Q6

$m = 2\,kg$

$r_1 = \langle 0m, 0m, 0m \rangle$, $F_1 = 4N \cdot \langle 0, 0, 1 \rangle$

$r_2 = \langle 2m, 2m, 0m \rangle$, $F_2 = 4N \cdot \langle 1/\sqrt{2}, 1/\sqrt{2}, 0 \rangle$

$r_3 = \langle 4m, 4m, 0m \rangle$, $F_3 = 4N \cdot \langle 0, -1, 0 \rangle$

$r_4 = \langle 6m, 3m, 0m \rangle$, $F_4 = 4N \cdot \langle 0, 0, 1 \rangle$

$r_5 = \langle 3m, 1m, 0m \rangle$, $F_5 = 4N \cdot \langle 1, 0, 0 \rangle$

< Calculations !! >

$(\tau = r \times F = |r||F| \sin\theta)$

$\tau_1 = \vec{0} \times F_1 = \vec{0} = \langle 0\ N.m, 0\ N.m, 0\ N.m \rangle$

$\tau_2 = 4 \begin{vmatrix} i & j & k \\ 2 & 2 & 0 \\ 1/\sqrt{2} & 1/\sqrt{2} & 0 \end{vmatrix} = \langle 0\ N.m, 0\ N.m, 0\ N.m \rangle$

$\tau_3 = 4 \begin{vmatrix} i & j & k \\ 4 & 4 & 0 \\ 0 & -1 & 0 \end{vmatrix} = \langle 0\ N.m, 0\ N.m, -16\ N.m \rangle$

$\tau_4 = 4 \begin{vmatrix} i & j & k \\ 6 & 3 & 0 \\ 0 & 0 & 1 \end{vmatrix} = \langle 12\ N.m, -24\ N.m, 0\ N.m \rangle$

$\tau_5 = 4 \begin{vmatrix} i & j & k \\ 3 & 1 & 0 \\ 1 & 0 & 0 \end{vmatrix} = \langle 0\ N.m, 0\ N.m, -4\ N.m \rangle$

$\tau_{net} = \tau_1 + \tau_2 + \tau_3 + \tau_4 + \tau_5 = \langle 12\ N.m, -24\ N.m, -20\ N.m \rangle$

$\therefore \tau_{net} = \langle 12\ N.m, -24\ N.m, -20\ N.m \rangle$