Design a journal bearing for a Centrifugal Pump running at 1440 rpm Dia of the Journal is 10cm and the load on each bearing is 2000 kg. The factor (Zn/p) may be taken as 23000. For Assume Value is → Atm temp = 30°C, O/p temp = 75°C.

Gorgy Co-efficient - 0.00125

C/R ratio = 0.001, $L/D = 1.5$.

Soln:

Sommer field Number, S.

$$S = \frac{Zn}{p} \times \left(\frac{D}{C}\right)^2$$

$$= \frac{23 \times 10^{-3} \times (1000/60)}{1.617 \times 10^{6}} \times \left(\frac{135}{150 \times 10^{-3}}\right)^2$$

$$\Rightarrow S = 0.192$$

From PSG DB 7.40 for $B = 360°$;

$L/D = 1$ & $S = 0.192$.

$$\mu \frac{D}{C} = 4.3$$

$$\mu = 4.3 \times \frac{150 \times 10^{-3}}{135}$$

$$\mu = 0.004778$$

Linear Velocity, $V = \pi DN/60$.

$$= \frac{\pi \times 13 \times 10^{-3} \times 1000}{60}$$

$$V = 0.068 \text{ m/s}.$$

$H_g = \mu W V \Rightarrow W = \rho D L$

$= 1.617 \times 13 \times 13$

$= 273.27 N.$

$H_g = 0.004778 \times 273.27 \times 0.068$

$H_g = 0.888 W$

$$H_d = \frac{(At + 18)^2 LD}{k} = \frac{[(60-16)+18]^2 \times 0.013 \times 0.05}{0.484}$$

$$H_d = 1.34 W$$