(8/15)

Roll No. ....160100116.....

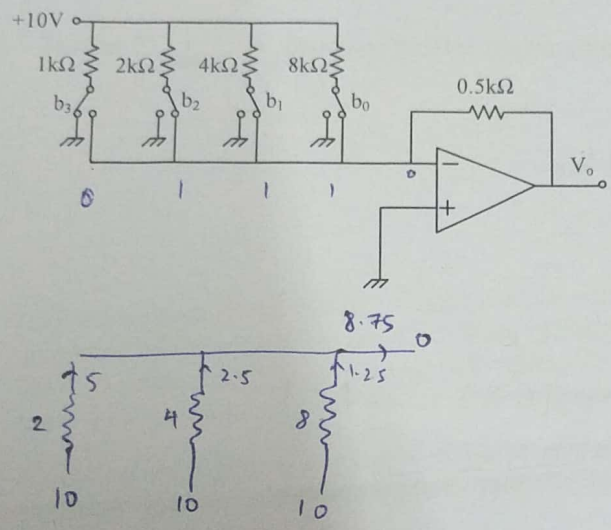
EE-101, S4: Quiz # 2

Date: 6th Nov, 2017
Time: 12:20pm to 12:40pm

Max. Marks: 15

Imp. Notes: (a) Answer only in the space provided next to the question
(b) Please answer all questions

Q1. In the DAC circuit shown below, determine V_o for the given states of the SPDT switches (represented by b_i). What would be V_o if the given binary number is 1101. (4 marks)



(4)

$V_o = -8.75 \times 0.5 = -4.375\ V$

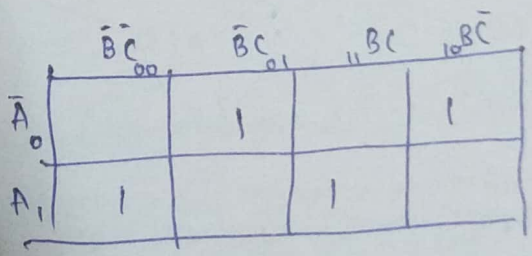
$(1101)_2 = (13)_{10}$

$V_o = \frac{13}{14} \times 4.375 =$

Case II: $i = \frac{13}{7} \times 4.375 =$

Q2. Truth table for a logic function $Y(A, B, C)$ is shown below. Using a K-map obtain an optimum expression for Y for its actual hardware implementation. (4 marks)

A	B	C	Y
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1



$Y(A,B,C) = \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC + \bar{A}B\bar{C}$

(4)

Q3. The operational driving point impedance across a pair of terminals *'a-b'* of an electrical network is given by:

$z_{ab} = \dfrac{2p^2+4p}{4p^2+11p+8}$; If $v_{ab}(t) = 20e^{-0.5t}$, determine the forced current response. (3 marks)

$i = \dfrac{V_{ab}(t)}{z_{ab}} = \dfrac{(4p^2+11p+8)\,V_{ab}}{2p^2+4p}$

$(2p^2+4p)\,i = 4p^2+11p+8$

Forced current response corresponds to $p = 0$

$i = 8/4 = 2A$

Q4. Determine 'V' and 'ϕ' for the following: (4 marks)

$v(t) = \sqrt{2}V \times \cos(\omega t+\phi) = 25\times\sin(\omega t+60^\circ) - 15\times\cos(\omega t+120^\circ) + 30\times\sin(\omega t+240^\circ)\text{V}$

$t = 0$

$25 \sin(60^\circ) - 15\cos 120^\circ + 30\sin 240^\circ$

$= \dfrac{25\sqrt{3}}{2} - 15$

$25\sin(\omega t+60^\circ) = 25\cos(30-\omega t) = 25\cos(\omega t-30^\circ)$

$30\sin(\omega t+240^\circ) = 30\cos(\omega t+150^\circ)$

$25(\cos\omega t)\left(\dfrac{\sqrt{3}}{2}\right) + 25(\sin\omega t)\left(\dfrac{1}{2}\right) - 15(\cos\omega t)\left(-\tfrac{1}{2}\right) + 15(\sin\omega t)\left(\tfrac{\sqrt{3}}{2}\right)$

$+ 30\cos\omega t\left(-\dfrac{\sqrt{3}}{2}\right) - 30\sin\omega t\left(\tfrac{1}{2}\right)$

$= \cos\omega t\left(\dfrac{25\sqrt{3}}{2} + \dfrac{15}{2} - \dfrac{30\sqrt{3}}{2}\right) + \sin\omega t\left(\dfrac{25}{2} + \dfrac{15\sqrt{3}}{2} - \dfrac{30}{2}\right)$

$V = 5.09$