Université Mohamed-BOUDIAF M'sila
Faculté de Technologie
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Année d'étude : 2ème année Socle Commun

Examen

Questions de cours (2pts)

On considère la caractéristique I = f (U_d) d'une diode à jonction **Figure. 1.**

1- Déterminer la tension de seuil de cette diode.

2-Soit M le point de fonctionnement appartenant à la courbe tel que I_M=100mA. Trouver graphiquement la résistance dynamique de la diode en ce point.

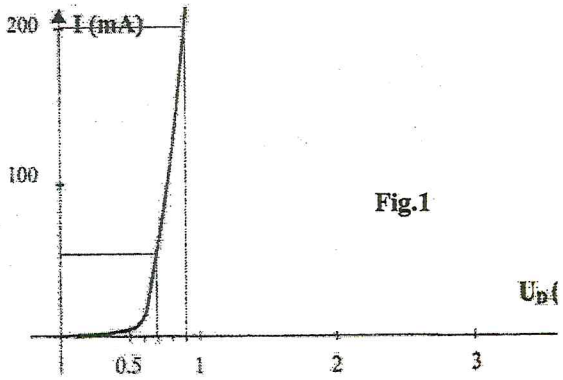


Fig.1

Exercice 1(2pts)

Pour le circuit de la **Figure.2** Trouver les valeurs correspondantes de R_1 pour satisfaire chacune des conditions suivantes :

a- v = 3V; b- v = 0V; c- i = 3A; d- La puissance dissipée dans R_1 est de 12W.

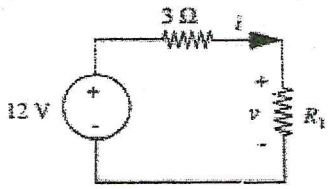


Fig.2

Exercice 2 (6pts)

1. Réduire le circuit de la **Fig. 3** à un dipôle équivalent comprenant une source de tension V_{eq} en série avec une résistance R_{eq} entre les deux points 1et 1'.
2. Si on connecte à l'accès 11' une résistance de charge R_L = 10 Ω, calculer la puissance absorbée par R_L.

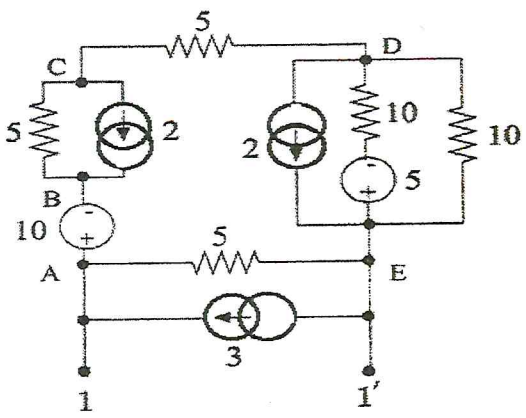


Fig.3

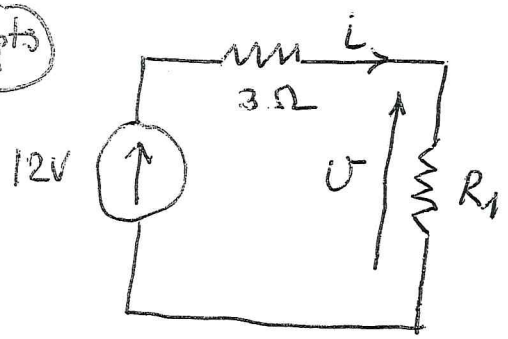
Corrigé Type

Q de cours : (2pts)

1 - $U_S = 0{,}6\,V$ (1)

2 - $r = \frac{\Delta U}{\Delta I} = \frac{0{,}9 - 0{,}7}{150 - 50} \cdot 10^3 = 1{,}4\,\Omega$ (1)

Ex1 : (2pts)



a - $U = 3V$ $\quad R_1 = ?$

$U = \frac{R_1}{R_1 + 3} \cdot 12 \Rightarrow$ puisque $U = 3V$ donc (0,25)

$3 = \frac{12 R_1}{R_1 + 3} \Rightarrow 3R_1 + 9 = 12R_1 \Rightarrow 9R_1 = 9$

$\boxed{R_1 = 1\,\Omega}$ (0,25)

b - $U = 0 \Rightarrow \boxed{R_1 = 0}$ (0,5)

c - $i = 3A$

$i = \frac{12}{R_1 + 3}$ (0,25) $\Rightarrow 3 = \frac{12}{R_1 + 3} \Rightarrow 3R_1 + 9 = 12$

$3R_1 = 3 \Rightarrow \boxed{R_1 = 1\,\Omega}$ (0,25)

d - la puissance dissipée dans $R_1 = 12\,\omega$

$P = Ui = R_1 i^2 = R_1 \left(\frac{12}{R_1 + 3}\right)^2$ (0,25)

$12 = \frac{144 R_1}{(R_1 + 3)^2}$

$12(R_1^2 + 6R_1 + 9) = 144 R_1$

$12R_1^2 + 72R_1 + 108 - 144R_1 = 0$

$12R_1^2 - 72R_1 + 108 = 0$

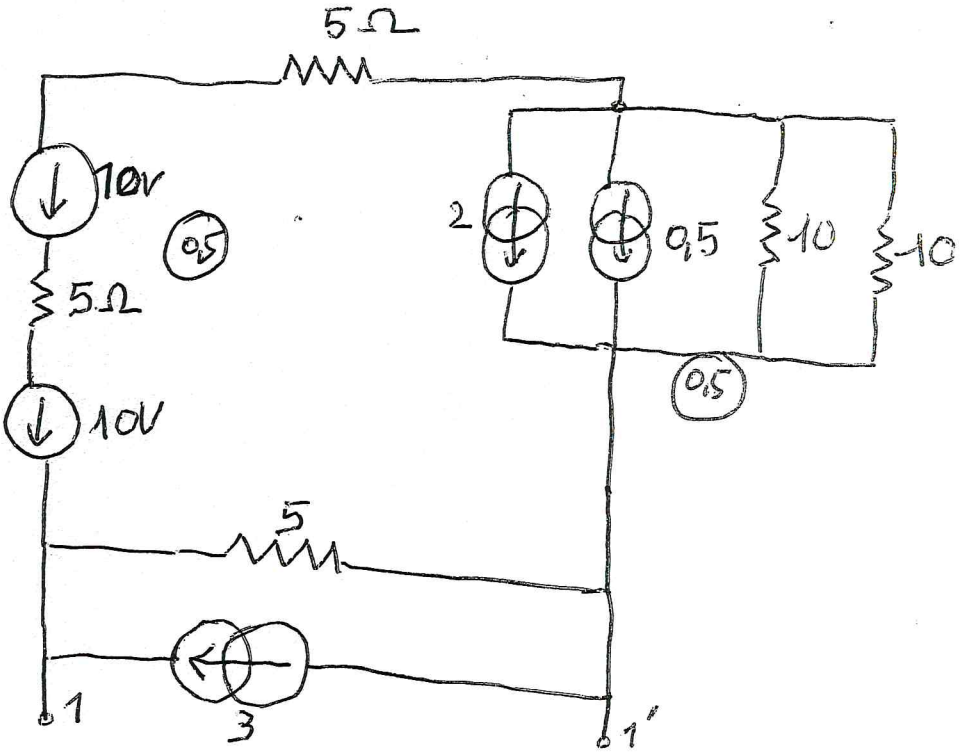
$6R_1^2 - 36R_1 + 54 = 0$

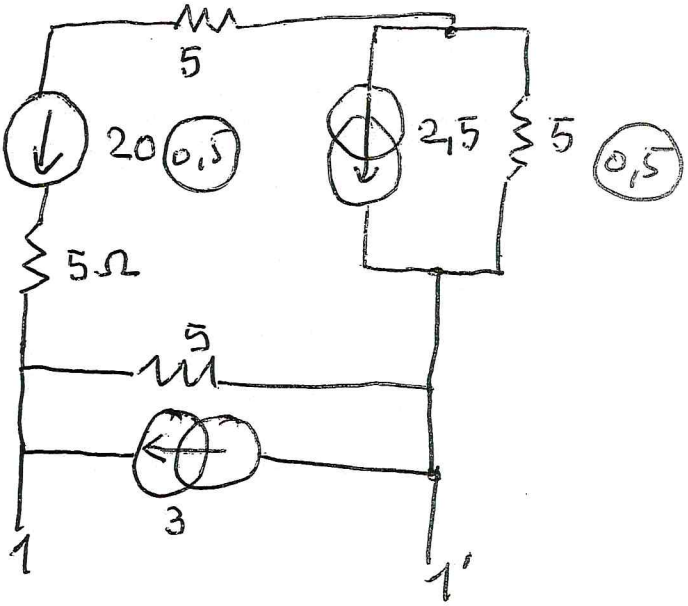
$R_1^2 - 6R_1 + 9 = 0$

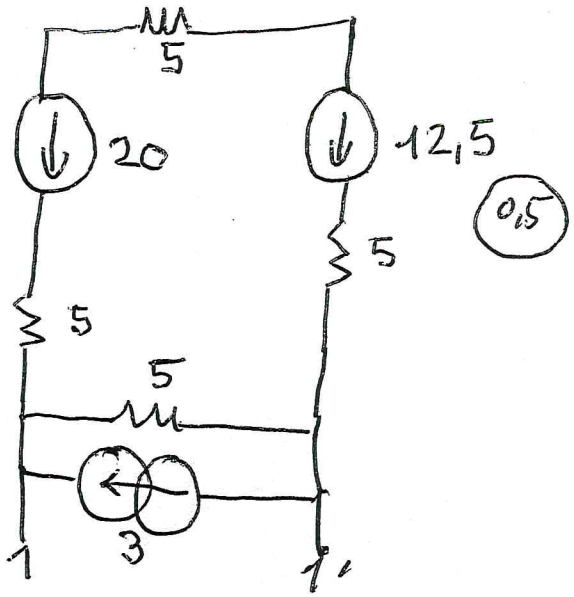
$\Delta = 36 - 36$

$(R_1 - 3)^2 = 0 \Rightarrow \boxed{R_1 = 3\Omega}$ (0,25)

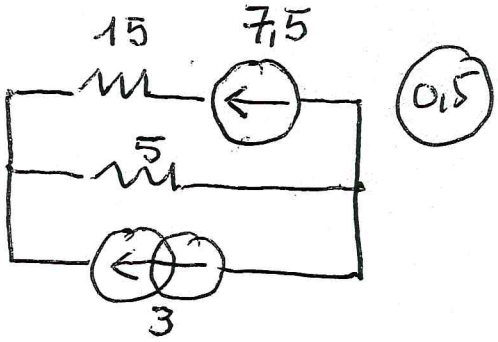
EX2 : (6pts)



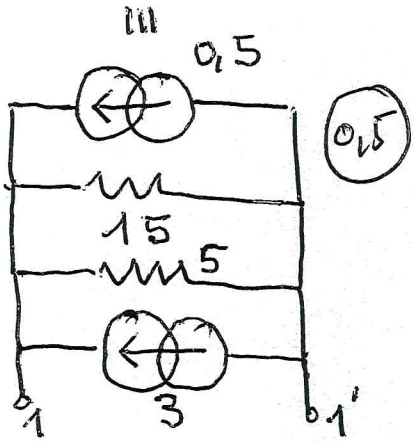




0,5



0,5



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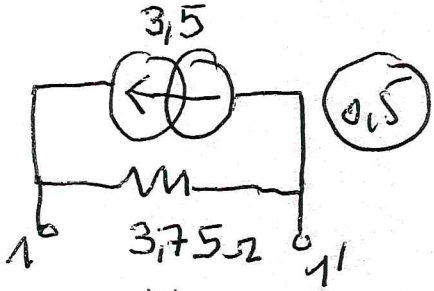

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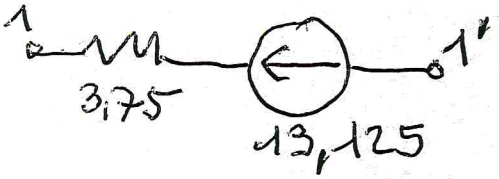
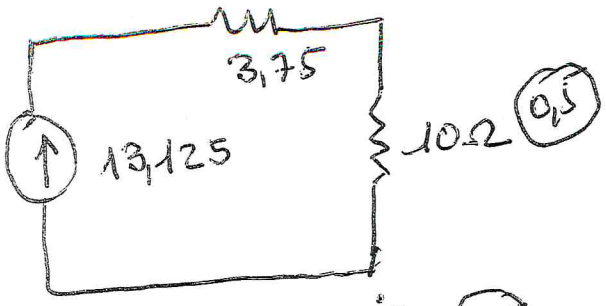


$V_{eq} = 13,125$

$R_{eq} = 3,75$



(0,5)

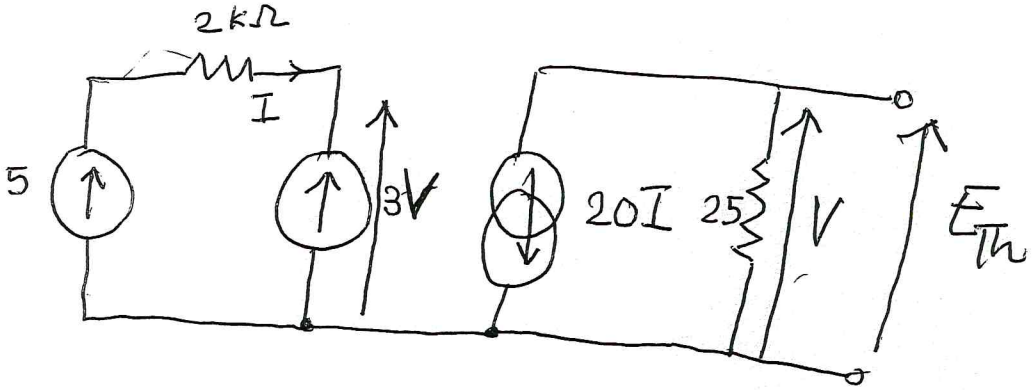
$P = R\, i^2$ (0,5)

$i = \frac{13,125}{3,75 + 10} = \frac{13,125}{13,75} = 0,95$ (0,5)

$P = 10 \cdot (0,95)^2 = 9W$ (0,5)

Ex 3

1- calcul de E_{Th}



$E_{Th} = V$ (0,5)

$V = -25 \times 20 . I = -500 . I$ ..... (1) (0,5)

$5 = 2000 . I + 3V$ ..... (2) (0,5)

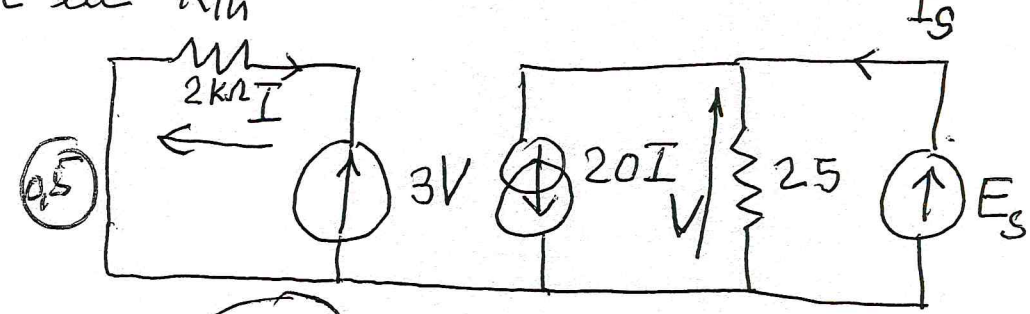
on injecte (1) dans (2)

$5 = \frac{-2000 . V}{500} + 3V$

$5 = -4V + 3V \Rightarrow \boxed{E_{Th} = -5 \text{ volts}}$ (0,5)

2- Calcul de R_{Th}

$R_{Th} = \frac{E_s}{I_s}$



(0,5)

$$I_S = 20.I + \frac{V}{25} \quad \text{---} \quad (1) \quad (0,5)$$

$$3V = -2000.I \quad \text{---} \quad (2) \quad (0,5)$$

$$V = E_S \quad \text{---} \quad (3) \quad (0,5)$$

on injecte (3), (2) dans (1)

$$I_S = \frac{-20.3E_S}{2000} + \frac{E_S}{25} \quad (0,5)$$

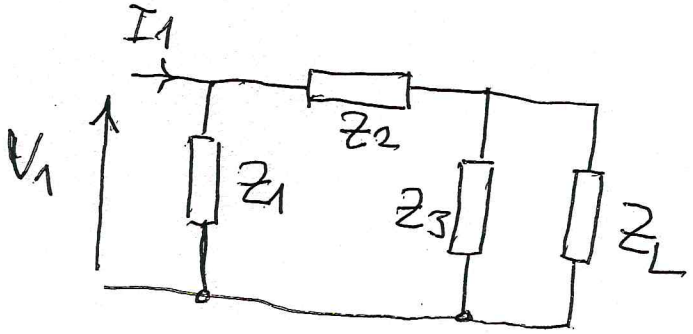
$$I_S = \left(\frac{-60}{2000} + \frac{1}{25}\right) E_S$$

$$I_S = \left(-\frac{3}{100} + \frac{4}{100}\right) E_S \Rightarrow I_S = \frac{E_S}{100}$$

$$R_{Th} = \frac{E_S}{I_S} \Rightarrow \boxed{R_{Th} = 100\,\Omega} \quad (0,5)$$

EX 4

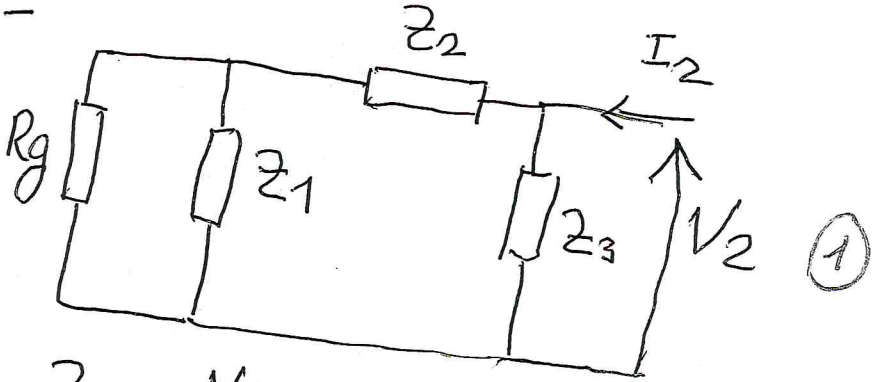
1 –



(0,5)

$$Z_e = \frac{V_1}{I_1} = Z_1 // (Z_2 + Z_3 // Z_L) \quad (2)$$

2 –



(1)

$$Z_S = \frac{V_2}{I_2} = Z_3 // (Z_2 + Z_1 // R_g) \quad (1,5)$$