Kafrelsheikh University ٢٠١٧
Faculty of Engineering
3ed year Mechanical Power

January 2017
Time allowed
3 hours

Mechanical Design

ASSUME ANY DATA YOU NEED; THEREFORE, NO QUESTIONS ARE ALLOWED. SOLVE AS MUCH AS YOU CAN.

---

1. (15 Marks)

A helical cylindrical spring is designed with stiffness 40 kgf/cm and the total deflection equal 4 cm, the allowable shear stress is 14 kgf/mm^2, and k = 1.3. The mean diameter of the spring equal 6 cm. find the wire diameter, the number of coils, and the pitch.

G = 0.8 MPa, $\quad h = d + 1.15\,\lambda_{max}/i \quad \frac{8kPD}{\pi d^3} \le \tau_d \quad \lambda = \frac{8PD^3 i}{GD^4}$

2. (15 Marks)

A multiple disc clutch has five plates having four pairs of active friction surfaces. If the intensity of pressure is not to exceed 0.127 N/mm2, find the power transmitted at 500 r.p.m. The outer and inner radii of friction surfaces are 125 mm and 75 mm respectively. Assume uniform wear and take coefficient of friction = 0.3.

$p.r = C \qquad T = n.\mu.W.R \qquad R = \frac{2}{3}\left[\frac{(r_1)^3 - (r_2)^3}{(r_1)^2 - (r_2)^2}\right]$

3. (20 Marks)

The block shown in **Fig.1**, provides a braking torque of 360 N.m. The diameter of the brake drum is 300 mm. The coefficient of friction is 0.3 find:

i. The force (P) to be applied at the end of the lever for the clockwise and counter clockwise rotation of the brake drum.
ii. The location of the pivot or fulcrum to make the brake self-locking for the clockwise rotation of the brake drum.

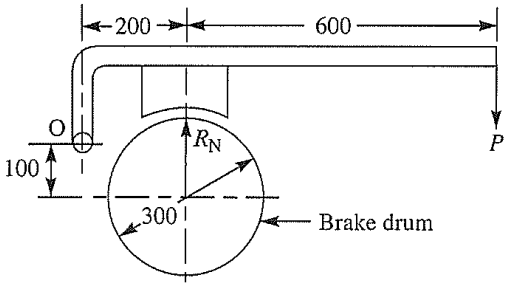

Fig. 1

4. (50 Marks)

The kinematic scheme of a power transmission system is shown in **Fig. 2**. A is the electric motor, B is a friction safety coupling (containing double cone friction surfaces) which limits the transmitted torque. C is two steps toothed gear reducer. The first step consists of a pair of spur gears. Make a complete constructional drawing showing the very fine constructional details of the **shaft I**, showing the safety coupling, pinion gear, rolling contact bearings, sealing devices, and lubrication device.

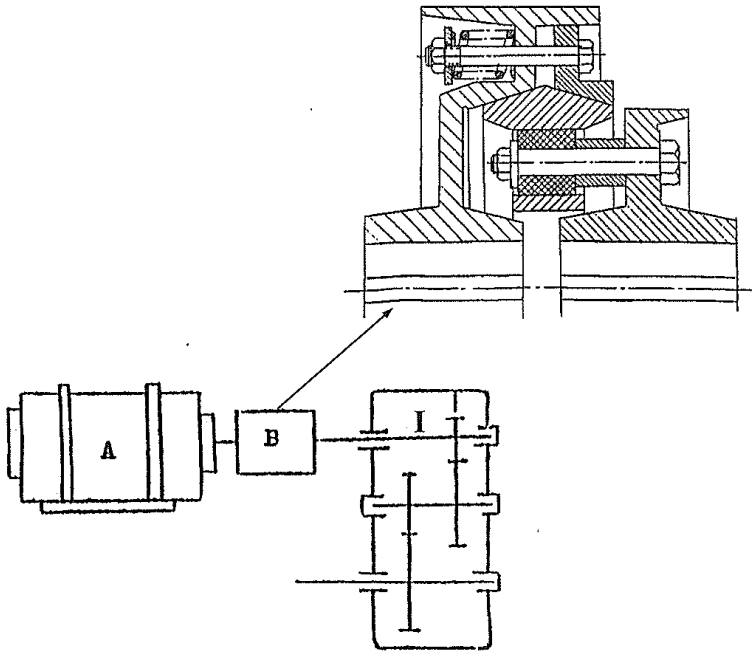

Fig. 2

انتهت الاسئلة