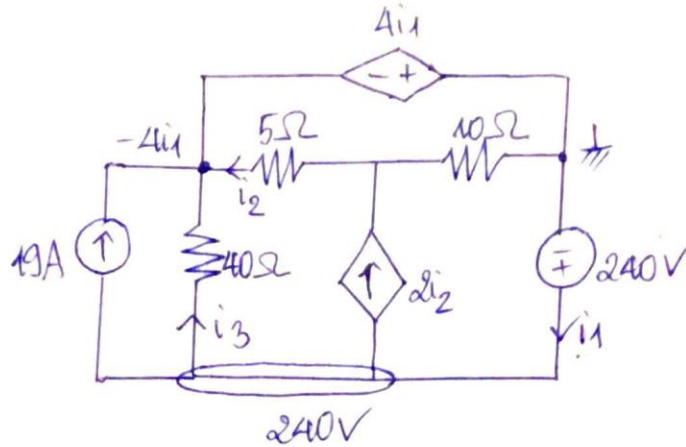


DÁP AN MÔN MẠCH ĐIỆN

Thứ ngày 3/1/2018

Câu 1: (2đ)

$$0,5đ \left\{ \begin{aligned} U_a \left(\frac{1}{10} + \frac{1}{5} \right) + \frac{4i_1}{5} &= 2i_2 \\ i_2 &= \frac{U_a + 4i_1}{5} \\ i_1 - 2i_2 - i_3 - 19 &= 0 \\ i_3 &= \frac{240 + 4i_1}{40} \end{aligned} \right.$$



$$0,5đ \left\{ \begin{aligned} U_a &= -80V \\ i_1 &= 10A \\ i_2 &= -8A \end{aligned} \right.$$

$$0,25đ P_{\text{tải}} = 5i_2^2 + \frac{U_a^2}{10} + \frac{(240 + 4i_1)^2}{40} = 2920W$$

$$0,25đ \left\{ \begin{aligned} P_{240V} &= 2400W \\ P_{2i_2A} &= 5120W \end{aligned} \right.$$

$$0,5đ \left\{ \begin{aligned} P_{19A} &= -5320W \\ P_{4i_1} &= 720W \end{aligned} \right.$$

$$\sum P_{ng} = 2920 = \sum P_{\text{tải}} \Rightarrow \text{cbes}$$

Câu 2: (2đ)

$$\text{Hở mạch: } 15 \angle 0^\circ - I_0 - 0,5I_0 = 0 \Rightarrow I_0 = 10 \angle 0^\circ (A) \quad 0,25đ$$

$$U_{ab} = I_0(2+4j) - 0,5I_0(4+3j) = 55 \angle 90^\circ (V) \quad 0,25đ$$

Ngắn mạch:

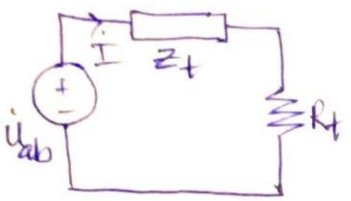
$$I_1 = 15 \angle 0^\circ \cdot \frac{2-4j}{6-j} = 11,02 \angle -54^\circ (A) \quad 0,25đ$$

$$I_0 = 12,33 \angle 46^\circ (A)$$

$$\Rightarrow I_{ng} = 13,53 \angle -80^\circ (A) \quad 0,25đ$$

$$Z_{\text{tđ}} = \frac{U_{ab}}{I_{ng}} = 4,01 - 0,63j = 4,07 \angle -9^\circ (\Omega) \quad 0,25đ$$

Mach thevenin

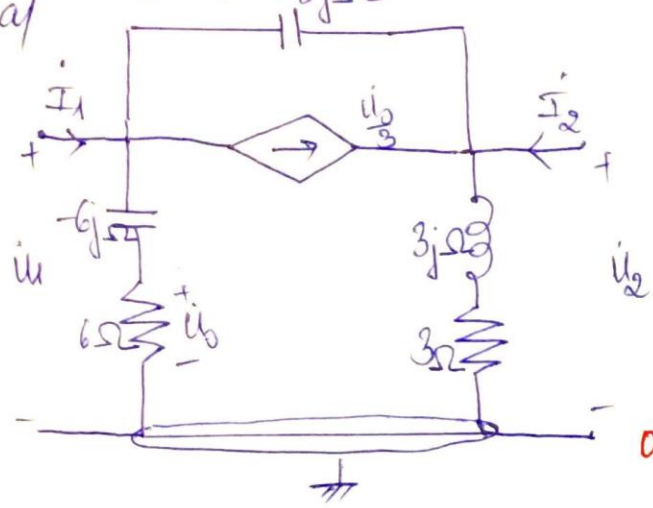


Điều kiện để P_{max} : $R_t = |Z_{td}| = 4,07 \Omega$ 0,25đ

$I = \frac{u_{ab}}{Z_t + R_t} = 6,78 \angle -86^\circ A$ 0,25đ

$P_{max} = \frac{1}{2} R_t \cdot I^2 = 94W$ 0,25đ

Câu 3: (2đ)



0,25đ
$$\begin{cases} u_1 \left(\frac{4}{6-6j} + \frac{1}{-3j} \right) - u_2 \cdot \frac{1}{-3j} = I_1 - \frac{u_0}{3} \\ u_2 \left(\frac{1}{-3j} + \frac{1}{3+3j} \right) - u_1 \cdot \frac{1}{-3j} = I_2 + \frac{u_0}{3} \\ u_0 = \frac{u_1}{6-6j} \cdot 6 = \frac{u_0}{1-j} \end{cases}$$

0,25đ
$$\begin{cases} Y_{11} = \frac{1}{4} + \frac{7}{12j} (S) & Y_{21} = -\frac{1}{6} - \frac{1}{2j} (S) \\ Y_{12} = \frac{1}{3j} (S) & Y_{22} = \frac{1}{6} + \frac{1}{6j} (S) \end{cases}$$

b/
$$u_a \left(\frac{1}{-3j} + \frac{1}{3+3j} + \frac{1}{-6j} \right) - \frac{5 \angle -45^\circ}{-3j} = \frac{u_0}{3}$$
 0,25đ

$$I = \frac{5 \angle -45^\circ}{6-6j} = 0,59 A$$
 0,25đ

$$u_0 = \frac{5\sqrt{2}}{2} V$$
 0,25đ

$$\Rightarrow u_a = 5\sqrt{2} \angle -37^\circ V$$
 0,25đ

$$P_{6\Omega} = \frac{6 \cdot 0,59^2}{2} = 1,04W$$
 } 0,25đ

$$I_1 = \frac{u_a}{3+3j} = 1,67 \angle -82^\circ A$$

$$P_{3\Omega} = \frac{1,67^2 \cdot 3}{2} = 4,18W$$
 } 0,25đ

$$P_{tm} = 5,22W$$

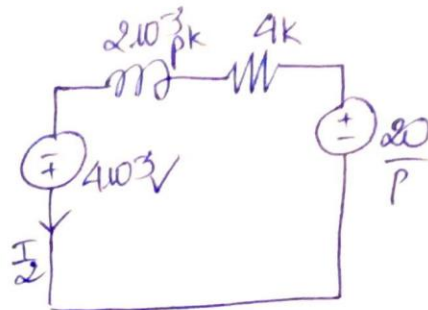
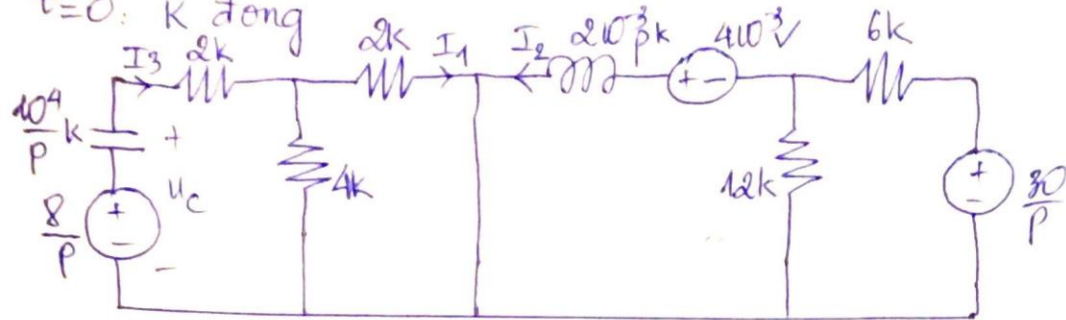
Câu 4 (2đ)

ĐKBD: K mở

$i_L(-0) = 2\text{mA}$ 0,25đ

$u_C(-0) = 8\text{V}$ 0,25đ

t=0: K đóng



$$I_1 = \frac{A}{4+2} \cdot \frac{8/P}{\frac{10^7}{P} + 2000 + \frac{4000}{3}} = \frac{16}{P+3000} \text{ (mA)} \quad 0,25đ$$

$$\Rightarrow \dot{i}(t) = 16e^{-3000t} \text{ (mA)} \quad 0,25đ$$

$$I_2 = \frac{20/P + 4 \cdot 10^{-3}}{2P + 4000} = \frac{5}{P} - \frac{3}{P+2000} \text{ (mA)} \quad 0,25đ$$

$$\Rightarrow \dot{i}_2(t) = 5 - 3e^{-2000t} \text{ (mA)} \quad 0,25đ$$

$$i(t) = \dot{i}(t) + \dot{i}_2(t) = 16e^{-3000t} + 5 - 3e^{-2000t} \text{ (mA)}$$

$$I_3 = \frac{8/P}{\frac{10^7}{P} + 2000 + \frac{4000}{3}} = \frac{24}{P+3000} \text{ (mA)} \quad 0,25đ$$

$$u_C = -I_3 \cdot \frac{10^7}{P} + \frac{8}{P} = \frac{8}{P+3000} \Rightarrow u_C(t) = 8e^{-3000t} \text{ (V)} \quad 0,25đ$$

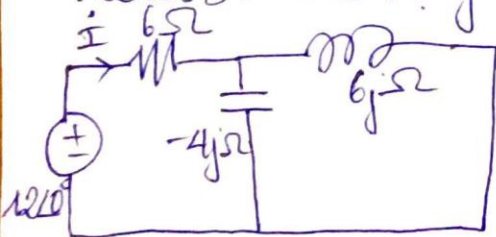
Câu 5 (2đ)

* Nguồn 10V tác động

$u_{e0} = 10\text{V}$ 0,25đ

$P_0 = 16,67\text{W}$ 0,25đ

* $12 \cos 3t$ tác động



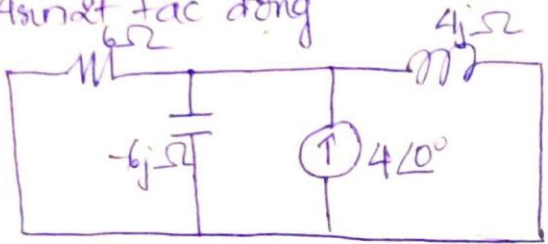
$$Z_{td} = 13,4 \angle -63^\circ \Omega$$

$$\dot{i} = 0,9 \angle 63^\circ \text{ A}$$

$$\dot{u} = 10,73 \angle -26,56^\circ \text{ V} \quad 0,25đ$$

$$P_1 = 2,43\text{W} \quad 0,25đ$$

* $4\sin \omega t$ + ac' dòng



$i_2 = 21,46 \angle 26,56^\circ \text{ V}$ 0,25đ

$P_2 = 38,38 \text{ W}$ 0,25đ

$u_2(t) = 10 + 10,73 \cos(3t - 26,56^\circ) + 21,46 \sin(2t + 26,56^\circ) \text{ V}$ 0,25đ

$P_{\text{tổng}} = 57,48 \text{ W}$

$u = \sqrt{10^2 + \frac{10,73^2}{2} + \frac{21,46^2}{2}} = 19,69 \text{ W}$ 0,25đ