**King Saud University**
**College of Engineering**
**Dept. of Electrical Engineering**

**EE-212: *Electric Circuits***
**Final Exam. – 18.07.1432 (*20.06.2011*)**
**Time Allowed: *3 Hours***

**الرقم:** **الاسم:**

**Answer All Questions.**

**Question #1**

The switch in Figure (1) has been closed for a long time. At t=0, it is opened

a) Find $I_L$ for $t < 0$.

b) Just after the switch is opened find, $I_L(0^+)$

c) Find $I_L(\infty)$

d) Derive an expression for $I_L(t)$ for $t > 0$

e) Sketch $I_L(t)$ against time.

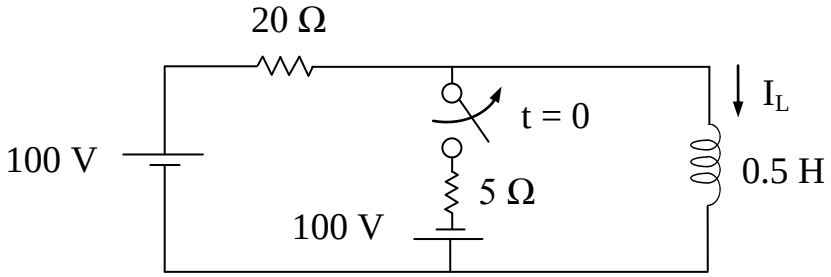


***Fig. (1)***

**Question #2**

In the circuit shown in Figure (2), the switch has been closed for a long time. At t=0 it is opened. Find $V_C(t)$ for $t > 0$.

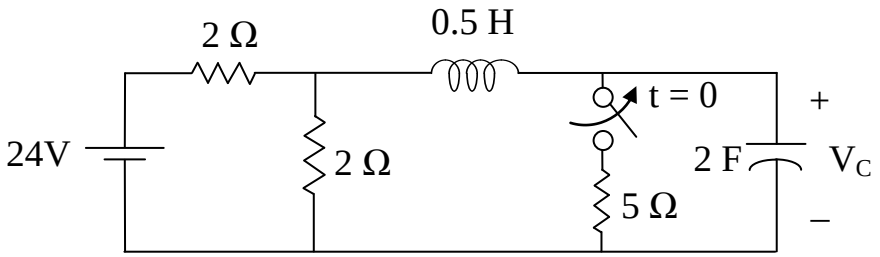


***Fig. (2)***

**Question #3**

A ) For the circuit shown in Figure (3), find the coupling coefficient and V(t).

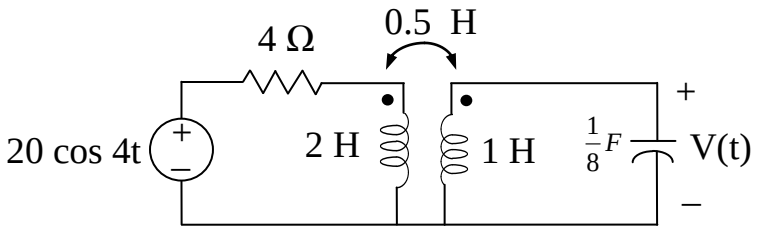


***Fig. (3)***

B) For the following Laplace transform functions $F(s)$ find the corresponding $f(t)$

i) $$F(s) = \frac{s+3}{(s+1)(s+2)}$$

ii) $F(s) = \dfrac{4}{(s+2)(s+1)^2}$

iii) $F(s) = \dfrac{10}{(s+3)(s^2+6s+10)}$

**Question #4**

A) An ideal voltage source $V_S = 100 \cos(\omega t)$ V, where $\omega$ is variable, is applied to a series *RLC* circuit with C = 0.25 μF. At resonance ($\omega = \omega_0$), the circuit current is $I = 1 \cos(\omega_0 t)$ A. When $\omega = 5200$ rad/s, $I = (1/\sqrt{2}) \cos(5200 - 45^o)$ A.

Determine:-

i) R ii) L iii) Resonant frequency $\omega_0$

iv) Bandwidth v) Quality factor

B) Obtain the transfer function $Vo/V_I$ of the circuit in Figure (4). What type of filter is this circuit? Give its cut-off frequency.

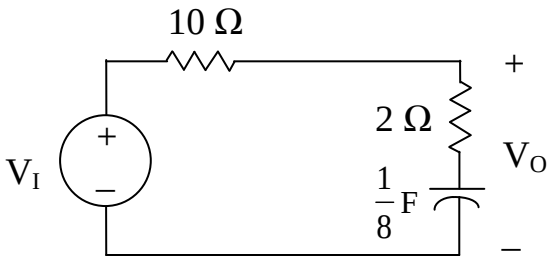


***Fig. (4)***

**Question #5**

A) Obtain the *Z* parameters for the network shown in Figure (4).

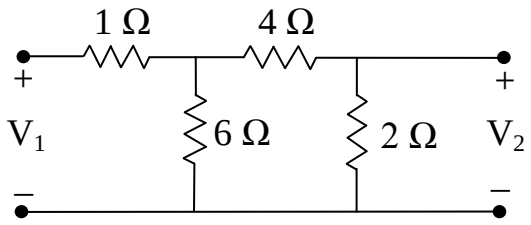


***Fig. (5)***

B) A two port circuit has the following y parameters

$y_{11} = 0.5$ S $\quad y_{12} = y_{21} = -0.4$ S $\quad y_{22} = 0.6$ S

If a 2-Ω load resistance is connected to port 2, determine the ratio $V_2/V_1$ and $I_2/I_1$.

C) On the attached graph paper, construct the Bode magnitude plot for

$$H(s) = \frac{40(s+1)}{(s+20)(s+100)}$$