3- CINEMATIQUE 8 pts

3.1- *Réglage de l'écartement avant des bras secoueurs :*

3.1.1- (0,5pt) $TF_{47/Chassis}$ et $TH_{47/Chassis}$ sont des arcs cercle de centre G et de rayon respectifs GF et GH

3.1.3- (0,5pt) $HH_0 = 30\ mm$ $35mm \longrightarrow 100\ mm$ $V_R = \frac{30 \times 100}{35}$

$30mm \longrightarrow V_R$

3.1.4- (0,5pt) $1tr \longrightarrow 3mm$ $\boxed{V_R = 85,71\ mm}$

$n\ ? \longrightarrow 85,71\ mm$ $n = \frac{1 \times 85,71}{3} = 28,57\ trs$ $\boxed{n = 28,57\ trs}$

3.2- **Détermination de l'amplitude du mouvement des bras secoueurs :**

3.2.1 $\boxed{AE_{max} = AB + BE}$ et $\boxed{AE_{min} = BE - AB}$

AN : $AE_{max} = 19,5 + 266 = 285,5\ mm$

(1pt) $AE_{min} = 266 - 19,5 = 246,5\ mm$

$\boxed{AE_{max} = 285,5\ mm}$ $\boxed{AE_{min} = 246,5\ mm}$

3.2.2 mesure = 42 mm $35mm \longrightarrow 100mm$

(1pt) $42\ mm \longrightarrow A$ $A = \frac{42 \times 100}{35} = 120\ mm$

$\boxed{A = 120\ mm}$

3.3- **Evaluation de la vitesse d'impact d'un bras secoueur sur un piquet :**

3.3.1 $\omega_{5/0} = \frac{\pi N_{5/0}}{30} = \frac{\pi \times 560}{30} = \boxed{58,64\ rad/s = \omega_{5/0}}$

(1pt) $V_{Be5/0} = AB \times \omega_{5/0} = 0,04575 \times 58,64 = 2,68\ m/s$

$\boxed{V_{Be5/0} = 2,68\ m/s}$

3.3.2 $\vec{Bh} = \vec{Eh'}$

(0,5pt)

3.3.3- projection de la ⊥ à $\vec{V_{B5/0}}$ sur (BE) = Bh

la ⊥ à (BE) passant par h' avec Bh = Eh'

(1pt) coupe la direction $\Delta\ \vec{V_{E\,Bielle/0}}$ donne $\vec{V_{E\,Bielle/0}}$

$V_{E\,Bielle/0} = 2,64\ m/s$

3.3.4- Methode : CIR (centre de rotation D)

$5m/s \longrightarrow 70mm$

$V_C\ ? \longrightarrow 96\ mm$ $V_{Ce41/0} = \frac{5 \times 96}{70} = 6,85\ m/s$

(1 pt) $\boxed{V_{Ce41/0} = 6,85\ m/s > 4\ m/s}$

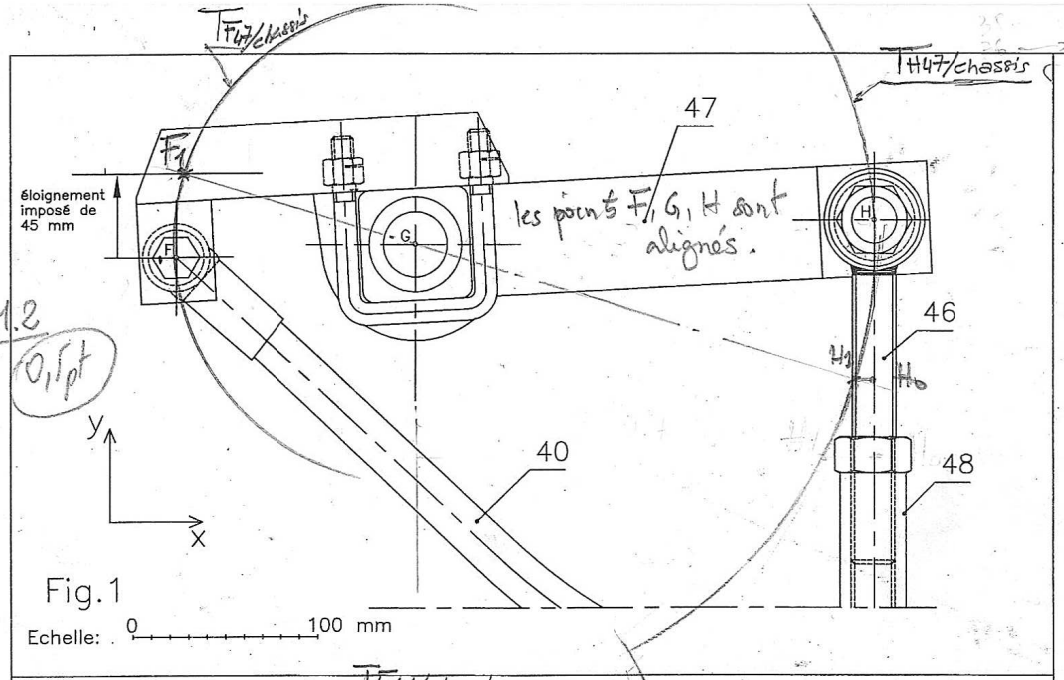

Fig.1

Echelle: 0 100 mm

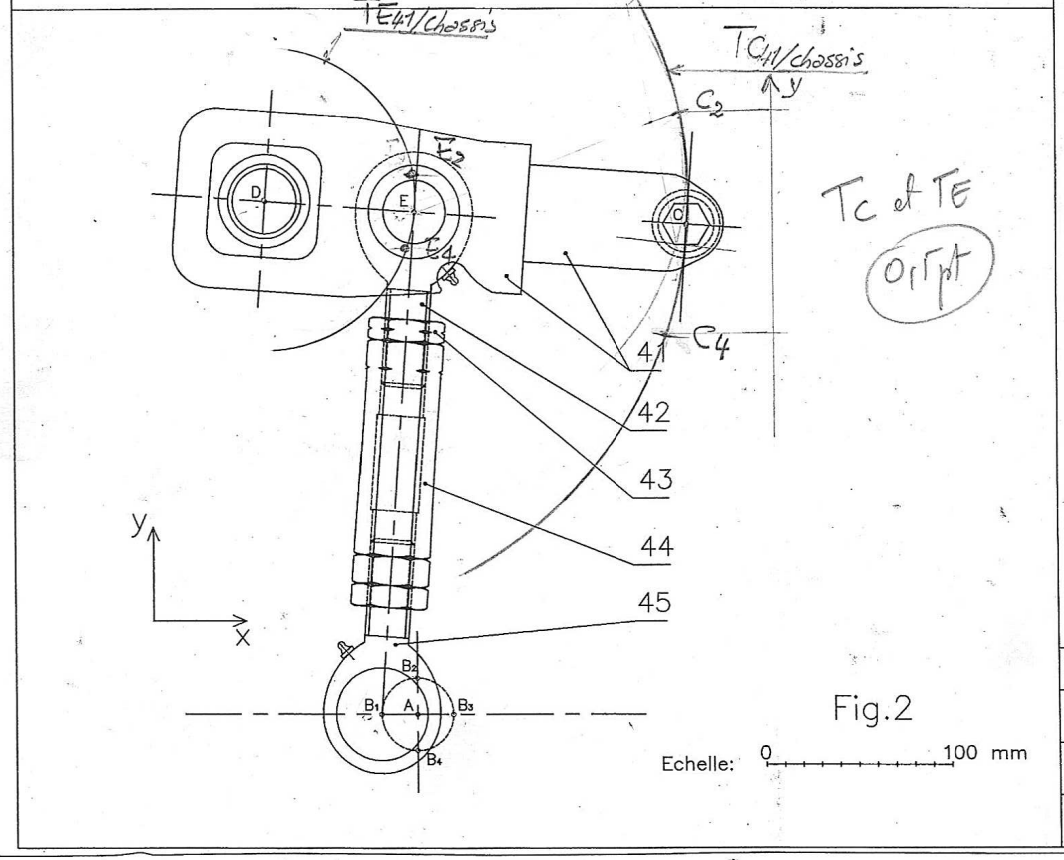

Fig.2

Echelle: 0 100 mm

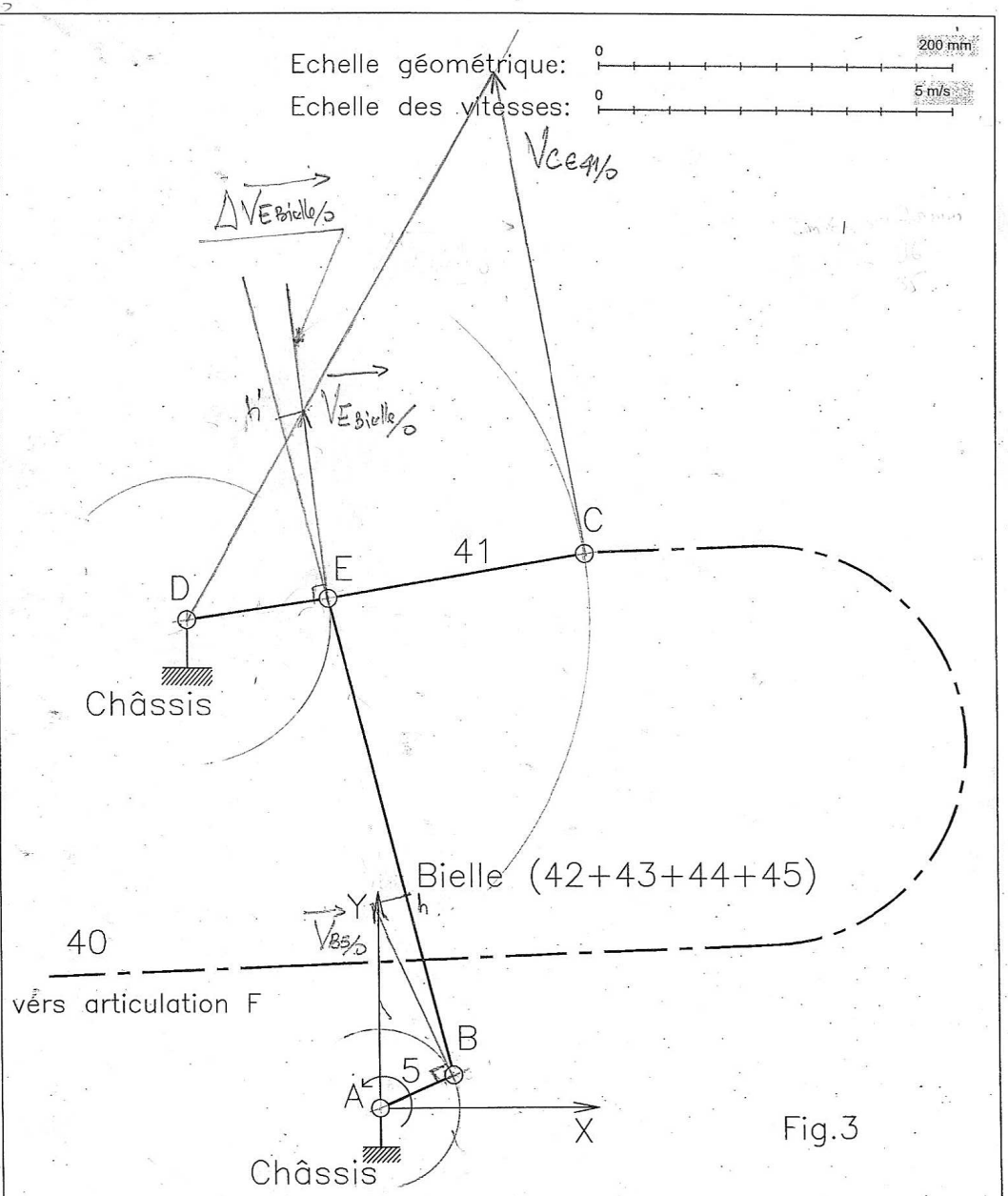

Fig.3

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Durée : 4 h	Epreuve : MECANIQUE	Série T1 –
Coef : 4		1er Groupe
Feuille 6/8	Echelle :	Code: 15 T 09 A 01

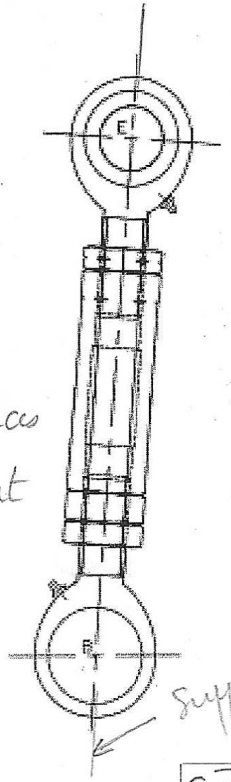
4.1
Isolement de la bielle :

Résolution graphique

4- STATIQUE 6pt

Bilan

Action	PA	DIR	SENS	Norme
$\vec{E}_{41/42}$	E	?	?	?
$\vec{B}_{5/45}$	B	?	?	?



1pt

2pts

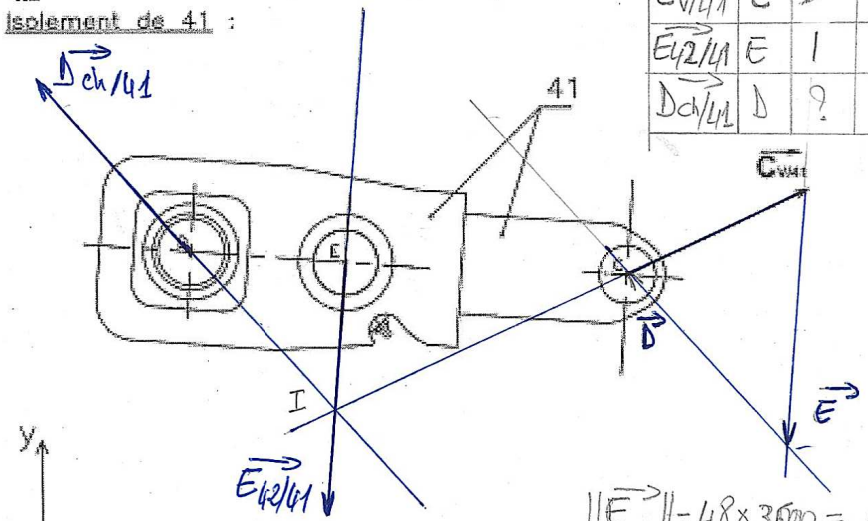
PFS :

système soumis à 2 forces donc les 2 forces doivent etre égales et direct opposées d'où :
Meme support (EB) même norme et sens opposé

Support des forces $\vec{E}$ et $\vec{B}$

4.2
Isolement de 41 :

$\vec{C}_{V/41}$	C	↗	↗	3500N
$\vec{E}_{42/41}$	E	?	?	?
$\vec{D}_{ch/41}$	D	?	?	?



2pts

Ech : 37mm → 3500N

$\|\vec{E}_{42/41}\| = \frac{48}{37} \times 3500 = \underline{4540,54N}$

$\|\vec{D}_{ch/41}\| = \frac{44}{37} \times 3500 = \underline{4162,16N}$

Résolution analytique

4.3- PFS :

(1) $\{\mathcal{E}_{bielle/5}\}_A + \{\mathcal{E}_{ch/5}\}_A + \{\mathcal{E}_{mot/5}\}_A = \{0\}$

$\{\mathcal{E}_{bielle/5}\}_A = \{\mathcal{E}_{bielle/5}\}_B + \vec{AB} \wedge \vec{R}_{bielle/5}$

$\| = \| + \begin{vmatrix} -19,5 \\ 0 \\ 0 \end{vmatrix} \wedge \begin{vmatrix} 320 \\ 4620 \\ 0 \end{vmatrix} = \begin{Bmatrix} +320 & 0 \\ +4620 & 0 \\ 0 & -90090 \end{Bmatrix}$

(1) ⇒
$320 + X + 0 = 0$
$4620 + Y + 0 = 0$
$0 + Z + 0 = 0$
$0 + L + 0 = 0$
$0 + M + 0 = 0$
$-90090 + 0 + C_m = 0$

⇒
$X = -320$
$Y = -4620$
$Z = 0$
$L = 0$
$M = 0$
$C_m = 90090$

$\{\mathcal{E}_{ch/5}\}_A = \begin{Bmatrix} -320 & 0 \\ -4620 & 0 \\ 0 & 0 \end{Bmatrix}$

$\{\mathcal{E}_{m/5}\}_A = \begin{Bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 90 \end{Bmatrix}$ Nm

4.4-

$P_{Maxi} = 2\, C_m \times \omega_{5/0}$ or $\omega_{5/0} = \frac{\pi N_{5/0}}{30}$

$P_{Maxi} = \frac{2 C_m \times \pi N_{5/0}}{30} = \frac{2 \times 90090 \cdot 10^{-3} \times \pi \times 560}{30}$

$P_{Maxi} = 10.566$ Watt ⇒ $\underline{P_{Maxi} = 10,56 \text{ KWatt}}$

1pt

7636 00

5-Résistance des matériaux

6pts

5.1. Etude théorique simplifiée de la sollicitation de l'arbre moteur (5) :

5.1.1

$\vec{O}_{34/10} + \vec{Q}_{34/10} + \vec{R}_{34/10} = \vec{0}$

$O_{34/10} - Q_{34/10} - R_{34/10} = 0$

$O_{34/10} = Q_{34/10} + R_{34/10} = 2 \times 4600$

$O_{34/10} = 9200\,N$

(1,5pt)

$M_O + M_O(\vec{Q}_{34/10}) + M_O(\vec{R}_{34/10}) + M_O(\vec{O}_{34/10}) = 0$

$M_O - 30Q - 83R + 0 = 0$

$M_O = 30Q + 83R$

$M_O = 4600(30+83) = 519.800\,N.mm$

$M_O = 519.800\,N.mm$

(1pt)

5.1.2

Entre [O, Q]

$\vec{T_y} + \vec{O}_{34/10} = \vec{0}$

$T_y + O_{34/10} = 0$

$T_y = -O_{34/10} = -9200\,N$

Entre [Q, R]

$T_y = -O_{34/10} + Q_{34/10}$

$T_y = -4600\,N$

Entre [O, Q]

(1pt)

$M_{fz} + M_O + M_O(\vec{O}_{34/10}) = 0$

$M_{fz} + M_O - x\,O_{34/10} = 0$

$M_{fz} = -M_O + x\,O_{34/10}$

$M_{fz} = -519.800 + 9200x$

En O $M_{fz_O} = -519.800\,N.mm$

En Q $M_{fz_Q} = -243.000\,N.mm$

Entre [Q, R]

$M_{fz} = -519.800 + 9200x - 4600(x-30)$

$M_{fz_Q} = -243.000\,N.mm$; $M_{fz_R} = 0$

$\|M_{f\,Maxi}\| = \|M_{f30}\| = 519\,800\,N.mm$

5.1.3

$\sigma_{Maxi} = \dfrac{M_{fz\,Maxi}}{I_{Gz}/V}$ $\quad I_{Gz} = \dfrac{\pi d^4}{64}$ et $V = d/2$

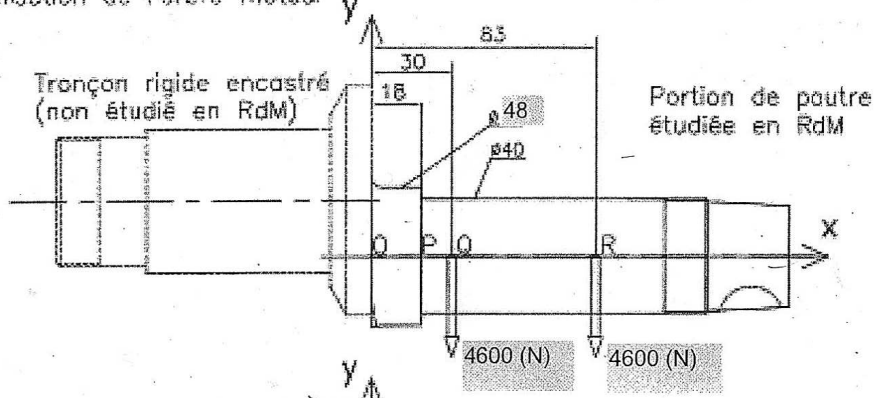
(1,5pt)

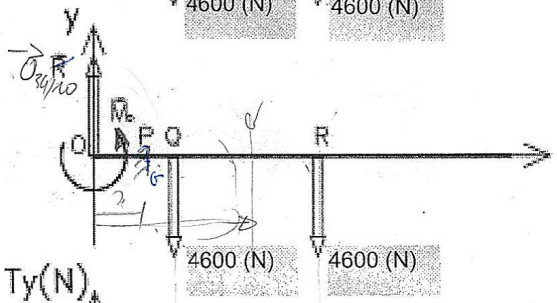
$\sigma_{Maxi} = \dfrac{M_{f\,Maxi} \times 64 \times d}{\pi d^4 \times 2} = \dfrac{M_{f\,Maxi} \times 32}{\pi d^3}$

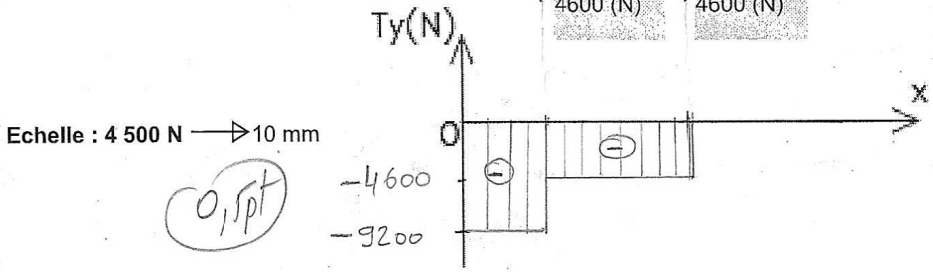
$\sigma_O = \sigma_{Maxi} \times K_t \Rightarrow \sigma_O = \dfrac{519800 \times 32}{\pi 48^3} \times 1,3 = 62,23$

$\sigma_O = 62,23\,N/mm^2$

Modélisation de l'arbre moteur







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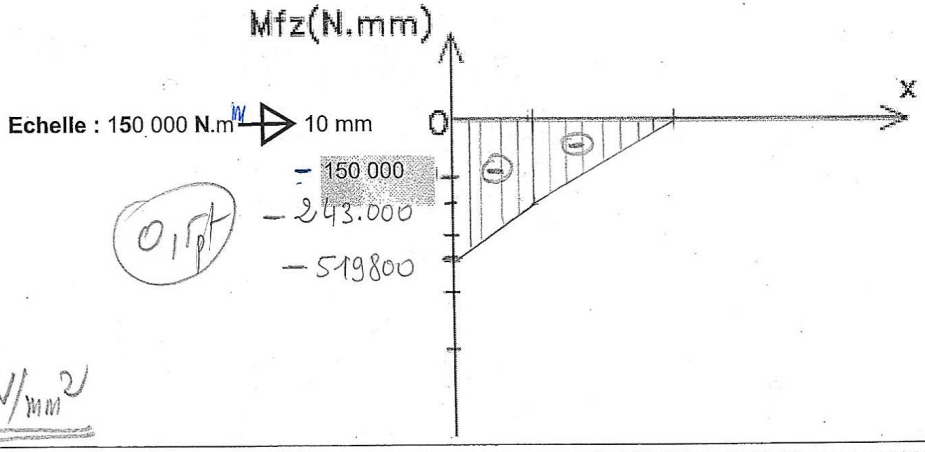

(0,5pt)

UNIVERSITE DE DAKAR-BACCALAUREAT DE L'ENSEIGNEMENT SECONDAIRE TECHNIQUE		
Durée : 4 h	Epreuve	Série : T1
Coefficient : 4	MECANIQUE	1er Groupe
Feuille N° : 8/8	Echelle :	Code : 15 T 09 A 01