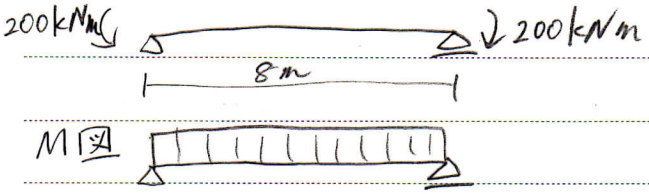
No.7

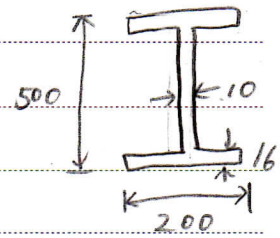
試　験　用　紙 (平成　年　月　日)

授業科目＿＿＿＿＿＿＿＿　＿＿＿学科＿＿＿年次　学籍番号＿＿＿＿＿＿　氏名＿＿＿＿＿＿＿＿

1. a)



M図



H-500×200×10×16.

$Z_x = 1870\ cm^3$　$i = 52.0\ mm$

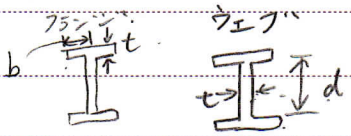
<幅圧比の検討>

フランジ　$\frac{b}{t} = \frac{100}{16} = 6.25 < 7.5$

ウェブ　$\frac{d}{t} = \frac{500-16\times2}{10} = 46.8 < 51$

表 4.6より

幅圧比



<許容曲げ応力度の算定>

細長比　$\lambda = \frac{l_b}{i} = \frac{8000}{52} = 153.8$

限界細長比　$\Lambda = \sqrt{\frac{\pi^2 E}{0.060\sigma_y}} = 101.9$

許容引張り応力度　$f_t = 21.6\ kN/cm^2$　均質なモーメントなので $C = 1$

$$f_{b1} = \frac{8900}{\left(\frac{l_b h}{Af}\right)} = \frac{8900}{\left(\frac{800\times50}{1.6\times20}\right)} = 7.12\ kN/cm^2$$

$$f_{b2} = \left[1 - 0.4\frac{\lambda^2}{C\Lambda^2}\right] f_t = \left(1 - 0.4\ \frac{153.8^2}{1\times101.9^2}\right)\times21.6 = 1.92\ kN/cm^2$$

$f_{b1} > f_{b2}$ より 許容曲げ応力度　$f_b = 7.12\ kN/cm^2$

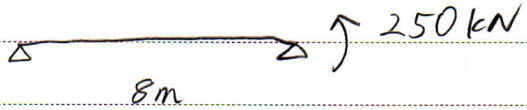
短期なので　$1.5 f_b = 10.68\ kN/cm^2$

曲げ応力度は

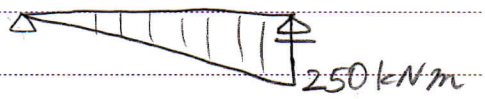
$$_a f_b = \frac{M}{Z} = \frac{20000}{1870} = 10.69\ kN/cm^2$$

$_a f_b > 1.5 f_b$ より NG

b)



M図



$C = 1.75$

$$f_{b2} = \left[1 - 0.4\ \frac{\lambda^2}{C\Lambda^2}\right] f_t = \left[1 - 0.4\ \frac{153.8^2}{1.75\times101.9^2}\right] 21.6 = 10.4\ kN/cm^2$$

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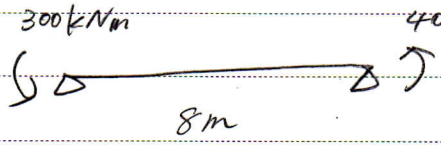
$f_{b2} > f_{b1}$ より 許容曲げ応力度 $f_b = 10.4\ kN/cm^2$

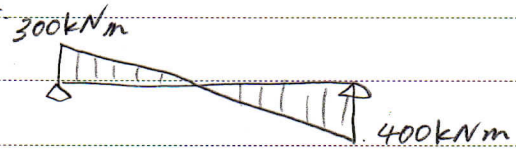
短期なので $1.5 f_b = 15.6\ kN/cm^2$

$_b f_b = \frac{M}{Z} = \frac{25000}{1870} = 13.4\ kN/cm^2$　$_b f_b < 1.5 f_b$ より ok

c)



M図



$C = 1.75 + 1.05\left(\frac{400}{300}\right) + 0.3\left(\frac{400}{300}\right)^2 = 3.68 > 2.3$

$C = 2.3$

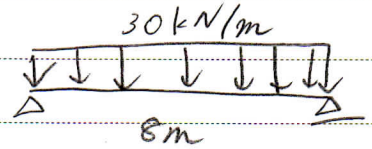
$f_{b2} = \left[1 - 0.4\ \frac{\lambda^2}{C\Lambda^2}\right] f_t = \left[1 - 0.4\ \frac{153.8^2}{2.3 \times 101.9^2}\right] \times 21.6 = 13\ kN/cm^2$

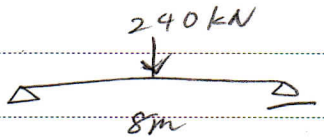
$f_{b2} > f_{b1}$ より 許容曲げ応力度 $f_b = 13\ kN/cm^2$　$1.5 f_b = 19.5\ kN/cm^2$

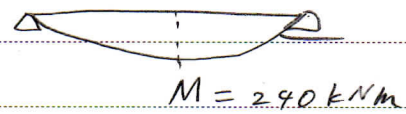
曲げ応力度は

$_c f_b = \frac{M}{Z} = \frac{40000}{1870} = 21.4\ kN/cm^2$　$_c f_b > 1.5 f_b$ より NG

d)







$C = 1$

a)より $f_{b2} = 1.92\ kN/cm^2$

$f_{b1} > f_{b2}$ より 許容曲げ応力度 $f_b = 7.12\ kN/cm^2$

$1.5 f_b = 10.68\ kN/cm^2$

曲げ応力度は

$_d f_b = \frac{M}{Z} = \frac{24000}{1870} = 12.8\ kN/cm^2$

$_d f_b > 1.5 f_b$ より NG