CSE 232 Final Exam, Jan. 12, 2023

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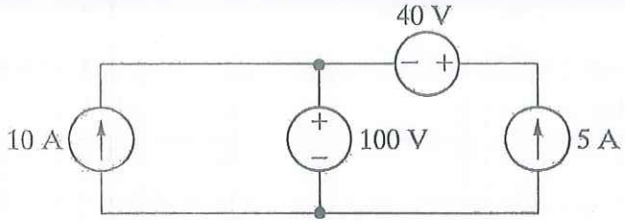
Attention :

- There are 19 Multiple choice questions plus one output wave form sketch (20 Total)
- 2 of the questions require extra (indicated by "~") drawing / skeching
- Marking the correct answer does not guarentee full credit. You need to show how you came up with that answer properly.
- Show all your calculations in a neat and clear style in order to get full credit.

BEST OF LUCK

1. For the Figure below calculate the power associated with the 5A source

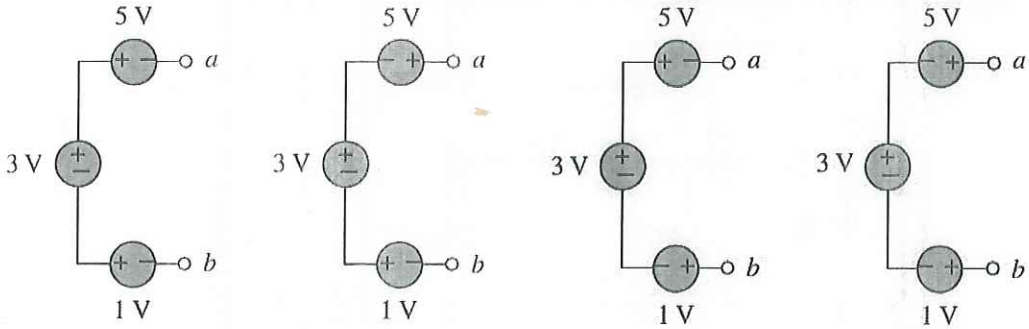


a) P = -300 W
b) P = 300 W
c) P = -700 W
d) P = 700 W
e) Can't be done. Connections are invalid.

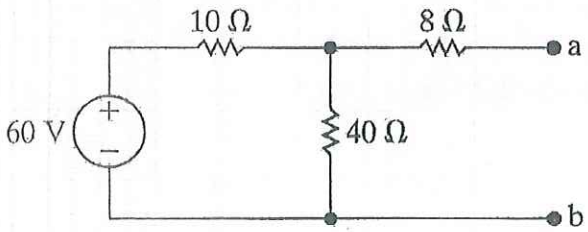
2. The maximum current that a 2W , 80 kΩ resistor can safely conduct is :

a) 160 kA b) 40 kA c) 5 mA d) 25 µA e) 25 mA

3. Which of the following circuits given below would output $V_{ab} = 7V$?



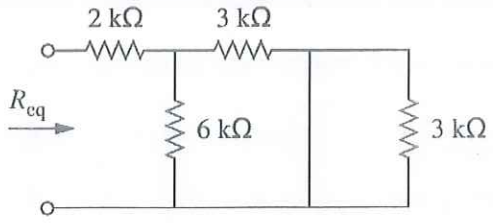
4. The Norton current with respect to the terminals for the circuit given below is 3 A. What is the short circuit current ?



a) $I_{SC} = 3mA$ b) $I_{SC} = 5mA$ c) $I_{SC} = 5A$ d) $I_{SC} = 6A$ e) None of these

A

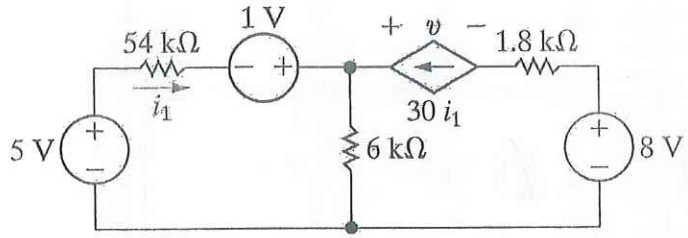
5. The equivalent resistance for the circuit given below is :



a) 4 kΩ b) 5 kΩ c) 8 kΩ d) 14 kΩ e) None of these

B

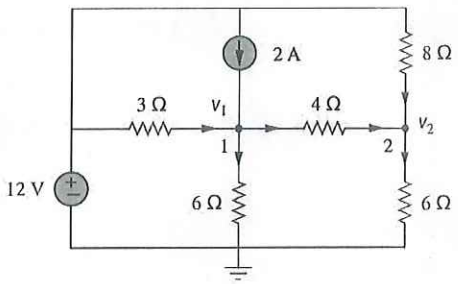
6. The voltage drop, v , across the dependent current source for the circuit below is :



a) 15.4 V b) 2 V c) -15.4 V d) 6V e) Current sources do not have a voltage drop

A

7. For the circuit given below the KCL for node 1 is given as



(a) $2+\dfrac{12-v_1}{3}=\dfrac{v_1}{6}+\dfrac{v_1-v_2}{4}$

(b) $2+\dfrac{v_1-12}{3}=\dfrac{v_1}{6}+\dfrac{v_2-v_1}{4}$

(c) $2+\dfrac{12-v_1}{3}=\dfrac{0-v_1}{6}+\dfrac{v_1-v_2}{4}$

(d) $2+\dfrac{v_1-12}{3}=\dfrac{0-v_1}{6}+\dfrac{v_2-v_1}{4}$

C

8. For the circuit of problem 7 the KCL for node 2 is given as

(a) $\dfrac{v_2-v_1}{4}+\dfrac{v_2}{8}=\dfrac{v_2}{6}$

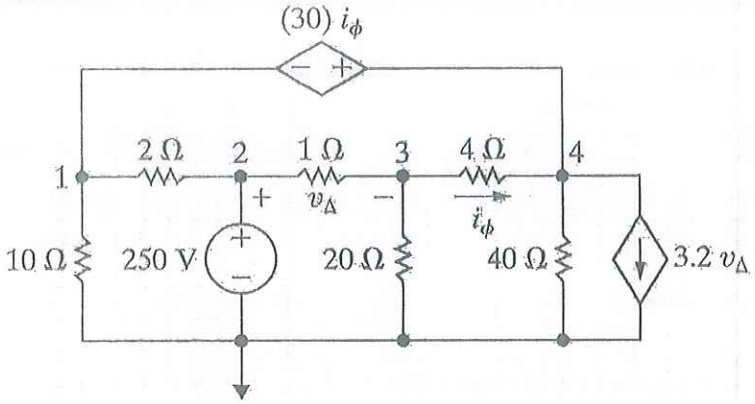
(b) $\dfrac{v_1-v_2}{4}+\dfrac{v_2}{8}=\dfrac{v_2}{6}$

(c) $\dfrac{v_1-v_2}{4}+\dfrac{12-v_2}{8}=\dfrac{v_2}{6}$

(d) $\dfrac{v_2-v_1}{4}+\dfrac{v_2-12}{8}=\dfrac{v_2}{6}$

C

9. For the circuit given below, the essential nodes and reference node are marked. Indicate the valid nodal eqaution for the Supernode



a) $\frac{V_1}{10} + \frac{V_1 - V2}{2} - 30i_\phi = 0$

b) $\frac{V_2 - V_1}{2} + \frac{V_2 - V_3}{1} + \frac{V_3}{20} + \frac{V_3 - V_4}{4} = 0$

c) $24V_1 - 138V_3 + 11V_4 = -27000$

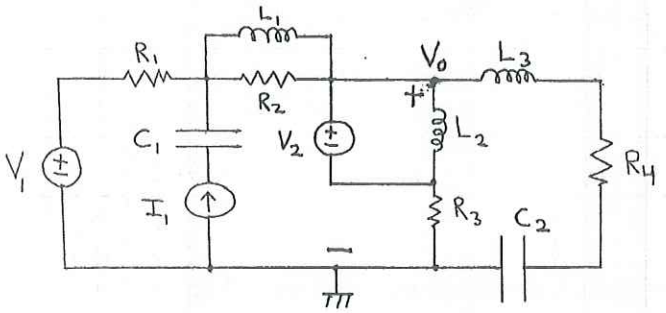
d) $10V_1 - 20V_3 - 40V_4 = 250$

e) There is no Supernode in the given circuit

B

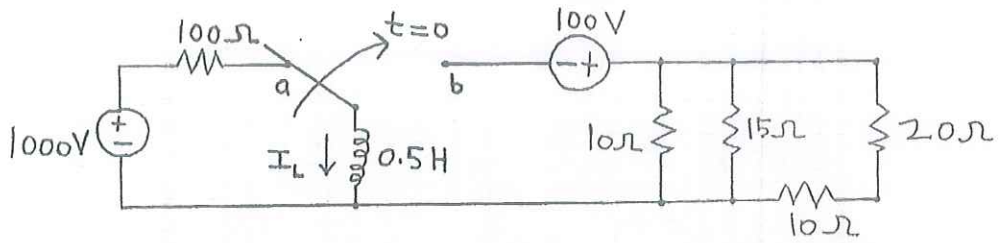
10. For the circuit given below, determine the steady state value of Vo, with respect to ground for the given component values

$V_1 = 10V$	$V_2 = 20V$	$I_1 = 5A$	
$R_1 = 70\Omega$	$R_2 = 100\Omega$	$R_3 = 30\Omega$	$R_4 = 150\Omega$
$L_1 = 7H$	$L_2 = 0.5H$	$L_3 = 1H$	
$C_1 = 1\mu F$	$C_2 = 12\mu F$		



a) Indeterminate
b) 3 V
c) 10 V
d) 5 V
e) None of the above

11. For the circuit given below determine the time constant of the transient response for $t \geq 0$

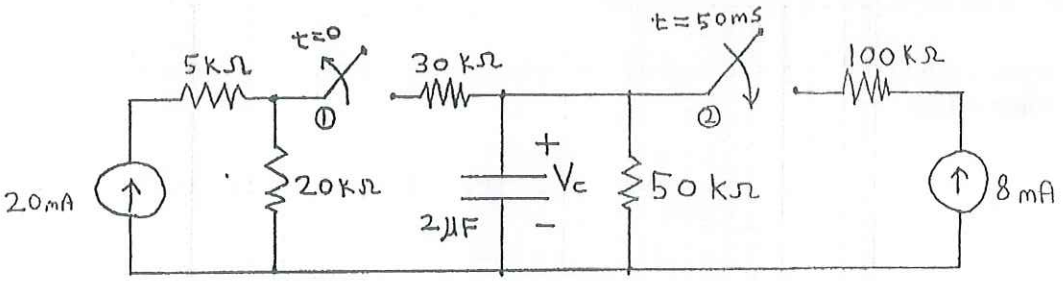


a) $\tau = 100ms$ b) $\tau = 50ms$ c) $\tau = 10s$ d) $\tau = 2.5s$ e) None of these

12. For the circuit given in Problem 11, the expression for $I_L(t)$ for $t \geq 0$ can be written as:

a) $I_L(t) = 20A$
b) $I_L(t) = 20 - 10e^{\frac{-t}{\tau}}A$
c) $I_L(t) = -20 + 30e^{\frac{-t}{\tau}}A$
d) $I_L(t) = 10e^{\frac{-t}{\tau}}A$
e) None of the above

13. In the circuit given below **switch 1** has been closed and **switch 2** have beed open since my 16th birthday. During this exam (specifically right now), let's say at **13.** , **switch 1** is opened. Then at 50 ms **switch 2** is closed



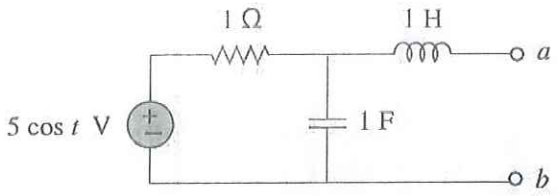
Determine Vc(t) valid for $0 \leq t \leq 50\ ms$

a) Vc(t) = $200e^{-10t}V$
b) Vc(t) = $200e^{-6.25t}V$
c) Vc(t) = $400e^{-6.25t}V$
d) Vc(t) = $400e^{-10t}V$
e) None of the above

14. For the circuit of Prblem 13, determine the Vc(t) for $t \geq 50\ ms$

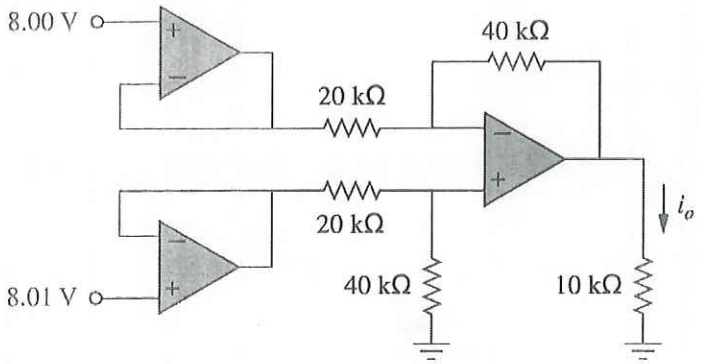
a) Vc(t) = $V_C(0.005)e^{-15t}V$
b) Vc(t) = $400[1 - e^{15t}]V$
c) Vc(t) = 121 V
d) Vc(t) = $V_C(0.05)e^{-10t+0.5} + 400[1 - e^{-10t+0.5}]V$
e) None of the above

15. Draw the Thevenin equavalent circuit and find the Thevenin impedance at terminals a-b for the circuit given below



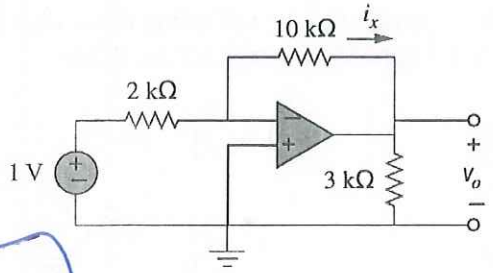
(a) 1 Ω
(b) $0.5 - j0.5\ \Omega$
(c) $0.5 + j0.5\ \Omega$
(d) $1 + j2\ \Omega$
(e) $1 - j2\ \Omega$

16. For the instrumentation amplifier circuit given below calculate the *value* of the output current i_o



a) 1.066 mA
b) – 1.066 mA
c) 0.133 μA
d) 2 μA
e) none of the above

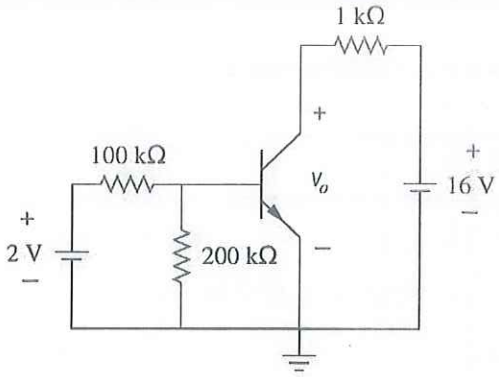
17. For the op-amp circuit given below calculate the output voltage, v_o and the value of i_x



a) -6 V, 0.6 A
b) -5 V, 0.5A
c) -6 V, 0.5 A
d) -5 V, 0.6 A
e) None of these

C

18. For the BJT circuit given below $\beta = 150$ and $V_{BE} = 0.7V$

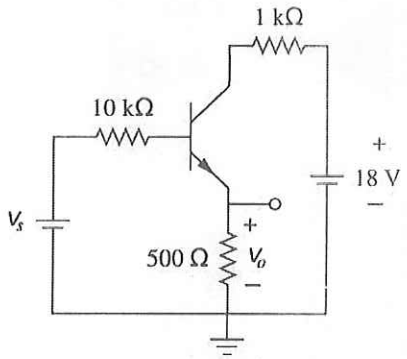


Find the value of v_o

a) not enough information
b) -12 V
c) 14.575 V
d) 12.65 V
e) 15.805 V

B

19. Calculate the value of v_s for the transistor circuit given below when $v_o = 4V, \beta = 150, V_{BE} = 0.7V$



a) 4.23 V b) 5.23 V c) 4.7 V d) 9.23 V e) not enough information

Sketch

20. Sketch the output signal when the input to the following diode circuit is a sinusoidal wave with amplitude of 15 V (assume 0.6 V forward biasing voltage for diodes)