令和７年度　大学院入学試験解答例（材料力学）　令和６年７月１３日(土)

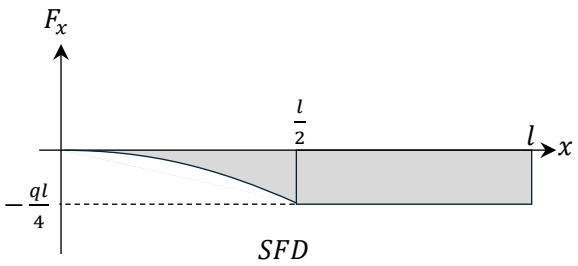
解答用紙一枚に一問ずつ解答せよ

1．(1) $y_c = \frac{45}{14}a$

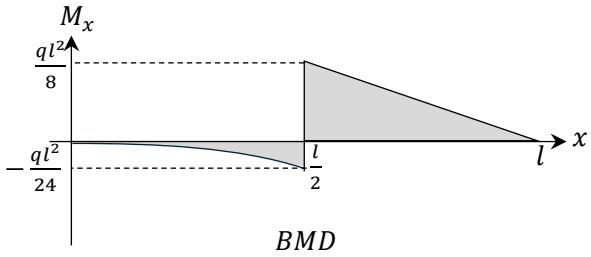
(2) $I_z = \frac{1025\pi a^4}{56}$

2．$\Delta l = \frac{dpl}{4tE}(1-2\nu)$

3．



SFD



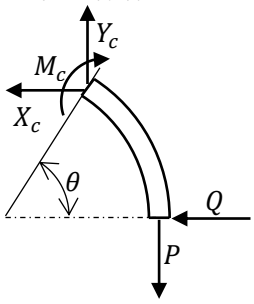
BMD

4．$\delta_{CV} = \frac{PL}{EA}\left(\frac{3}{2}+\frac{4}{\sqrt{3}}\right)$

5．$\theta_B = \frac{1568Ta}{33G\pi d^4}$，$\theta_C = \frac{1600Ta}{33G\pi d^4}$

6．(1)

BC の自由体線図



$\rightarrow : -X_c - Q = 0$

$\uparrow : Y_c - P = 0$

Ⓒ：$M_c + Qrsin\theta + Pr(1-cos\theta) = 0$

(2) $U = \frac{r^3}{2EI}(\frac{Q^2\pi}{2} + 4PQ + \frac{3P^2\pi}{2})$

(3) $\delta_{BV} = \frac{\partial U}{\partial P} = \frac{r^3}{2EI}(4Q + 3P\pi)$，　$\delta_{BH} = \frac{\partial U}{\partial Q} = \frac{r^3}{2EI}(Q\pi + 4P)$

(4) $\delta_{BV,Q=0} = \frac{3P\pi r^3}{2EI}$，　$\delta_{BH,Q=0} = \frac{2Pr^3}{EI}$