S J P N Trust's **Hirasugar Institute of Technology, Nidasoshi.** Inculcating Values, Promoting Prosperity Approved by AICTE and Affiliated to VTU Belgaum.	ECE Dept. Exam Internal Assessment Odd Sem(2018-19)

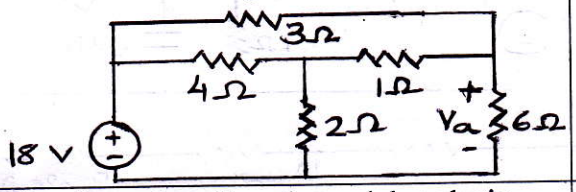
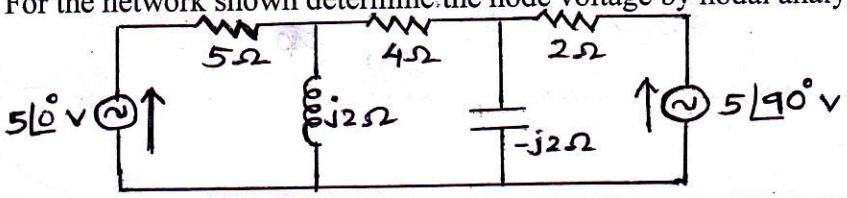
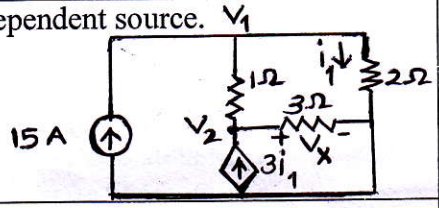
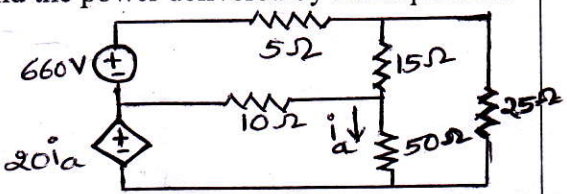
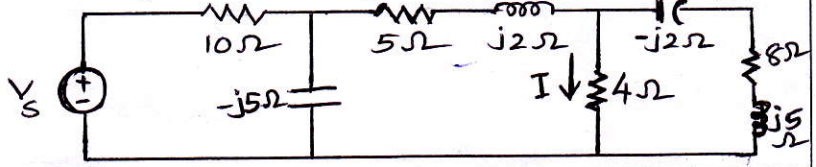
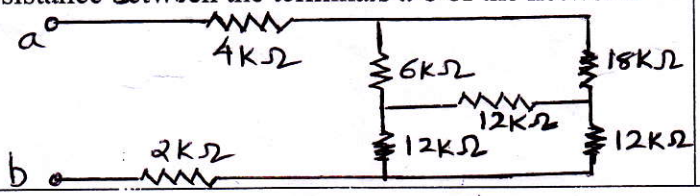
FIRST INTERNAL ASSESSMENT

Sem: III EC
Date: 12/09/2018

Subject: Network Analysis
Time: 11a.m-12 noon

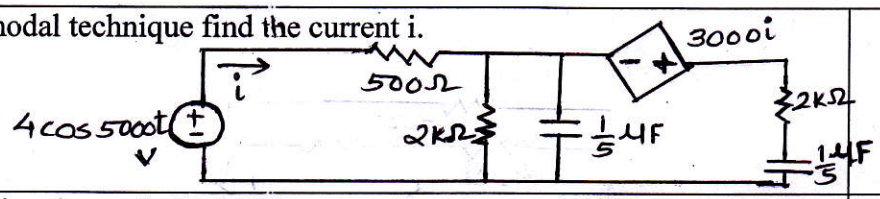
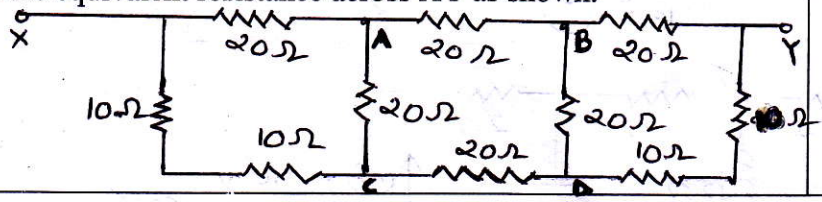
Sub. Code: 17EC35
Max. Marks: **30**

Note: Answer two full questions..

Q. No		Description of Questions	Marks	CO	RBT Level
1	a	Calculate the voltage across the 6Ω resistor using source shifting & transformation technique. 	5	C205.1	L4
	b	For the network shown determine the node voltage by nodal analysis. 	7	C205.1	L4
	c	Explain the procedure of converting a delta network to Star Network.	3	C205.1	L4
		OR			
2	a	Determine the power supplied by the dependent source. 	6	C205.1	L4
	b	Use mesh current analysis to find the power delivered by the dependent voltage source in the circuit. 	7	C205.1	L4
	c	Write the formulas for converting a Star Network to delta Network.	2	C205.1	L4
3	a	Find the source voltage Vs shown using nodal technique. Take I=3∠45° A. 	8	C205.1	L4
	b	Find the value of resistance between the terminals a-b of the network. 	7	C205.1	L4

Please Turn OverLeaf

OR

4	a	Using nodal technique find the current i. 	7	C205.1	L4
	b	Determine the equivalent resistance across XY as shown. 	8	C205.1	L4

Course Coordinator
Prof. S.S.Malaj

Module Coordinator
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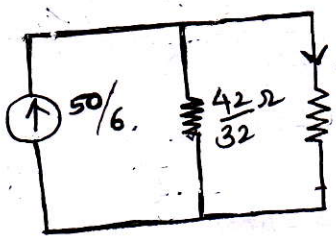
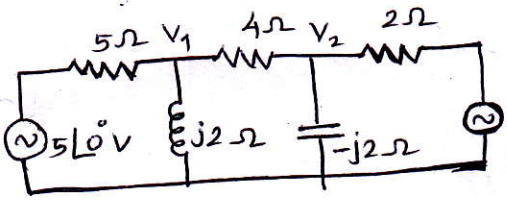
HOD
Dr.V.G.Kasabegoudar

IA - 1 SCHEME OF EVALUATION

Sem : III rd | Subject : Network Analysis | Sub Code : 17EC 35 | Date : 12/09/18

Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
1	a)	 $I = \frac{50}{6} \times \frac{\frac{42}{32}}{\frac{42}{32}+6}$ $I = \frac{50}{6} \times \frac{42}{234}$ $I =$ $V = 6 \times \frac{25 \times 7}{117}$ $V = 6 \times 1.49$ $V = 8.97V$	5	C205.1	L4
	b)	 $\frac{V_1-5\angle 0^\circ}{5} + \frac{V_1}{j2} + \frac{V_1-V_2}{4} = 0$ at node 1 $(9-j10)V_1 - 5V_2 = 20\angle 0^\circ$ At node 2 $\frac{V_2-V_1}{4} + \frac{V_2}{-j2} + \frac{V_2-5\angle 90^\circ}{2} = 0$ $-V_1 + (3+2j)V_2 = 10\angle 90^\circ$ $\therefore V_1 = 2.47\angle 287.65^\circ$ $V_2 = 3.08\angle -122.07^\circ$	4+3	C205.1	L4
	c)	$R_{ab}(Y) = R_{ab}(\Delta)$ $R_a + R_b = \frac{R_2(R_1+R_3)}{R_2+R_1+R_3}$ $\Rightarrow R_a = \frac{R_1R_2}{R_1+R_2+R_3}$ $R_{bc}(Y) = R_{bc}(\Delta)$ $R_b + R_c = \frac{R_3(R_1+R_2)}{R_3+R_1+R_2}$ $R_b = \frac{R_2R_3}{R_1+R_2+R_3}$ $R_{ca}(Y) = R_{ca}(\Delta)$ $R_c + R_a = \frac{R_1(R_2+R_3)}{R_1+R_2+R_3}$ $R_c = \frac{R_1R_3}{R_1+R_2+R_3}$	3	C205.1	L4

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IA - 1 SCHEME OF EVALUATION

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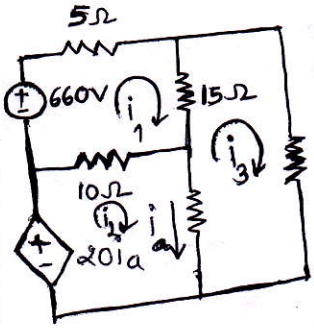
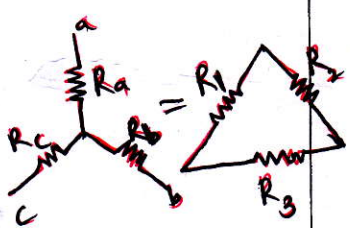
Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
2	a)	At node 1 $i_1 = \frac{V_1}{2}$ $\frac{V_1}{2} + \frac{V_1 - V_2}{1} - 15 = 0$ $3V_1 - 2V_2 = 30$ $\frac{V_2 - V_1}{1} + \frac{V_2}{3} - 3i_1 = 0$ $15V_1 - 8V_2 = 0$ $\therefore V_1 = -40V \quad V_2 = -75V$ $i_1 = \frac{V_1}{2} = -20V$ $V_x = V_2 = -75V.$ $P = V_2 - 3i_1 = -75 \times 3 \times -20$ $= 4500W$	6	C205.1	L4
2	b)	 Mesh 1: $30i_1 - 10i_2 - 15i_3 = 660$ Mesh 2: $-10i_1 + 60i_2 - 50i_3 = 20i_a$ Mesh 3: $-15i_1 - 50i_2 + 90i_3 = 0$ $i_a = i_2 - i_3$ $i_1 = 42A \quad i_2 = 27A \quad i_3 = 22A, \; i_a = 5A$ Power delivered by dependent voltage source = $P_{20i_a} = (20i_a)\, i_2$ $= 2700W$ (delivered)	7	C205.1	L4
2	c)	$R_1 = \frac{R_aR_b + R_bR_c + R_aR_c}{R_b}$ $R_2 = \frac{R_aR_b + R_bR_c + R_aR_c}{R_c}$ $R_3 = \frac{R_aR_b + R_bR_c + R_aR_c}{R_a}$  	2	C205.1	L4

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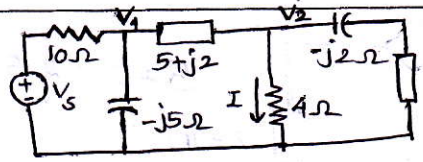
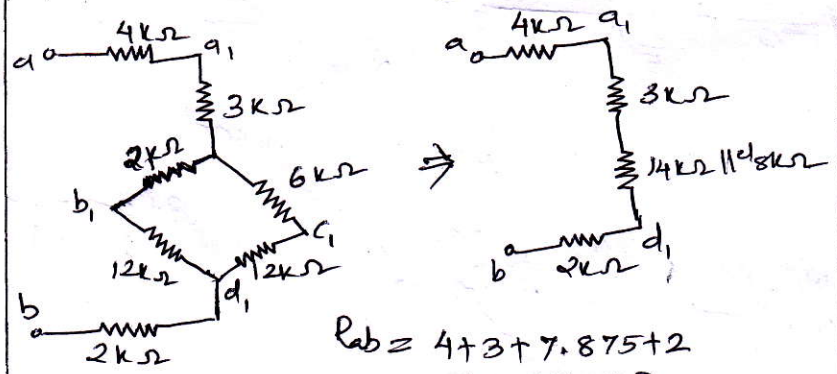
IA - 1 SCHEME OF EVALUATION

Sem : III rd **Subject :** Network Analysis **Sub Code :** 17EC35 **Date :** 12/9/2018

Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
3	a)	 KCL at node 1 :- $\frac{V_1-V_s}{10}+\frac{V_1}{-j5}+\frac{V_1-V_2}{5+j2}=0$ $\Rightarrow (11+j12)V_1-(5+j2)V_s=10V_2$ KCL at node 2 :- $\frac{V_2-V_1}{5+j2}+I+\frac{V_2}{8+j3}=0$ $\Rightarrow (8+j3)V_1=(13+j5)V_2+(34+j31)I$ $V_2=4I=4(3\angle 45^\circ)=12\angle 45^\circ=6\sqrt{2}+j6\sqrt{2}$ $(8+j3)V_1=74.24+j290.62$ $V_1=\frac{300\angle 75.7^\circ}{8.54\angle 20.6^\circ}=35.1\angle 55.1^\circ$ $=20.1+j28.8\ V$ Substituting V_1 & V_2 gives $(5+j2)V_s=-209.4+j473.1$ $V_s=\frac{517.4\angle 113.9^\circ}{5.38\angle 21.8^\circ}=96.1\angle 92.1^\circ V$	2+6	C205.1	L4
	b)	 $R_{ab}=4+3+7.875+2$ $=16.875\ k\Omega$	2+5	C205.1	L4
4	a)	X_C of $\frac{1}{5}$ 4F Capacitor $=\frac{1}{j\omega C}=\frac{1}{j5000\times\frac{1}{5}\times 10^{-6}}$ $=-j1k\Omega$ ll^el combinations of $2k\Omega$ & $-j1k\Omega$ is			

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IA - 1 SCHEME OF EVALUATION

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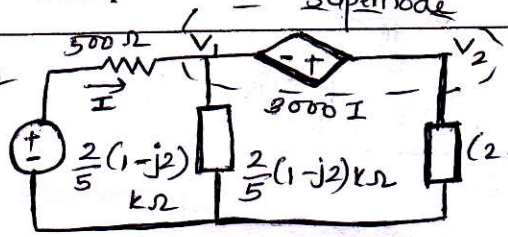
Q. No.	Bit	Description	Marks	CO's	RBT LEVEL



$Z_p = \frac{2}{5}(1-j2)\ k\Omega$

5+2 | C205.1 | L4

Constraint Equation

$V_2 = V_1 + 3000I$

KCL at supernode

$$\frac{V_1 - 4\angle 0^\circ}{500} + \frac{V_1}{\frac{2}{5}(1-j2)\times 10^3} + \frac{V_2}{(2-j1)\times 10^3} = 0$$

$$\frac{V_1 - 4\angle 0^\circ}{500} + \frac{V_1}{\frac{2}{5}(1-j2)\times 10^3} + \frac{V_1 + 3000I}{(2-j1)\times 10^3} = 0$$

$$I = \frac{4\angle 0^\circ - V_1}{500}$$

$$\therefore \frac{V_1 - 4\angle 0^\circ}{500} + \frac{V_1}{\frac{2}{5}(1-j2)\times 10^3} + \frac{V_1 + 3000\left(\frac{4-V_1}{500}\right)}{(2-j1)\times 10^3} = 0$$

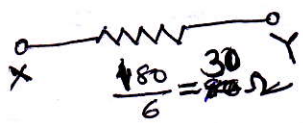
$I = 24\angle 53.1^\circ$

$i = 24\cos(5000t + 53.1^\circ)\ mA$

3+3+2 | C205.1 | L4

4 b)

$\Rightarrow$



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