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Answer in the question paper. Write your name, E.No. and group on both sheets in the designated area. One A4 size sheet in your own handwriting is allowed in the examination hall

Q1. For the Wanzer Needle Bar mechanism shown below:

a) Label the binary links in the order 1, 2, 3.. 2 pt 2

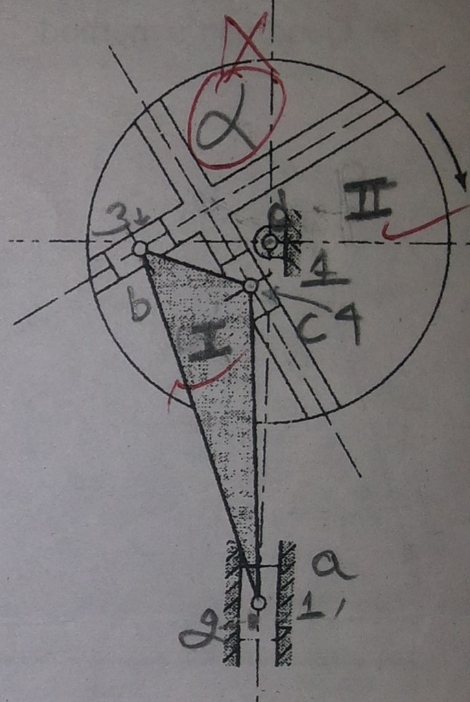
b) Label the ternary links, I, II, III … 1 pt 1

c) Label the higher pairs, α, β, χ… 1 pt

d) Label the lower pairs, a, b, c ..: a, b, c only ? 1 pt

e) Determine the degree of freedom using parts a to d above

and show calculations for that. 2 pt




$n = 8$ 

$J_1 = 4$ $h = 1$

$J_2 = 3.1$ ?, $f_r = 0$, $J = (4+3)$

$F_e = 3(n-1) - 2J - h - f_r$

$= 3(7) - 2\times(9) - 1$

$= 21 - 18 - 1$

$= 2$

By Formula $F_e = 2$ 1.

but In reality $F_e = 1$

(due to overclosed Mechanism)

4

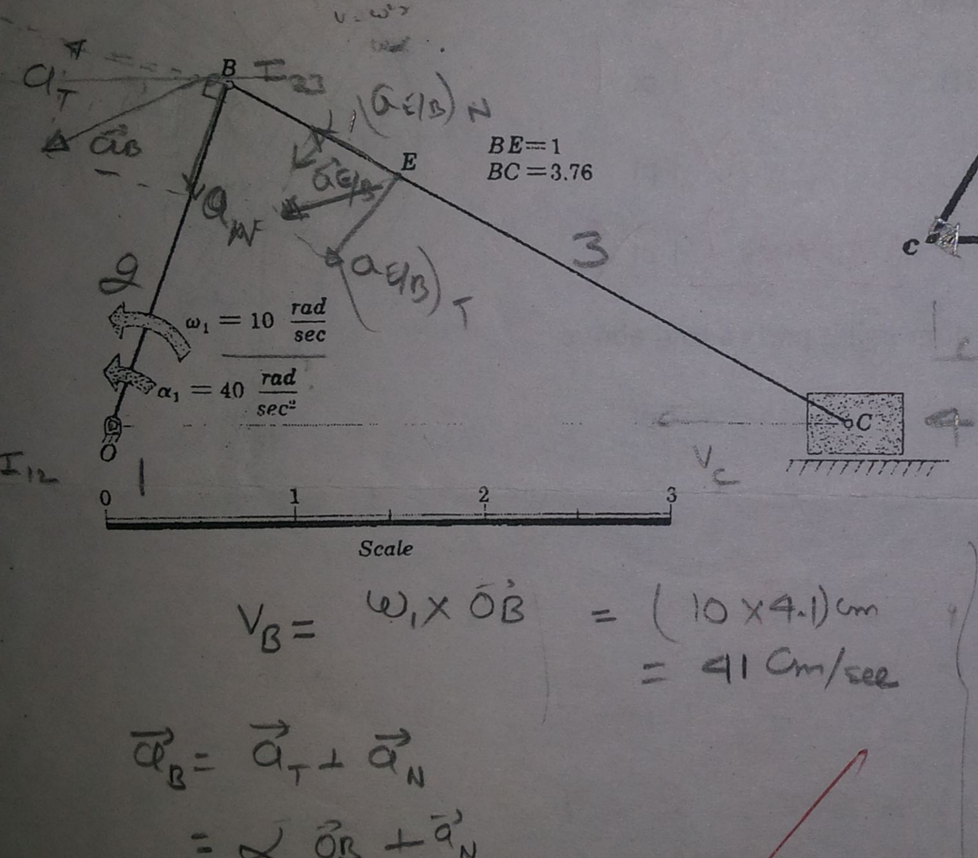
Q2. For the mechanism shown below, a figure drawn to scale and the velocity diagram is given.

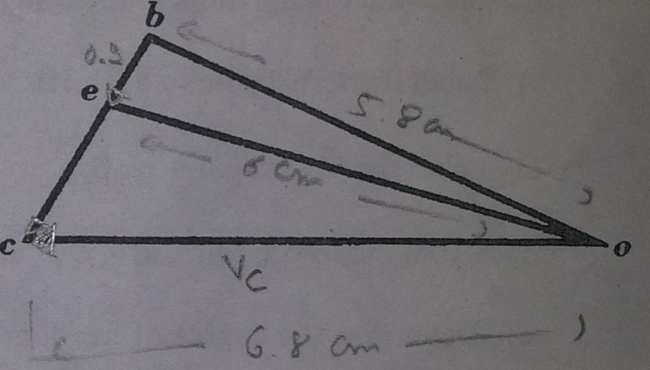
a) Determine the scale of the velocity diagram.

b) Determine the acceleration of the acceleration of the point E on the coupler.

c) State the magnitude and the direction made by the acceleration vector with the line of sliding.

d) Determine the angular acceleration of link OB to obtain an acceleration of 50 /s$^2$ of the slider by Goodman's method. [ 2 + 6 + 2 + 4]



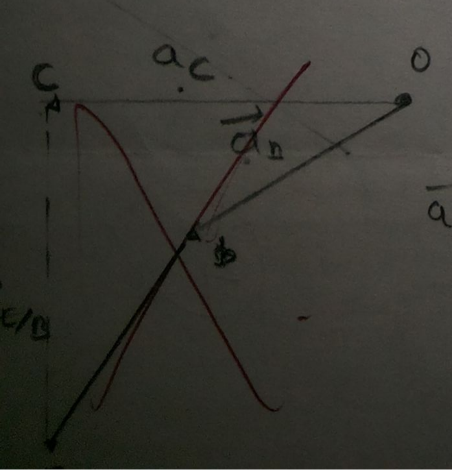

scale ?

$V_B = \omega_1 \times \bar{OB} = (10 \times 4.1)$ cm

$= 41$ Cm/sec

$\vec{a}_B = \vec{a}_T + \vec{a}_N$

$= \alpha . \bar{OB} + \vec{a}_N$



$\vec{a}_E = \vec{a}_B + \vec{a}_{E/B}$

0

(i) $V_B = 5.8$, then $V_c = 6.8$

$V_B = 41$, — $V_c = \frac{6.8 \times 41}{5.8} = 48.06$

(ii) $V_B = 5.8$, then $V_e = 6$

$V_B = 41$, — $V_c = \frac{6 \times 41}{5.8} = 42.4$

(iii) $V_B = 5.8$ then $V_{e/B} = 0.9$