KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

ELECTRICAL ENGINEERING DEPARTMENT

Term151 EE 202

EXAM I

DATE: Wednesday 7/10/2015

TIME: 6:00 PM-7:30 PM

SER #	
ID#	
Name	**KEY**
Section#	

	Maximum Score	**Score**
Problem 1	10	
Problem 2	10	
Problem 3	10	
Problem 4	10	
Total	**40**	

Problem 1:

Circle the correct answer only. No points will be given if more than one answer is selected for any part of the MCQ questions. The parts have equal weights.

a) How much must be the value of R so the equivalent resistance between a-b is equal to 100Ω?

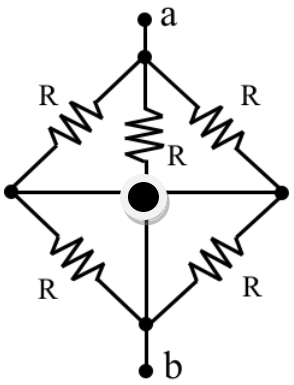
(i) 100 Ω

(ii) 200 Ω

(iii) 300 Ω

(iv) 400 Ω

(v) 50 Ω



b) What is the equivalent resistance in term of *R* between points a-b?

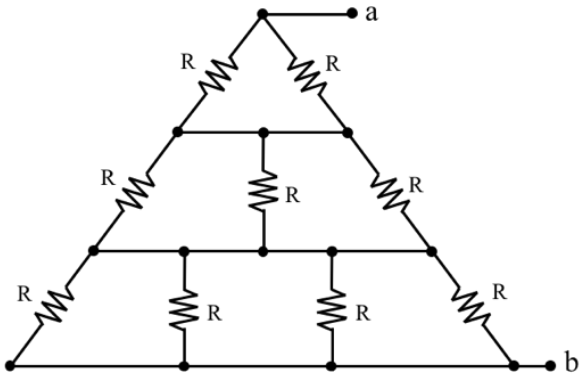
(i) 12R/13

(ii) R/9

(iii) 13R/12

(iv) 9R

(v) 3R



c) If a 5 Ω resistor dissipates 125 W, the voltage across its terminals and the current passing through it can be:

(i) 25 V and -25 A

(ii) 5 V and 25 A

(iii) -25 V and -5 A

(iv) 625 V and 5 A

(v) 5 V and 625 A

d) The power absorbed by the 6 A current source in the circuit shown is:

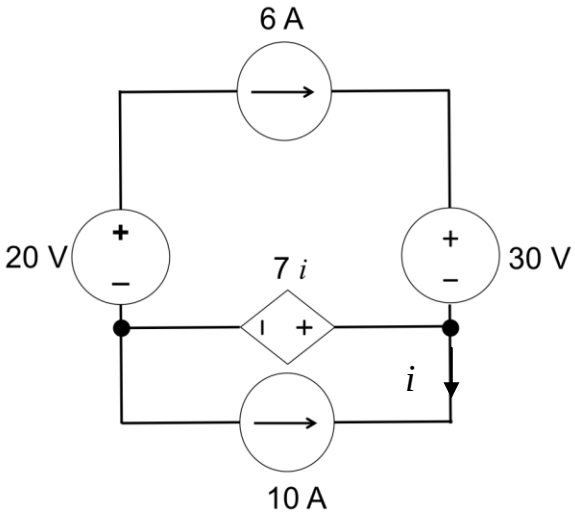
(i) − 360 W

(ii) 360 W

(iii) − 480 W

(iv) 480 W

(v) 60 W



e) For the circuit shown, the value of α that makes the connection valid is

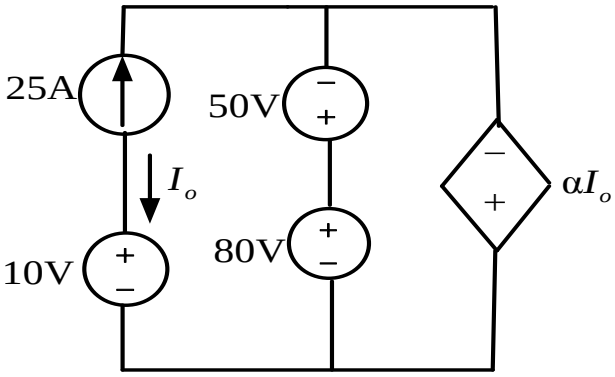
(i) 5.2 V/A

(ii) 0.8 V/A

(iii) 1.2 V/A

(iv) 2.5 V/A

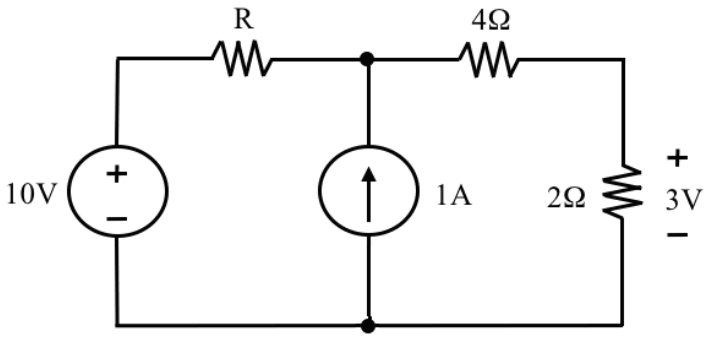
(v) None of the above.

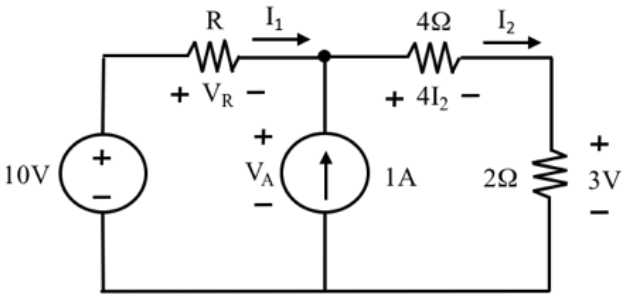


Problem 2

a) Using Kirchhoff's Laws (KVL and KCL) and Ohm's Law, find **the value of R** in the following circuit.

No points will be given if other methods are used (DO NOT USE NODAL OR MESH METHOD.)





$I_2 = \frac{3V}{2\Omega} = {}^3/_2\,\mathrm{A} = 1.5\mathrm{A}$

KCL at top node:

$-I_1 - 1A + I_2 = 0$ or

$I_1 = -1A + I_2 = -1A + 1.5A = 0.5A$ (3)

KVL at mesh 1:

$-10V + V_R + V_A = 0$

$V_R = 10V - V_A$ (3)

KVL at mesh 2:

$-V_A + 4I_2 + 3V = 0$

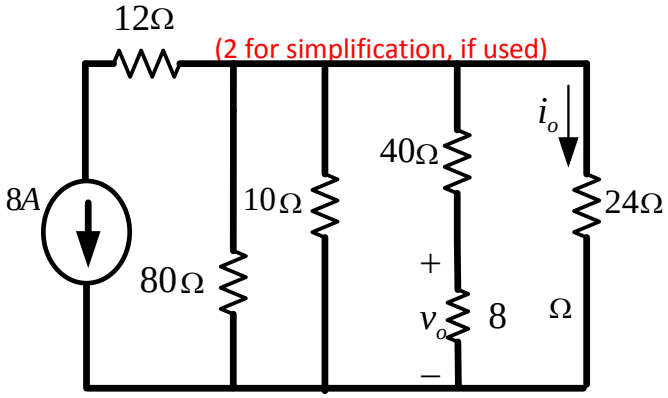
$V_A = 4(1.5A) + 3V = 6V + 3V = 9V$ (3)

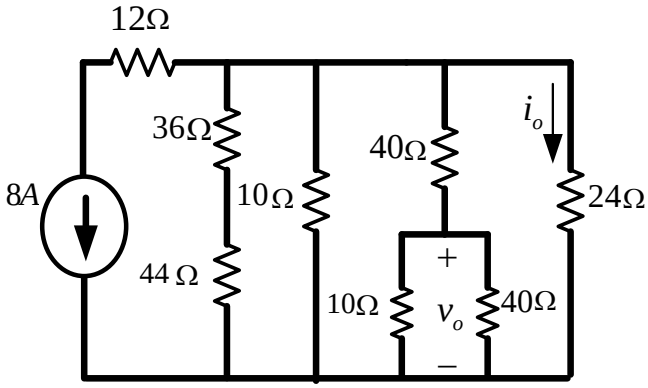
➔ $V_R = 10V - V_A = 10V - 9V = 1V$ (2)

➔ $R = \frac{V_R}{I_1} = \frac{1V}{0.5A} = 2\Omega$ (2)

Problem 3

For the circuit shown, use current division rule to determine i_o, and voltage division rule to determine v_o (no points will be given if other methods are used.)





Solution (0 out of 5 if no CDR is used, and 0 out of 5 if no VDR is used)

We don't need to simplify to les than two parallel resistors.

(4)

$$i_0 = \frac{-8(\frac{1}{24})}{\frac{1}{80}+\frac{1}{10}+\frac{1}{48}+\frac{1}{24}} = -1.905A$$

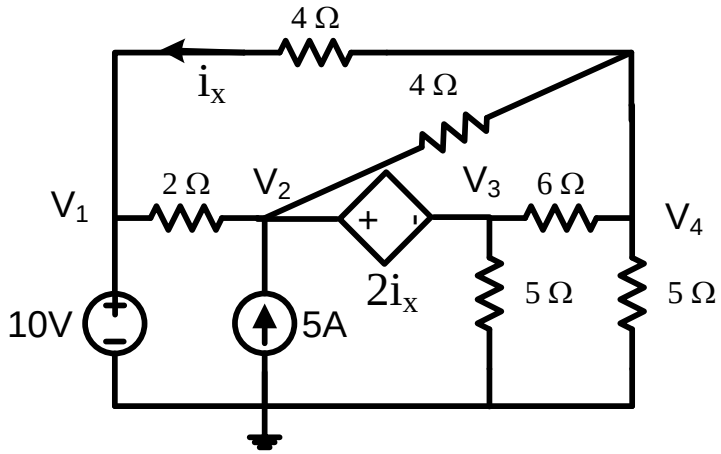
To find v_o, first finding voltage 24 ohms resistance then use VDR

(4)

$$v_0 = \frac{8}{40+8}v_{24} = \frac{24i_0(8)}{40+8} = \frac{-45.72(8)}{40+8} = -7.619\ V$$

Problem 4

Write the node equations needed to solve for the node voltages V_1,V_2,V_3,V_4 shown in the following circuit. **Do not simplify and do not solve the equations.**



Solution

(If missing a full term in the equation then 0 for that equation)

$V_1 = 10V$ (1)

$$\frac{V_4}{5} + \frac{V_4 - V_3}{6} + \frac{V_4 - V_2}{4} + \frac{V_4 - 10}{4} = 0 \quad (3)$$

$$SN(V_1 \,\&\, V_3): \quad \frac{V_2 - 10}{2} + \frac{V_2 - V_4}{4} + \frac{V_3 - V_4}{6} + \frac{V_3}{5} - 5 = 0 \quad (4)$$

$$Constraint: \; V_2 - V_3 = 2i_x \quad (1)$$

$$i_x = \frac{V_4 - 10}{4} \quad (1)$$