Exercice8

$P = 105\,W$ $\quad I_{rad} = 1000\,W.m^{-2}$

$U = 35V$ $\quad U_{cel} = 0{,}5V$ et $I_{cel} = 0{,}5A$

1°/ Pour avoir 35V il faut que

$N_{cel} \times 0{,}5V = 35V \Rightarrow N_{cel} = \frac{35}{0{,}5}$

$N_{cel} = 70$ cellules

2°/ $I = \frac{P}{U} = \frac{105}{35} = 3A$

N.branches?

Chaque branche délivre 0,5A pour avoir 3A il faut donc 6 branches ($6 \times 0{,}5A = 3A$)

3°/ Nombre total de cellules :

$N_c = N_{branches} \times N_{cellules/branche}$

$N_c = 6 \times 70 = 420$ cellules.

4°/ a) $S_c = 5 \times 5 = 25\,cm^2 = 25.10^{-4}\,m^2$

b) rendement

Surface totale du panneau solaire

$S = S_c \times 420 = 25.10^{-4} \times 420$

$S = 1{,}05\,m^2$

donc la puissance captée $P = S \times I_r$

$P = 1{,}05 \times 1000 = 1050\,W$ et $\eta = \frac{P_M}{P} = \frac{105}{1050} = 10\%$

Exercice 2

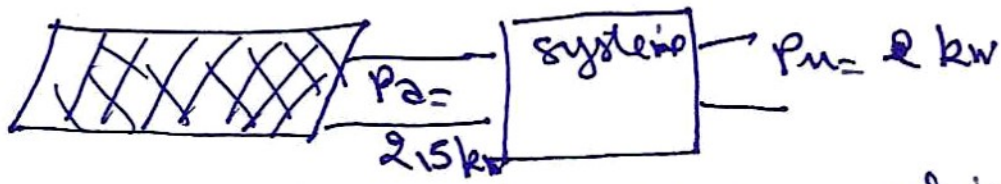
$P_u = 2\,kW$ $\quad I_r = 1250\,W.m^{-2}$

Panneau : $1200mm \times 417mm$

a) $S_1 = L \times l = 1,2 \times 0,417 = 0,50\,m^2$

b) $P_a = \frac{P_u}{\eta} = \frac{2}{0,8} = 2,5\,kW$

c)



la puissance captée par les panneaux solaires

$$P_{cap} = \frac{P_a}{\eta} = \frac{2,5}{0,2} = 12,5\,kW$$

d) l'irradience est de $1250\,W.m^{-2}$

Pour capter $12,5\,kW = 12500\,W$ il faut installer $10\,m^2$ de panneaux solaires

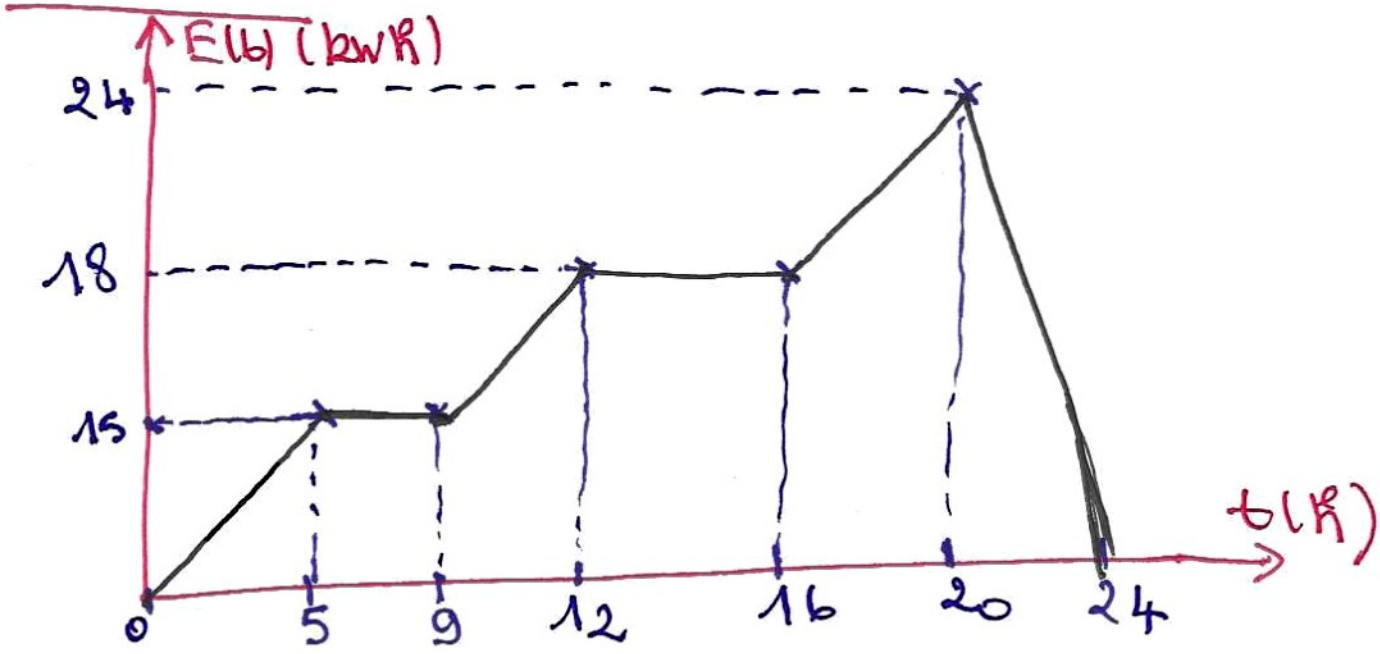
$$S = \frac{P_{cap}}{I_r} = \frac{12500}{1250} = 10\,m^2$$

e) Un panneau solaire a une surface de $0,5\,m^2$

$$N = \frac{S}{S_1} = \frac{10}{0,5} = 20$$

il faut 20 panneaux solaires.

Exercice3



1/ $P(b) = \frac{dE(b)}{dt}$

on calcule la pente des courbe sur 6 intervalles

$0 < t < 5h$ $\quad a_1 = \frac{\Delta E}{\Delta t} = \frac{15-0}{5-0} = \frac{15}{5} = 3kW$

$5 < t < 9h$ $\quad a_1 = \frac{\Delta E}{\Delta t} = 0$

$9 < t < 12h$ $\quad a_2 = \frac{\Delta E}{\Delta t} = \frac{18-15}{12-9} = \frac{3}{3} = 1kW$

$12 < t < 16h$ $\quad a_3 = \frac{\Delta E}{\Delta t} = 0$

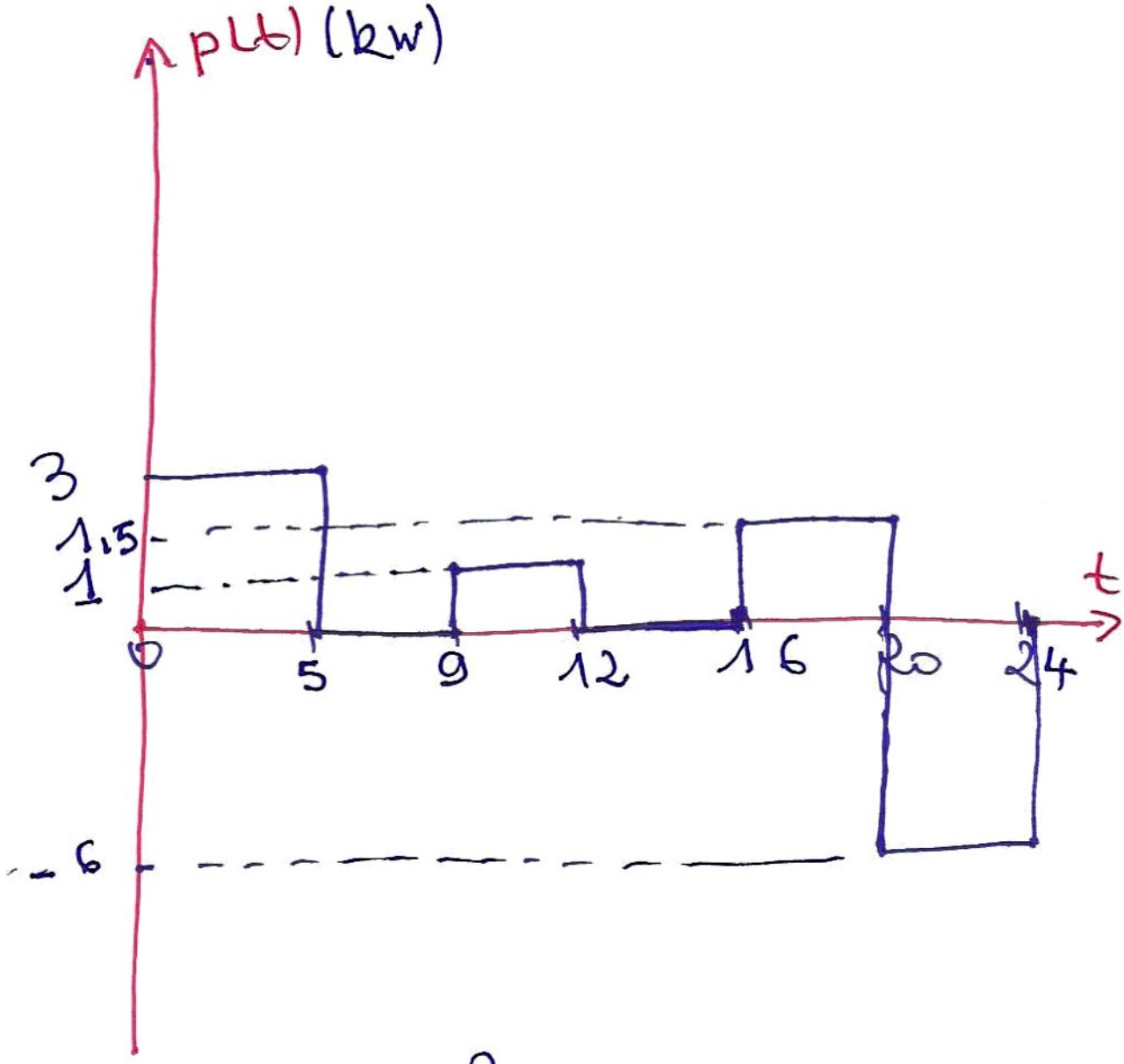
$16 < t < 20h$ $\quad a_4 = \frac{\Delta E}{\Delta t} = \frac{24-18}{20-16}$

$a_4 = \frac{6}{4} = 1,5kW = 1,5kW$

$20h < t < 24h$ $\quad a_5 = \frac{\Delta E}{\Delta t} = \frac{24-24}{24-20}$

$a_5 = \frac{-24}{4} = -6kW$

donc on a la courbe de p(t) suivante



2o/ P moyenne?

$$P = \frac{A}{T} = \frac{A_1 + A_2 + A_3 + A_4}{T}$$

$A_1 = 3 \times 5 = 15\ kwh$; $A_2 = 1 \times 3 = 3\ kwh$

$A_3 = 1,5 \times 4 = 6\ kwh$, $A_4 = -6 \times 4 = -24\ kwh$

$$P = \frac{15 + 3 + 6 - 24}{24} = 0\ kw$$

$$\boxed{P_{moy} = 0\ kw}$$