EECS / CSE 70A MIDTERM #1

GRADING RUBRIC

Problem 1.

a.

Step	Points
Recognizing series combination $R_1+R_4 = 3\ \Omega$	1
Recognizing parallel combination $3\Omega \parallel R_2 = 2\ \Omega$	1
Recognizing series combination $R_3+2\ \Omega = 12\ \Omega$	1
Recognizing parallel combination $12\Omega \parallel R_5 = 4\ \Omega$	1
Recognizing series combination $R_6+4\ \Omega = 6\ \Omega$	1
Recognizing parallel combination $6\Omega \parallel R_7 = 3\ \Omega$	1
Recognizing series combination $3\Omega + R_8 = 12\Omega$	1
Recognizing parallel combination $12\Omega \parallel R_9 = 3\Omega$	1
Recognizing series combination $3\Omega + R_{10} = 5\Omega$	1
Final answer = 5Ω	1
Total	**10**

b.

Step	Points
Recognizing parallel combinations $R_2 \parallel R_3$	2
Application of the parallel resistors formula in step 1 $(20\Omega \parallel 30\Omega) = 12\Omega$	1
Recognizing series combination of $R_1+12\Omega = 16\Omega$	1
Recognizing parallel combination of $R_5 \parallel R_6$	2
Application of the parallel resistors formula in step 3 $(40\Omega \parallel 60\Omega) = 24\Omega$	1
Recognizing parallel combination of $16\Omega \parallel 24\Omega$	2
Final answer = 9.6Ω	1
Total	**10**

Problem 2.

Step	**Points**
Recognizing using supernode for Node 1 and Node 2	2
Recognizing that Node 3 voltage is set by the voltage source	1
Writing the expressions for KCL at supernode (V_1+V_2 = 6)	4
Writing the expression for dependent voltage source	2
Writing the expression for V_2 versus V_x	1
Finding the second equation for V_1 and V_2	2
Writing the expression for i0	2
Final Answers (Should be filled in the table)	
V_1 = 4.5V	2
V_2 = 1.5V	2
V_3 = 6V	1
i_0 = 0.375A	1
Total	**20**

Problem 3.

Step	**Points**
Recognizing the current IB is set by the current source	1
Recognizing using supermesh for A&C	1
KVL Loop equation for Supermesh	4
Writing the expression for IA and IC based on current source	2
Final Answers	
I_A = -2/3 A	2
I_B = 2 A	1
Ic = 10/3A	2
i_1=I_A= -2/3A	1
i_2 =I_B-I_A= 8/3A	1
i_3 = I_C=10/3A	1
i_4 = I_B-I_C= -4/3A	1
V_1 = V_2+R_2i_2=0 V	1
V_2 = R_3i_4= -2.6V	1
V_3 = R_4i_3=6.6V	1
Total	**20**

Problem 4.

Method 1:

Step	**Points**
Writing the KVL in the left mesh	2
Writing the KVL in the middle mesh	2
Finding the values of i_b and V_x	2
Calculating i_4 by writing the KCL at node A	2
Calculating i_3 by writing the KCL at node B	2
Calculating V_5 by writing the KVL in the right mesh	1
Finding the value of P_3 & the type	2&1
Finding the value of P_4 & the type	2&1
Finding the value of P_5 & the type	2&1
Total	**20**

OR

Method 2:

Step	**Points**
Writing the KVL in the left mesh	2
Writing the KVL in the middle mesh	2
Finding the values of i_b and V_x	2
Calculating the current of the left mesh	2
Calculating the current of the middle mesh	2
Calculating V_5 by writing the KVL in the right mesh	1
Finding the value of P_3 & the type	2&1
Finding the value of P_4 & the type	2&1
Finding the value of P_5 & the type	2&1
Total	**20**

Problem 5.

Step	**Points**
Solving the open circuit voltage for Thevenin voltage source	-
Writing the KCL at node a	2
Writing the KCL at the top node	2
Finding the Values of V_{oc} and V_x	4
Finding the R_{th}	-
Recognizing parallel combination of $R_1 \| \| R_3 = 5/6\Omega$	1
Recognizing series combination of $R_2 + 5/6\Omega = 23/6\Omega$	1
Recognizing the parallel combination of $R_4 \| \| R_5 = 8/6\Omega$	1
Recognizing the parallel combination of $8/6\Omega \| \| 23/6\Omega = 92/93\Omega$	1
Finding the I_{No}	2
Finding the R_{No}	2
Drawing the correct Thevenin equivalent network	2
Drawing the correct Norton equivalent network	2
Total	**20**