Homework for second order circuit
SEE 1023, 2010/2011 Sem2

HW Question 1 (test #2, 2007/2008, S2)

Question 5.

It is known that the current i(t), in the circuit of Fig. Q2 for t >0 is given by:

$$i(t) = B_1 e^{-112.7t} + B_2 e^{-887.3t} \quad A$$

where B_1 and B_2 are constants

(i) Determine the value of the capacitance C *[4 Marks]*

(ii) If the initial energy stored in the capacitor is 1.25J, determine B_1 and B_2 *[6 Marks]*

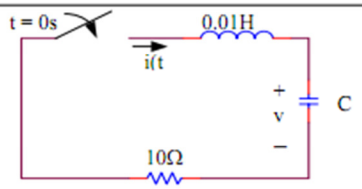


Fig. Q2

HW Question 2 (Past year Test #2)

Q3. The switch in the circuit of Figure Q3 has been in position 'a' for a long time. At t = 0, the switch moves instantaneously to position 'b'.
Suis dalam litar Rajah S3 berada pada kedudukan 'a' dalam masa yang lama. Pada t = 0, suis diubah ke kedudupkan 'b'.

(a) what is the initial values of i and v_C **[3 Marks]**
apakah nilai awal bagi i dan v_C ***[3 Markah]***

(b) what is the initial value of $\frac{di}{dt}$ **[3 Marks]**
apakah nilai awal bagi $\frac{di}{dt}$ ***[3 Markah]***

(c) determine and sketch the type of response of the circuit **[4 Marks]**
tentukan dan lakarkan jenis sambutan litar ***[4 Markah]***

(d) find $v_c(t)$ for $t \geq 0$ in term of A_1 and A_2 [you are not required to find A_1 and A_2] **[3 Marks]**
dapatkan $v_c(t)$ pada $t \geq 0$ dalam sebutan A_1 dan A_2 [anda tidak perlu mandapatkan A_1 dan A_2]. ***[3 Markah]***

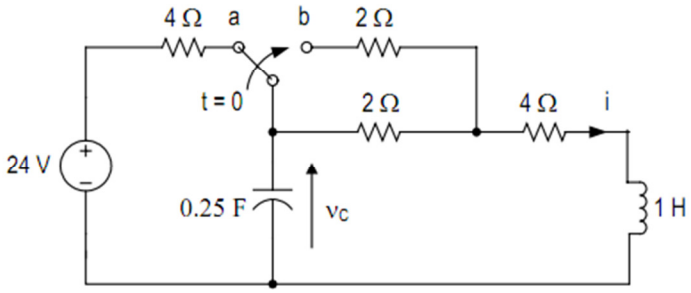


Figure Q3
Rajah S3

HW Question 3 (Past year Test #2)

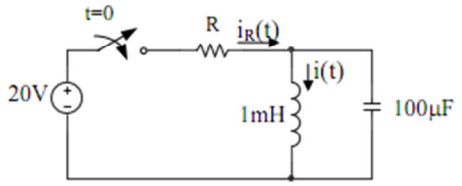
S4) Suis dalam Rajah S4(a) ditutup pada t = 0s. Semasa t = 0˙, tiada tenaga tersimpan pada L dan C. Sambutan untuk i(t) yang diperolehi ditunjukkan dalam Rajah S4(b). Nilai-nilai pemuat, C dan peraruh, L masing–masing ialah 100μF dan 1mH.
The switch in Figure Q4(a) is closed at t = 0s. At t = 0˙, no energy is stored in L and C. Figure Q4(b) shows the response obtained for i(t). The values of C and L are 100μF and 1mH respectively.

(a) Apakah jenis redaman yang ditunjukkan oleh Rajah S4(b)? **[1 Markah]**
What type of damping is shown in Figure Q4(b)? ***[1 Marks]***

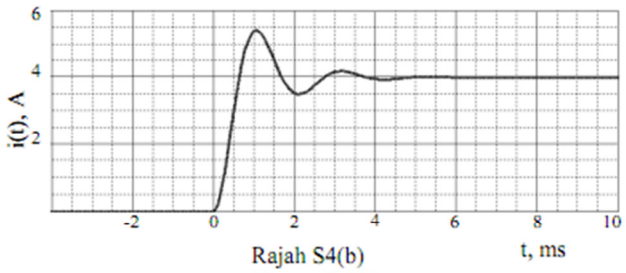
(b) Apakah nilai rintangan R dalam litar pada Rajah S4(a)? **[4 Markah]**
What is the value of R shown in Figure Q4(a)? ***[4 Marks]***

(c) Jika $i(t) = 4 + e^{-1000t}[- 4\cos(3000t) - 1.33\sin(3000t)]$ untuk $t \geq 0$, dapatkan ungkapan $i_R(t)$ untuk $t > 0$ **[10 Markah]**
If $i(t) = 4 + e^{-1000t}[- 4\cos(3000t) - 1.33\sin(3000t)]$ for $t \geq 0$, find the expression of $i_R(t)$ for $t > 0$ ***[10 Marks]***

(d) berapakah nilai L (nilai R dan C adalah sama seperti di atas) untuk menghasilkan sambutan teredam kritikal? **[5 Markah]**
What is the value of L (R and C unchanged) so that the damping becomes critical? ***[5 Marks]***



Rajah S4(a)
Figure Q4(a)



Rajah S4(b)
Figure Q4(b)