{ A}</math>  <math>i_2 = 0.075 \text{ A}</math>  <math>i_3 = 0.845 \text{ A}</math></p> <p>Voltage across <math>20\Omega = 0.075 \times 20 = \underline{1.5V}</math></p>	8	CO202-1	L4	
	b.		7	CO202-1	L4	

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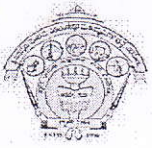
IA - 1 SCHEME OF EVALUATION

Sem : III		Subject : NT	Sub Code : 18EC32	Date : 15/09/19		
Q. No.	Bit	Description	Marks	CO's	RBT Level	
Q3	a.		2	(202.1)	14.	
		<p>Current through <math>6\Omega</math></p> $I = 8.57 \times \frac{1.33}{1.33} = 1.53A$ <p>voltage across <math>6\Omega</math></p> $V = 1.53 \times 6 = \underline{9.23V}$				
		<p>Apply KCL at node <math>V_1</math></p> $\frac{V_1 - 110}{2} + \frac{V_1 - V_2}{3} + \frac{V_1 - V_3}{16} = 0$ $11V_1 - 2V_2 - V_3 = 880 \quad \text{--- (1)}$ <p>Apply KCL at node <math>V_2</math>.</p> $\frac{V_2 - V_1}{3} + \frac{V_2}{3} + \frac{V_2 - V_3}{24} = 0$ $-3V_1 + 12V_2 - V_3 = 0 \quad \text{--- (2)}$				

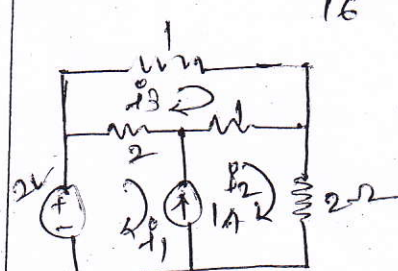
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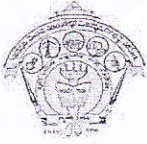
## IA - I SCHEME OF EVALUATION

Sem :	Subject :	Sub Code :	Date :	Marks	CO's	RBT Level
III	NT	18EC82	15/09/19			
Q. No.	Bit	Description				
		<p>Apply KCL at node <math>V_3</math>.</p> $\frac{V_3 + 110}{3} + \frac{V_3 - V_2}{24} + \frac{V_3 - V_1}{16} = 0$ $-3V_1 - 2V_2 + 21V_3 = -1760 \quad \text{--- (3)}$ $\begin{bmatrix} 11 & -2 & -1 \\ -3 & 12 & -1 \\ -3 & -2 & 21 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \\ V_3 \end{bmatrix} = \begin{bmatrix} 880 \\ 0 \\ -1760 \end{bmatrix}$ $V_1 = 75.84 \quad V_2 = 13 \text{ V} \quad V_3 = -71.74 \text{ V.}$ $i_1 = \frac{110 - 75.84}{2} = 17.08 \text{ Amp}$ $i_4 = \frac{75.84 - 13}{8} = 7.855 \text{ A}$ $i_2 = \frac{13}{3} = 4.33 \text{ A.}$ $i_3 = \frac{110 - 71.74}{3} = 12.75 \text{ A.}$ $i_5 = \frac{13 - (-71.74)}{24} = 3.53 \text{ Amp.}$ $i_6 = \frac{75.84 - (-71.74)}{16} = 9.224 \text{ Amp.}$				
Q3	b.	 <p>Apply supermesh for mesh ① &amp; ②</p> $2(i_1 - i_3) + (i_2 - i_3) + 2i_2 = 2$ $2i_1 - 3i_2 - 3i_3 = 2$ $2i_1 + 3 + 3i_1 - 3i_3 = 2$ $5i_1 - 3i_3 = -1 \quad \text{--- (1)}$ <p>constant eqn  <math>i_2 - i_1 = 1 \text{ A} \therefore i_2 = 1 + i_1</math></p>	7	C202.1	14.	

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**IA-1 SCHEME OF EVALUATION**

Sem :	Subject :	Sub Code :	Date :	Marks	CO's	RBT Level
III	NT	18EC32	15/09/19			
Q. No.	Bit	Description				
9.		<p>KVL for mesh ①</p> $-2i_1 - i_2 + 4i_3 = 0$ $-2i_1 - i_1 + 4i_3 = 0$ $-3i_1 + 4i_3 = 0 \quad \text{--- ②}$ $i_1 = -0.090 \text{ A} \quad i_2 = 0.91 \text{ A}$ $i_3 = 0.1818 \text{ A}$				
A	a.	<p>Note that <math>V_b = 8V</math></p> $V_a = 6i_1 + V_d$ $i_1 = \frac{V_b - V_c}{2}$ <p>KCL at supernode</p> $\frac{V_a - V_b}{2} + \frac{V_a}{2} + \frac{V_d - V_c}{2} - 3V_c = 0$ $V_a \left( \frac{1}{2} + \frac{1}{2} \right) + \frac{1}{2} V_b + \frac{1}{2} (V_d - V_c) = 3V_c \quad \text{--- ①}$ <p>From <math>V_b = 8</math>          ... constraint eqn <math>V_a = 6 \frac{(V_b - V_c)}{2} + V_d</math></p> $V_a = 3(8 - V_c) + V_d \quad \text{--- ②}$ <p>Put this <math>V_a</math> in eqn ①</p> $\left[ 3(8 - V_c) + V_d \right] - \frac{1}{2}(8) + \frac{1}{2}(V_a - V_c) = 3V_c$ $24 - 3V_c + V_d - 4 + \frac{1}{2}V_d - \frac{1}{2}V_c = 3V_c$ $-6.5V_c + 1.5V_d = -20 \quad \text{--- ③}$ <p>KCL at node c</p> $\frac{V_c - V_b}{2} + \frac{V_c - V_d}{2} = 4$ <p>Put <math>V_b = 8</math></p> $\frac{V_c - 8}{2} + \frac{V_c - V_d}{2} = 4$	B	C2021	L4	

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### IA - I SCHEME OF EVALUATION

Q. No.	Bit	Description	Marks	CO's	RBT Level
<p style="text-align: center;">Sem : III      Subject : NT      Sub Code : 19EE32      Date : 15/09/19</p>					
4	b	$V_c - 8 + V_e - V_d = 8$ $2V_c - V_d = 16$ $V_c - 0.5 V_d = 8$ $\underline{V_c = -1.14 V}$ $\underline{V_d = -18.3 V}$	7	CO2.1	4.

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