

Svarsblankett för uppgift 1-7

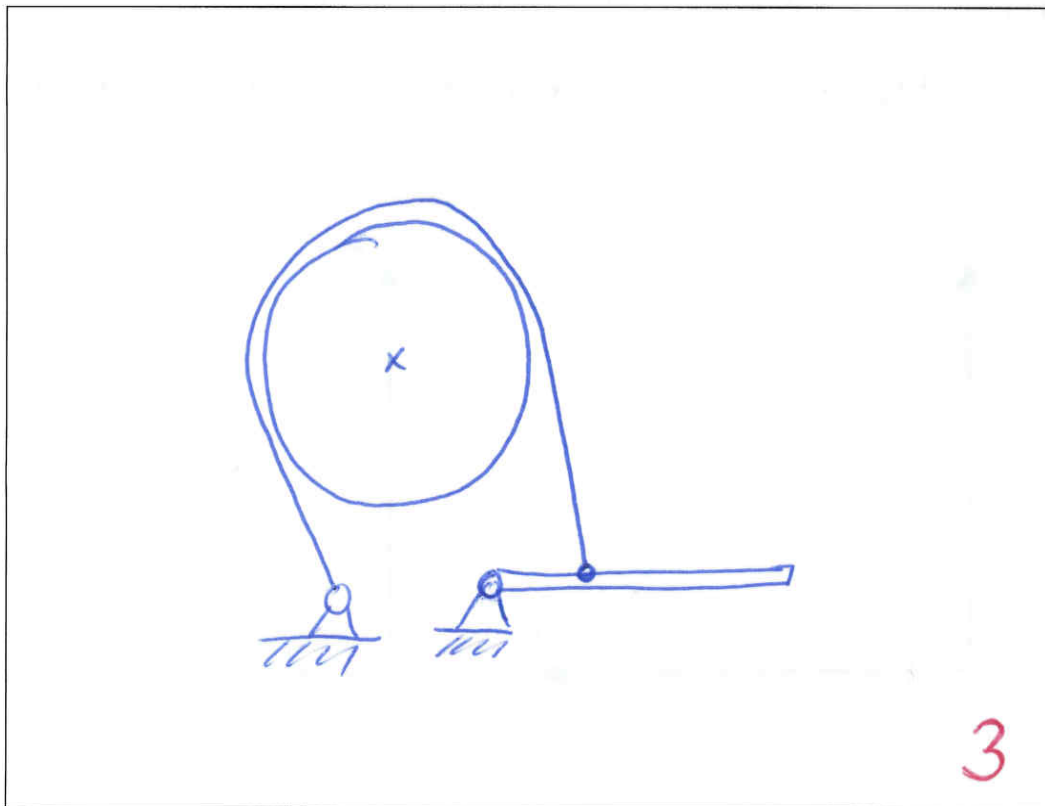
Tentamen i MF1015 - Produktframtagning för T (fd 4F1815)

Måndag 1 december 2008 kl 8-13 V21, 22, 32, 34

NAMN _____

Personnummer _____

1



2 a)

Yttre tryck p [MPa]

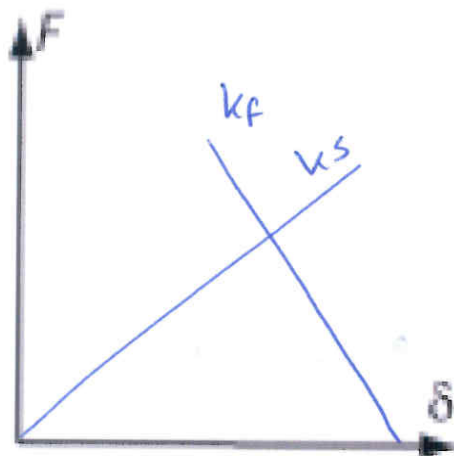
Glidhastighet v [m/s]

PV -talet $PV = p \cdot v$ [MPa $\cdot$ m/s] / 2

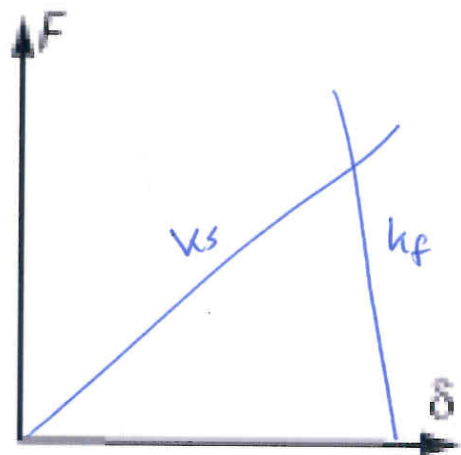
2 b)

Sfäriskt kullager, Sfäriskt rullager 1

- 3 a) kugghjul |
- 3 b) tätning |
- 3 c) kil / kilspår |
- 3 d) Mutter för att hålla det koniska kugg-
hjulet på plats axiellt |
- 4 a) Man har för få kuggar |
- 4 b) Försvagad kuggrot |
- 4 c) Högra, styvare fläns vilket ger
en mindre kraft i skruven |



Vänstra



Högra

5 $M_M = P \cdot V_{PM} = 5600 \text{ Nm}$ 2

6 a) $-\frac{Z_3}{Z_1} = -2,13$ | b) $n_B = 1940 \text{ rpm}$ | c) $M = \frac{P}{\omega} = 1,57 \text{ Nm}$ |

7 $b = 6, h = 6, L = 15 + 2 \times \frac{b}{2} = 21 \Rightarrow L = 22 \text{ mm}$ 2

Svar till Tentamen

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$$8. \quad b = \sqrt{\frac{8Fr(1-\nu^2)}{\pi EL}}, \quad A = 2bL = 1.52 \text{ mm}^2$$

$$9. \quad \tau = \frac{F_N}{A}, \quad A = \frac{\pi d^2}{4} = 28.3 \text{ mm}^2$$

$$a) \quad F_N = \frac{F}{2} \rightarrow \tau = 17.68 \text{ MPa}$$

$$b) \quad F_N = \frac{F}{4} \rightarrow \tau = 8.84 \text{ MPa}$$

$$10. \quad K_I = 1, \quad K_V = \sqrt{\frac{78+14\sqrt{\nu}}{78}} = 1.14, \quad F_{ber} = \frac{2M_1}{d_1} K_I K_V = 1335 \text{ N}$$

$$p = 472 \sqrt{\frac{F_{ber}(u+1)}{bd_1 u}} = 571.66 \text{ MPa}$$

$$N = L_h \cdot n_1 \cdot 60 = 8.7 \cdot 10^6 \text{ belastningar}, \quad K_{HN} = 1.323, \quad K_{HK} = 1, \quad p_{lim} = 1275 \text{ MPa}$$

$$p_{till} = \frac{p_{lim} K_{HN} K_{HK}}{S_H}, \quad p_{till} = p \rightarrow S_H = 2.90$$

$$11. \quad A_i = \frac{\pi d_i^2}{4} = 28.3 \text{ mm}^2$$

$$b) \quad F_i = \sigma_i A_i = 39.67 \text{ kN}$$

$$c) \quad A_s = \frac{\pi d_s^2}{4} = 78.54 \text{ mm}^2, \quad k_s = \frac{A_s E}{L} = 269.65 \text{ kN/mm}$$

$$A_f = \frac{\pi}{4} \left((N + 0.3L)^2 - D_h^2 \right) = 867.08 \text{ mm}^2, \quad k_f = \frac{A_f E}{L} = 2977 \text{ kN/mm}$$

$$F_{s\max} = F_i + \frac{F_L}{1 + \frac{k_f}{k_s}} = 40.919 \text{ kN}$$

$$d) \quad \tan \alpha = \frac{p}{\pi d_m} = 0.0529, \quad \mu'_g = \frac{\mu_g}{\cos \frac{\beta}{2}} = 0.1617, \quad D = \frac{D_h + N}{2} = 14 \text{ mm}$$

$$M_1 = \frac{F_i d_m}{2} \left(\frac{\tan \alpha + \mu'_g}{1 - \mu'_g \tan \alpha} + \mu_u \frac{D}{d_m} \right) = 77.62 \text{ Nm}$$

$$e) \quad \delta_s = \frac{F_i}{k_s} = 0.1471 \text{ mm}, \quad \delta_f = \frac{F_i}{k_f} = 0.0133 \text{ mm}, \quad \alpha = \frac{\delta_s + \delta_f}{p} \cdot 360 = 38.5087^\circ$$

12. 5 friktionsstyrkor, $r_m = \frac{r_y + r_i}{2} = 100 \text{ mm}$

$$M_k = 5 \cdot F_f \cdot r_m = 150 \text{ Nm}$$

$$P = M_k \omega = 47.124 \text{ kW}$$

13.

a) 12 r/s

b) $M_M - M_K = (J_M + J_R) \dot{\omega}_M$, $\dot{\omega} = \frac{8}{0.8} = 10 \text{ rad/s}^2$, $t = \frac{\Delta\omega}{\dot{\omega}} = \frac{2\pi \cdot 12}{10} = 7.55398$

c) 22 varv/s

d) 24 varv/s

e) $M_M - M_L = (J_M + J_R + J_T + J_L) \dot{\omega}_M$, $\dot{\omega} = \frac{6}{3} = 2 \text{ rad/s}^2$

14. $M = \frac{F_t \cdot d}{2} \rightarrow F_t = 1746 \text{ N}$, $F = \frac{F_t}{\cos 20} = 1858 \text{ N}$

$$F \cdot 80 - F_{R1} \cdot 120 = 0 \rightarrow F_{R1} = 1238.7 \text{ N}$$

$$\frac{F_{A1}}{F_{R1}} = 1.2109 > 1.14 \rightarrow P = 0.35 F_{R1} + 0.57 F_{A1} = 1288.6 \text{ N}$$

$$C = 15.6 \text{ kN} \rightarrow L_{10h} = \frac{10^6}{60n} \left(\frac{C}{P} \right)^3 = 24645 \text{ timmar}$$